HOW TO USE THIS CATALOG

We intend the UC Davis General Catalog as a source of information about the Davis campus course offerings, academic programs, campus facilities, services, fees, requirements, and campus life. We know that it is used for a variety of ends and purposes by both current and prospective students and their advisers. While we attempt to provide information for all of these uses, you may find that some information you need is not given. Therefore, throughout the book, we refer to other publications available from individual offices or departments. In the Correspondence Directory on the inside front cover you will find a list of the most frequently questioned offices and their addresses. (Please refer to the Index for locations of other offices or department addresses.) On page 338 there is a list of major publications and where you can request them.

The Catalog is divided into four major sections:

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

If you are a prospective student, the first section of the catalog will answer your questions about the Davis campus—what it’s like and what makes it special. You should supplement this impression by reading, in the second section, the description of the college or school which interests you. Section three is intended to answer the question, “What does UCD offer to help me reach my goals?” If you are a prospective freshman or international student, you may find it helpful to look over the glossary of unfamiliar terms on page 340. The names of some majors may not convey to you what academic areas courses cover, so check the lists of courses offered to satisfy the requirements of any unfamiliar major. Department chairpersons, program directors, major advisers, or any faculty member listed with these major offerings would be happy to answer any further questions you might have.

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

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

Advisers of prospective students may wish to send for the Planning Guide to Majors, distributed by the Office of Relations with Schools (12B Mrak Hall), for more comprehensive information on programs and their requirements.

We are always trying to make the Catalog more helpful, so please let us know of difficulties you encounter in using it or send us your suggestions for improvement (Publications Office, Reprographics Building or Registrar’s Office, 124D Mrak Hall).
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two in August, two in September.

Information herein is subject to revision.

COMPLIANCE STATEMENTS

Privacy Act. A student’s Social Security number is
used to verify his/her identity in the UCD
Student Records System. In accordance with
the Federal Privacy Act of 1974, students are hereby
notified that disclosure of their social security
number is mandatory. This record-keeping
system was established prior to January 1, 1975
pursuant to the authority of The Regents of the
University of California under Art. IX, Sec. 9, of
the California Constitution.

Nondiscrimination. The University of California,
in compliance with Titles VI and VII of the Civil
Rights Act of 1964, Title IX of the Education
Amendments of 1972, and Sections 503 and 504
of the Rehabilitation Act of 1973, does not
discriminate on the basis of race, color, national
origin, religion, sex, or handicap in any of its
policies, procedures, or practices; nor does the
University, in compliance with the Age
Discrimination in Employment Act of 1967,
Section 402 of the Vietnam Era Veterans
Readjustment Act of 1974, and Section 12940 of
the State of California Government Code,
discriminate against any employees or
applicants for employment on the basis of their
age, or because they are disabled veterans or
veterans of the Vietnam era, or because of their
medical condition (as defined in Section 12926
of the California Evidence Code), their ancestry,
or their marital status; nor does the University
discriminate on the basis of citizenship, within
the limits imposed by law or University policy.
This nondiscrimination policy covers admission,
access, and treatment in University programs
and activities, and application for and treatment
in University employment.

In conformance with University policy and
pursuant to Executive Orders 11246 and 11375,
Section 503 of the Rehabilitation Act of 1973,
and Section 402 of the Vietnam Era Veterans
Readjustment Act of 1974, the University of
California is an affirmative action/equal
opportunity employer.

Inquiries regarding the University’s equal
opportunity policies may be directed to the Vice
Chancellor of Academic Affairs and Affirmative
Action Officer, 521 Mrak Hall, 752-2070. Speech
and hearing impaired persons may dial
752-6TTY.

Sexual Harassment. Sexual harassment of
students, staff, or faculty members is prohibited
by law and by University regulation. Sexual
harassment is unacceptable and shall not be
condoned on the UCD campus. The campus
community will take all necessary and
appropriate steps to protect students, staff, and
faculty from sexual harassment and all forms of
sexual intimidation and exploitation. Grievance
procedures for student complaints charging
legally impermissible discrimination (Policy
280-05) are available in the Office of Student
Activities and Conduct and may be used to
bring complaints of sexual harassment. Students
may receive informal counseling and formal
assistance by contacting any of the following
offices: Vice Chancellors, Deans of the Schools
and Colleges, or the Office of Student Activities
and Conduct. In addition, the ASUCD Student
Grievance Center, Counseling Center, and the
Women’s Resources and Research Center are
available to provide referral service.

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

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

Price $1.50. Cost by mail (includes price of
catalog): $5.00 First Class; $4.00 Second Class;
overseas: $11.50 Air Mail; $7.00 surface mail
from the Office of the Registrar. (Make checks
payable to: The Regents of the University of
California.)
CALEDAR

Academic Calendar*

- Pick up registration and course enrollment materials from the Registrar’s Office (all continuing students).
- Faculty advisers available to all students.
- Turn in course enrollment forms and student data card (all continuing students).
- Turn in fees along with fee statement (all continuing students).

- Quarter begins.
  - Orientation and testing.
  - In-Person Registration.
  - In-Person Enrollment.

- Instruction begins.
  - Final day of late registration.
  - Final date to file petitions to change status from part-time to full-time student, or vice versa.
  - Final date to file petitions to add courses to study list.
  - Final date to file petitions for Pelp.
  - Final date to petition to drop courses (thereafter permission may be granted only by the dean of your school or college and only under exceptional circumstances).
  - Final date for undergraduates to file petitions with the dean of their college or school to take courses on a P/NP basis. Exceptions rarely approved.
  - Final date for graduate students to file petitions with the Dean of the Graduate Division to take courses on a S/U basis.
  - Final date to file Independent Study Program project proposal form (available at the Dean’s office) with the student's college dean for forwarding to Committee on Courses of Instruction.

- Instruction ends.
  - Final examinations.
- Quarter ends.
  - Commencement.

- Academic and Administrative Holidays.

<table>
<thead>
<tr>
<th>FALL 1983</th>
<th>WINTER 1984</th>
<th>SPRING 1984</th>
<th>FALL 1984</th>
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<tbody>
<tr>
<td>May 31-Aug. 12</td>
<td>Nov. 7-9</td>
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<td>Thurs., Mar. 29</td>
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<td>Sept. 26-28</td>
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Candidates for Degrees
Undergraduates

- Filing period for those who expect to complete work for A.B. and B.S. degrees to file an Announcement of Candidacy with the Registrar.

- Final date for Agricultural and Environmental Sciences students who plan to complete work for a minor program to file applications with the Dean’s Office.

- Final date for Letters and Science students who plan to complete work for a minor program to file applications with the Dean’s Office.

*Dates are subject to change and should be checked with appropriate Class Schedule and Room Directory.
Graduate Students

- Final date for those who expect to complete work for master’s degrees to file applications for candidacy with the Dean of the Graduate Division.
  - FALL 1983: Mon., Oct. 3
  - WINTER 1984: Mon., Jan. 9
  - SPRING 1984: Mon., Mar. 5
  - FALL 1984: Fri., June 1 (for Sept. ’84)

- Final date for candidates for master’s degrees to file theses with the committee in charge.
  - FALL 1983: Mon., Nov. 1
  - WINTER 1984: Mon., Feb. 13
  - SPRING 1984: Mon., May 14

- Final date for candidates for master’s degrees to file theses with the Dean of the Graduate Division.
  - FALL 1983: Fri., Dec. 16
  - WINTER 1984: Thurs., Mar. 22
  - SPRING 1984: Fri., June 15
  - FALL 1984: Fri., Sept. 7 (for Sept. ’84)

- Final date for those who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the Dean of the Graduate Division.
  - FALL 1983: Mon., Aug. 15
  - FALL 1984: Mon., May 21 (for Sept. ’84)

- Final date for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the committee in charge.
  - FALL 1983: Mon., Oct. 3
  - SPRING 1984: Tues., Jan. 3
  - FALL 1984: Mon., July 2 (for Sept. ’84)

- Final date for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the Dean of the Graduate Division.
  - FALL 1983: Thurs., Dec. 1
  - SPRING 1984: Thurs., Mar. 1
  - FALL 1984: Mon., Aug. 27 (for Sept. ’84)

Admission Deadlines

- Applications for admission to undergraduate standing, including applications for intercampus transfer and EOP/SAA, must be filed with complete credentials with the Office of Undergraduate Admissions on or before this date.
  - FALL 1983: Nov. 30
  - WINTER 1984: July 31
  - SPRING 1984: Oct. 31

- Applications for admission to graduate standing, with complete credentials, must be filed with the Dean of the Graduate Division on or before this date.
  - FALL 1983: June 1
  - WINTER 1984: Oct. 1
  - SPRING 1984: Jan. 1
  - FALL 1984: June 1

- Applications for admission to the Graduate School of Administration for 1984-85 must be filed with the School on or before this date.
  - FALL 1983: June 1
  - WINTER 1984: Oct. 1
  - SPRING 1984: Jan. 1
  - FALL 1984: June 1 (1983)

- Applications for admission to the School of Law for 1984-85 must be filed with the School on or before this date.
  - FALL 1983: June 1
  - WINTER 1984: Oct. 1
  - SPRING 1984: Jan. 1
  - FALL 1984: June 1

- Applications for admission to the School of Medicine for 1984-85 must be filed with the School on or before this date.
  - FALL 1983: June 1
  - WINTER 1984: Oct. 1
  - SPRING 1984: Jan. 1
  - FALL 1984: June 1 (1983)

- Applications for admission to the School of Veterinary Medicine for 1984-85 must be filed with the School on or before this date.
  - FALL 1983: June 1
  - WINTER 1984: Oct. 1
  - SPRING 1984: Jan. 1
  - FALL 1984: June 1 (1983)

- Applications for readmission to undergraduate status must be filed with the Registrar on or before this date.
  - FALL 1983: Fri., Aug. 19
  - WINTER 1984: Fri., Dec. 9
  - SPRING 1984: Fri., Mar. 9

- Applications for readmission to graduate status must be filed with the Graduate Division on or before this date.
  - FALL 1983: Mon., Aug. 1
  - WINTER 1984: Mon., Nov. 14
  - SPRING 1984: Mon., Feb. 6

Financial Aid Deadlines

- Applications for grants, loans, work-study, and California Student Aid Commission awards for 1984-85 must be filed with the Financial Aid Office on or before this date.
  - FALL 1983: Thurs., Feb. 9
  - WINTER 1984: Jan. 13
  - FALL 1984: Jan. 15

- Applications for UCD undergraduate scholarships for 1984-85 must be filed with the Scholarship Office on or before this date.
  - FALL 1983: Thurs., Feb. 9
  - WINTER 1984: Jan. 13
  - FALL 1984: Jan. 15

- Applications for President’s Undergraduate Fellowships for 1984-85 must be filed with the Scholarship Office on or before this date.
  - FALL 1983: Thurs., Feb. 9
  - WINTER 1984: Jan. 13
  - FALL 1984: Jan. 15

- Applications for fellowships and graduate scholarships for 1984-85 must be filed with the Graduate Division on or before this date.
  - FALL 1983: Thurs., Feb. 9
  - WINTER 1984: Jan. 13
  - FALL 1984: Jan. 15
Introduction
THE DAVIS CAMPUS

James H. Meyer, Chancellor of UC Davis, administers this campus of 18,776 students, and 1,288 teaching faculty.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. The Graduate Division administers graduate study and research at all schools and colleges. Professional studies are carried on at the Schools of Administration, Law, Medicine, and Veterinary Medicine. Approximately 5,220 students are engaged in graduate or professional study.

The University of California, Davis is accredited by the Western Association of Schools and Colleges, Association of American Law Schools, Association of American Medical Colleges, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc., American Chemical Society, American Society of Landscape Architects, the Commission for Teaching Preparation and Licensing, and the Joint Commission on Accreditation of Hospitals.

UCD's History

During the 1983-84 academic year, the Davis campus is celebrating seventy-five years of service to California — service expressed in teaching, research and public service.

Long renowned for its strengths in the agricultural and biological sciences, the campus is more and more recognized for the quality of teaching and research in the social sciences, arts and humanities, physical sciences, engineering, medicine, veterinary medicine, and the law.

Reflecting on its achievements and mindful of its traditions, the campus today rededicates itself to excellence in teaching, to continued pursuit of truth and knowledge through research, and to the dissemination of information through public service activities.

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

The demand for greater educational opportunities in the state increased rapidly and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was granted those who completed the Davis program. A few years later, the Davis campus had its own College of Agriculture and, in 1946, the School of Veterinary Medicine (still the only one in the state) was established.

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

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

UCD has long been known for teaching and research in agricultural sciences. The reputation of the Davis campus in many other fields has advanced as Davis has moved into the ranks of the top 25 general research universities in the United States.

The Setting

The Davis campus lies adjacent to the city of Davis (population 37,800), 15 miles west of Sacramento and 72 miles northeast of San Francisco. Sacramento, with all its resources as the state capital, is only twenty minutes away, yet Davis is surrounded on all sides by open space — including some of the most valuable agricultural land in the state. The total campus comprises approximately 3,600 acres. About 980 acres are devoted to the central campus, the remainder being used for agricultural research and for such special facilities as the Veterinary Medical Teaching Hospital, the California Primate Research Center, and the University Airport. (The University of California, Davis, Medical Center is located in Sacramento.)

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

Winters in Davis are mild, with the temperatures rarely below freezing. It hardly ever snows in the winter, but you should get good use from your raingear. Average winter temperatures range from 36° to 54°. Summers are sunny, hot, and dry. Although some days the thermometer may exceed 100°, the overnight temperatures can drop into the 50s. Davis weather in the spring and fall is among the most pleasant in the state.
Davis is very much a bicycling town. More than 40 miles of bike paths and 30,000 bicycles have given Davis the title "City of Bicycles." One study found that bicycles are used for 25 percent of all travel in Davis.

The central UCD campus is closed to motor vehicles and automobile parking lots are located on its perimeter. Special parking places are reserved for handicapped drivers (those with special disability license plates) and ramps at most buildings provide easy access for wheelchairs. Sidewalks have inclines to street level at intersections.

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

Campus Life

The Davis campus has always been especially noted for its friendliness and informality. To many people, Davis brings to mind Picnic Day (the annual campus open house in April) and the almost universal use of bicycles within the community. Since the Davis campus is a residential community and was originally small and isolated, a tradition of close relations between students and faculty has developed. Even though the campus has now grown to 18,776 students, its style remains friendly, informal, and personal. As the campus moves into the eighties, a special effort will be made to reflect the diversity of the general population by attracting more ethnic minorities, handicapped students, Vietnam-era veterans, and other underrepresented groups.

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

The City of Davis

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

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

Since its early years, Davis has recognized the importance of open space. It now operates eighteen large and grassy city parks, many with tennis courts, playgrounds, swimming pools, and playing fields, as well as a municipal golf course.

The city of Davis is changing. It still retains many characteristics of the small college town it once was, but the growth of the University has brought a corresponding development within the community. From fewer than 22,000 people only a decade ago, the population of Davis stands today at over 37,800.

Despite the pressures of rapid growth, people in Davis are actively concerned with maintaining the quality of life here. The small-town flavor is being preserved in the downtown core area — the city’s central business district — and action by the citizens and City Council have emphasized that concern with the quality of life means a commitment to planned, environmentally sound development and limited growth.

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

The Davis Campus Today

Looking around the campus you can see modern concrete and glass buildings contrasting with the older, original wooden structures from the University Farm days. But the newest building on the main campus — set between Sproul Hall, a nine-story concrete office tower, and University House, one of the oldest buildings on campus — is a harmonious blend of redwood, glass, and concrete.

The planned expansion of the Davis campus is nearing completion, and, although some of the buildings are less than a decade old, the spirit of its past as the University Farm gives UCD a sense of tradition. A University is never static, always changing to meet new needs and new conditions. Looking back, we can see that the campus has developed in ways which the founders of the University Farm could never have envisioned. But looking ahead, out of an era in which the role of the University in society is being reexamined, we can predict that the Davis campus will retain its fundamental assumption that academic programs at all levels of the University — undergraduate, graduate,
When the first transcontinental railroad cars steamed into the western terminal in Sacramento, only 40 students—taught by 10 professors—were enrolled in the University of California. A year earlier, in 1868, Governor Henry H. Haight signed the Organic Act which provided that a “complete University” be created for the State of California. Classes began in 1869 on the campus of the College of California in Oakland. The first few buildings on the Berkeley campus were completed in 1873, and that year the University took up residence in its new home. The following June, degrees were conferred upon the University’s first 12 graduates.

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

The nine campuses of the University have a current enrollment of more than 136,700 students. 90 percent of them residents of California. Nearly one-third of the students are studying at the graduate level.

The University’s reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. In a recently conducted survey, published in the Chronicle of Higher Education, 4,000 faculty at four-year colleges and universities throughout the U.S. were asked to name the departments in their disciplines which “have the most distinguished faculties.” Four U.C campuses, including U.C Davis, were named to the top ten in at least one field and two campuses were named in more than five fields. The University has 14 Nobel Laureate winners on its faculty, and the total membership from all nine campuses in the National Academy of Sciences is the largest of any college or university system in the country. In 1983, 24 scholars from within the University received fellowship grants from the John Simon Guggenheim Foundation. These fellowships are among the highest honors that scholars can receive.

Governance of the University is entrusted to a corporation called The Board of Regents. Of the individuals comprising the Board, 18 are prominent California citizens appointed by the Governor; and seven, including the President of the University and the Governor of California, serve ex officio. A Student Regent is selected each year from a list of names submitted to the Board by the Student Body Presidents’ Council.

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

The Regents have delegated authority for the organization of the University to the President. David Pierpont Gardner is President and head of the Systemwide Administration. Authority for the administration of each campus has been delegated to a Chancellor.
Introduction

professional, and research — must reinforce and strengthen each other.

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

THE UNIVERSITY LIBRARY

Information:
Peter J. Shields Library Office
108 Shields Library
752-1203

The library, on the Davis campus contains more than 1,830,600 volumes and receives more than 46,300 periodicals, serials, and government publications annually. Its holdings in the natural sciences and agriculture are outstanding. There are strong collections in the humanities, social sciences, fine arts, and engineering. Materials in law and medicine are already substantial and are still growing. According to a recent survey by the Association of Research Libraries, the UCD Library ranks twenty-seventh among the ninety-nine academic libraries surveyed on its "overall library index."

In addition to the main stack collection, the Peter J. Shields Library, there are 2,100,000 items on microcopy, 106,000 maps, 577,000 pamphlets, 20,600 rare books, 14,600 sound recordings, and a center containing a bibliographic collection of worldwide scope. The use of most Library materials has been made easier by a computerized circulation control system.

The Library provides orientation and assistance in using the various library collections, which operate on an open-stack basis to permit users direct access to the shelved volumes. Audio tape walking tours and lectures on the uses and resources of the library are part of the Educational Services Program. Courses can also assist the Library user: a 3-credit course, "Introduction to Library Research and Bibliography" (English 28), is given most quarters; a 1-credit course, "Biology/Agriculture Research" (Entomology 275), is given twice each year; and a non-credit class called "Library Survival" is offered.

Researchers, faculty members, and students have a valuable research tool in the Automated Information Retrieval Services (AIRS) located in the Humanities-Social Sciences Reference Department and the Biological and Agricultural Sciences Department (of Shields Library), in the Physical Sciences Library, and in the Health Sciences Library. Through computers located at two off-campus locations, bibliographies and reference lists on a wide range of topics available from the periodical literature of the last three to eight years. AIRS can provide bibliographies and conduct searches on subjects in agriculture, biology, chemistry, education, engineering, geology, the humanities, the medical sciences, nutrition, physics, and psychology.

The Shields Library is an official depository for Federal and State publications, and the Government Documents Department provides services that make it easier to use these publications.

The Reserve Book Service lends, on a short-term basis, material which is heavily used because of assigned class readings.

Unbound periodical titles — some 6,500 — are housed in the Periodicals Room in a closed-stack area. They are for use in the Shields Library only.

The Department of Special Collections provides assistance in the use of rare books, the Hinman collator, University archives, The Performing Arts Collection, and the 383,000-item F. Hal Higgins Library of Agricultural Technology.

Other facilities at the Shields Library include a browsing collection for recreational reading, headphones for music listening, audio-visual equipment, a typing room, an outdoor reading area, a graphic arts loan collection, and copying machines at various locations.

In addition to the collections and facilities of the Shields Library, there are branch libraries for the health sciences, the physical sciences and engineering, and agricultural economics. The Health Sciences Library's approximately 189,100 volumes support programs in both human and veterinary medicine. The Physical Sciences Library contains 176,700 volumes and also houses a collection of more than 833,000 Research Reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and other governmental agencies. An independent Law Library housing about 192,000 volumes supports the instructional and research programs of the School of Law. There are also a number of specialized departmental libraries located on the campus.

RESEARCH AND SERVICE ACTIVITIES

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

University of California Arboretum

Arboretum Headquarters
Temporary Building 32
752-2498

The Arboretum occupies an area of about 111 acres, providing materials for teaching and research. Most of the plants are attractive but drought-tolerant trees and shrubs. The acreage also includes paths and picnic tables for recreation.

Outstanding plant collections are represented by the oaks in the Shields Grove, the California native trees and shrubs, and the T. Elliot Weier Redwood Grove. Other collections of great horticultural and botanical interest include plantings of acacia, ceanothus, eucalyptus, hakea, and exotic confiers, as well as various groups in the Heath family (Ericaceae), Legume family (Leguminosae), and Myrtle family (Myrtaceae).

The Arboretum program of seed exchange, initiated in 1961, has provided the University with numerous exotic plant specimens and also serves to distribute California native plants throughout the world.

10
Work-learn internships for Davis students are available in botany, horticulture, and environmental education.

Center on Administration of Criminal Justice
101 King Hall
752-2893

The Center is a joint law-social science program which works to bring about greater understanding and meaningful reform in the criminal justice system. Current research projects include studies in the area of juvenile delinquency, bail reform, and police practices. In addition to conducting research, staff of the Center also assist students, faculty, and citizens who are interested in studying or researching the criminal justice system.

Agricultural History Center
378 Voorhies Hall
752-1827

The Center coordinates and administers several research and publication programs designed to further the study of agricultural history. The primary research activity is a study of the causes and consequences of agricultural mechanization in the nineteenth and twentieth centuries.

The Center was founded in 1964 and assumed the responsibility of editing Agricultural History, the journal of the Agricultural History Society. The Center also oversees a continuing program that publishes bibliographies on American agricultural history.

California Primate Research Center
Primate Center
752-0447

The research staff of the California Primate Research Center investigate selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral biology, perinatal biology and reproduction, respiratory diseases, and a variety of biomedical topics. Primate medicine and primate pathology teams are responsible for the maintenance of the health of the colony and for research on spontaneous diseases.

The Center, established in 1962, is supported by an operating grant from the National Institutes of Health. Much of the research is supported by extramural grants and contracts awarded by a variety of national and international agencies.

The facilities and training programs of the Center are currently being used by 60 core and affiliate faculty members, over 40 collaborating scientists, more than 90 undergraduate and graduate students, 5 visiting scientists, and approximately 60 technical and supporting staff members.

Campus Writing Center
Information: 752-8024

The Campus Writing Center, which began in the fall of 1981, is a multi-faceted program designed to provide writing instruction across the curriculum. Its primary means of accomplishing this goal are through
- Adjunct writing courses
Introduction

- Writing workshops, and
- Individual writing consultations.

Adjunct writing courses are offered for credit to students who are also enrolled in specific courses in other fields. These courses provide instruction in expository or scientific writing and assist students with research and writing skills appropriate for the field of study involved. Topics of instruction and writing assignments in each adjunct course all pertain to the subject matter of the companion course.

The writing workshops focus on specific aspects of academic writing and are adapted to meet the needs of any field. They also can be designed for particular audiences— for TAs correcting and evaluating student papers, for scientists or engineers writing technical reports, for graduate students writing theses, or for undergraduate students writing essay exams or term papers. Workshops, which may run for one session or several, are available upon request by any interested faculty member or campus group.

Individual writing consultations are available by appointment to any interested faculty, staff, or graduate student. To schedule a consultation, call the Campus Writing Center at the number above.

The Campus Writing Center is affiliated with the English department. All services of the Center are provided free of charge to UC Davis students, faculty, and staff.

Computer Center

501 Hutchison Hall
752-0233

The Computer Center, located in the basement of Hutchison Hall, serves the campus for batch, interactive timesharing, and remote job entry computing. The Center's primary concern is service to students and, therefore, instructional usage has priority over research and administrative users. Davis has developed an innovative Easy Access System of Computing for student use. Any student on campus, upon presentation of a valid registration card at the Computer Center Dispatch Counter, may open an Easy Access account. A specified sum is allotted to each student from instructional funds, and, within general confines, the student may use the funds to purchase computer time for any project. Regularly scheduled computer-related courses are funded separately.

Equipment operated by the Center includes a dual processor Burroughs B6800, the primary administrative computer; a dual processor Burroughs B7900, four Digital Equipment Corporation (DEC) PDP 11/70 systems; a DEC VAX 11/780 and two VAX 11/750s. These systems support over 165 terminals located in seven terminal rooms plus over 200 additional terminals located throughout the campus. One of the terminal classrooms is designed primarily for teaching interactive graphics. During open hours these classrooms can be used by students any time that class instruction is not scheduled. Consultants are available to answer questions.

The computer systems located in Hutchison Hall are accessed through the Develcon Dataswitch. This
switching computer allows the user to identify from an individual terminal the computer system required for the work which is to be accomplished. The three systems located in Surge IV and the one in Academic Office Building 4 have terminals directly connected, and only limited access through the Dataswitch. Keypunch machines and card readers are available for batch input to the Burroughs systems. The Center also operates two public Remote Computing Stations on campus. Services and equipment at these stations include programming, consulting, reference manuals, interactive terminals, keypunch machines, and card readers.

**Center for Consumer Research**

148 Everson Hall  
752-2647

The Center is a small research unit devoted to consumer issues. Major areas of interest include product and service quality, consumer information and education, consumer decision behavior, and institutions and public policy as they relate to consumer issues. Activities of the Center include support of consumer projects undertaken by faculty, graduate students, and Extension specialists; a colloquium series; and a newsletter, in addition to a core research program.

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

**Early Childhood Laboratory**

Temporary Building 117  
752-2988

The Early Childhood Laboratory was established in 1963 by the Department of Applied Behavioral Sciences and serves as a facility for students majoring in Human Development and for other students interested in young children. The four programs at the Laboratory accommodate children from ages 6 months to 5 years of age for three hours each day.

Students from several classes use the facilities, some doing observational studies and others gaining experience working with the children. The students learn to relate theory and practice, developing their abilities as they relate to professionals, peers, children and parents. Selected graduate students and faculty members also conduct research at the Laboratory. Enrollment information may be obtained by calling or writing the Laboratory.

**Food Protection and Toxicology Center**

109 Environmental Toxicology Building  
752-1142

The Center sponsors and coordinates research into the nature, transport, and biologic effects of pesticides and other toxic agents. It develops analytical methods for detecting and measuring trace amounts of toxic materials, and studies their accumulation, storage, and breakdown in the environment.

Studies serve medicine, agriculture, the food-processing industry, and the public, through the examination of chemical and microbial hazards in agricultural production and in the processing and preservation of food.
Veterinary Medicine Teaching and Research Center
18830 Road 112
Tulare, California 93274
(209) 688-1731

The new facilities of the Tulare Center were occupied on the thirty-first of January, 1983. Located in a region of the State that has concentrated, diversified livestock production enterprises, the Center will be developing programs with livestock production units to serve as a principal clinical center of UCD’s School of Veterinary Medicine for teaching, research, and service programs on food-animal herd health, preventive medicine, and production management.

Water Resources Center
2102 Wickson Hall
752-1544

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

Research interests include water resource systems engineering, economic evaluation of water development and conservation, political strategy in water resource development, environmental and energy relationships in water resource management, watershed hydrology, ground water use, soil and land use management in relation to water resource use, and maintenance and improvement of water quality.

Facility for Advanced Instrumentation
9 Hutchison Hall
752-0284

The Facility provides and maintains sophisticated equipment for campus investigators. Equipment includes transmission electron microscopes, scanning electron microscopes, electron microprobe, mass spectrometers, a programmable spectrophotometer, morphometric equipment, and a variety of instruments for biochemical analysis. The staff trains those members of research groups who have not had experience in preparatory techniques and are also available as consultants for research projects.

Institute of Ecology
2132 Wickson Hall
752-3026

Established in 1966 as an organized research unit, the Institute fosters ecological and environmental research, provides intellectual leadership in ecology, administers resources and facilities, provides information on extramural support of ecological research, and maintains liaison with governmental and private organizations interested in funding ecological and environmental research.

The Institute has three publication series and sponsors national and international activities, including organizing symposia and conferences. It provides grants to support collaborative research in ecology among faculty members at UCD, and through these grants provides financial assistance to undergraduate students and graduate research assistants. The Institute’s Cooperative Resources Studies Unit, supported by an agreement with the National Park Service, sponsors and administers research in the national parks of California.

Cooperating in the Institute’s investigations are more than one hundred faculty members from all the schools and colleges on the Davis campus.

Institute of Governmental Affairs
Shields Library
752-2042

The Institute was established in 1962 to foster research in public affairs and government. The proximity of the Institute to Sacramento has led to a research orientation toward the problems and processes of state and local government in California. The staff works closely with social science faculty and students on this campus in conducting and supporting research on such topics as the California Legislature, environmental regulation and growth control, policy and government in small communities, and political leadership.

IGA activities include publishing several types of studies; preparing grant proposals for extramural funding of social science research; administering extramural grants; providing a specialized library of published and fugitive materials open to faculty, students, and other users; providing a Social Science Data Service; training graduate and undergraduate students in research methods through participation in faculty-led projects; and conducting policy workshops and conferences.
Institute of Marine Resources
Temporary Building 186
752-2506

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

Intercampus Institute for Research at Particle Accelerators
Professor Richard L. Lander, Director
325 Physics/Geology Building
752-1780

This Universitywide Institute, established in 1977, conducts research that uses the unique facilities at national accelerator laboratories, particularly the Stanford Linear Accelerator Center and the Enrico Fermi National Accelerator Laboratory. High-energy particle physics is the dominant area of research. The Institute allows faculty and graduate students to undertake experimental projects that could not be implemented on an individual campus. The Institute also promotes seminars and lectures by visiting researchers at individual campuses.

Bodega Marine Laboratory
Box 247
Bodega Bay, California 94923
(707) 875-2211

The Bodega Marine Laboratory is designed to support research and teaching in the marine sciences. Located on Bodega Head, adjacent to the town of Bodega Bay in Sonoma County, the property consists of 327 acres fronting on both the ocean and Bodega Harbor. The property is treated as a biological refuge and is part of the UC Natural Land and Water Reserves System. Its mile-long ocean frontage is protected as a California Marine Life Refuge.

Crocker Nuclear Laboratory
Crocker Nuclear Laboratory
752-1460

This facility was established by the University in 1965 as an interdepartmental laboratory for the application of nuclear science to a variety of disciplines. The Laboratory has research programs in nuclear physics and chemistry, air pollution analysis, activation analysis, biology, neutron structural damage studies, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications. Teaching activities at the undergraduate, graduate, and postdoctoral levels are in biology, medicine, radiochemistry, and physics.

Laboratory for Energy-Related Health Research (LEHR)
Laboratory for Energy-Related Health Research
752-1340

The Laboratory for Energy-Related Health Research is a focus for coordinated interdisciplinary research and teaching about biomedical problems related to exposure to effluents of energy fuel cycles. The overall aim of the research programs at LEHR is to determine basic mechanisms of effects and predict human health hazards from continual exposure to realistic levels of energy-related pollutants. To this end, research animals are exposed to graded levels of radiation and fossil fuel pollutants, and the data obtained are used to establish levels harmful to humans. Expanded programs to study toxic, mutagenic, and carcinogenic compounds are done in special animal holding facilities, and in laboratories for cell biology research and inhalation toxicology.

Serology Laboratory
2116 Medical Sciences 1A
752-1159/1359

The Serology Laboratory was established in 1955 largely to provide unique blood-typing services for the animal breeding industry. It is a self-supporting activity which generates income mainly through blood-typing services for various cattle and horse breeder registries in North America. The laboratory functions as a division of the Department of Reproduction, School of Veterinary Medicine, and its facilities are available to students working towards M.S. and Ph.D. degrees in genetics, immunology, and comparative pathology. The facilities are also available to upper division students interested in gaining experience through the internship Program.

Current research activities of the Serology Laboratory are concerned largely with a thorough immunogenetic analysis of the major histocompatibility complex (MHC) of domestic animals, in particular the MHC of cattle and horses. As established mostly during the past decade, the MHC is a chromosomal region which contains genes that govern the functions of the immune system. The key to the MHC analysis is the elucidation of the various antigenic markers which characterize the membrane of lymphocytes. These markers, originally referred to as histocompatibility antigens because of their role in the rejection of allografts, are associated with resistance or susceptibility to a variety of diseases. The Laboratory has a reputation for its pioneering research on animal blood groups and biochemical polymorphisms, and is researching these areas on a continuing basis. In addition, the Laboratory provides karyotyping services for infertility cases in domestic animals and has research programs to uncover the mode of inheritance of suspected hereditary diseases.

In all of the programs, the Laboratory works closely with the Equine Research Laboratory and the Livestock Diseases Research Laboratory, as well as with departments such as Animal Science, Avian Sciences, Veterinary Pathology, and Epidemiology and Preventive Medicine.
Stebbins Cold Canyon Reserve
Wesley W. Weathers, Ph.D.
Department of Avian Sciences
109 Amsmunden Hall
UC Davis
752:1300

Information:
Natural Land and Water Reserves System
2120 University Avenue
Berkeley, CA 94720

The University of California administers some 26 natural reserves throughout the state. These reserves comprise a representative cross-section of California's diverse ecosystems and include deserts, off-shore islands, mountains, and even submarine canyons. Unlike parks or wilderness areas, the reserves are devoted entirely to teaching and research purposes and are not available for recreation. Since 1965, when the program was initiated, the University, using non-state funds, has acquired these carefully selected sites which might otherwise have become unavailable for scientific study.

In 1979, the University purchased the Cold Canyon property, 277 acres of wildland near Lake Berryessa (about 14 miles west of campus), as part of its Natural Land and Water Reserves System. The reserve is named in honor of G. Ledyard Stebbins, Professor of Genetics. The Davis campus has administrative and management responsibility for the reserve, which will be maintained in its present natural state. The reserve is available for teaching and field research by scientists and students from all campuses of the University and researchers from other institutions of higher learning. Terrain and rainfall patterns of the Cold Canyon area support examples of several different plant communities found in both the inner and outer coast ranges. The diversity of plant and animal species on the reserve, and its close proximity to the campus, contribute to the popularity of the reserve as an open-air classroom and research site.

Adult Fitness Program
Department of Physical Education
752-2540

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

Emphasis is placed on the evaluation of cardiovascular fitness and health and on the assessment of body fat proportion by underwater weighing. Participants receive individual counseling for exercise training, weight control, and preventive medicine in general. Supervised exercise sessions include walking, jogging, swimming, and cycling. A cardiac rehabilitation program is offered to patients with coronary heart disease and to individuals who have a high risk for developing heart disease.

Special activities of the Adult Fitness Program are offered to University students and employees. These low-cost activities give participants an opportunity to have their body type and fatness determined, with personal counseling on how to achieve a desired body weight through proper nutrition and exercise. A "Shape-Up" program for students is open at the beginning of each quarter and includes supervised exercise sessions.

Agricultural Alternative Development Program (Student Experimental Farm)
Information:
College of Agricultural and Environmental Sciences
752-7645
This program was initiated in the summer of 1977 following several years of courses, discussions, and analysis of "alternative agriculture" and its importance to the College of Agricultural and Environmental Sciences. The Student Experimental Farm is an innovative research facility run by the students on 18 acres of University land. Students participate as volunteers, work-study interns, and Research Associates. Its purpose is threefold, as (1) an educational adjunct to the curriculum providing graduate and undergraduate students with the opportunity to design, conduct, and analyze their own field experiments; (2) a research and development program for conducting valid scientific research in small-scale and alternative technologies; and (3) a small farm and urban garden extension service.

Carnegie Institution of Washington, Department of Embryology, Davis Division
752-0210

The world-renowned embryological collection founded in Baltimore in 1914 by Franklin P. Mall, and the later collections of Herig, Rock, Hartman, and Bluntschli, are now housed at UCD. In addition to the microscope slides, photographs, and reconstructions showing human development, the collection includes insectivore, prosimian, platyrhine, and catarrhine embryos.

The resources of this department are temporarily closed to visiting researchers.

ADDITIONAL ACADEMIC RESOURCES

UNIVERSITY EXTENSION
Information and catalogs:
4485 Chemistry Annex
752-0880

Venture, the free quarterly University Extension catalog, contains the current list of continuing education programs offered in 29 northern California counties. Enrollment is open to the general public. No formal admission to student status is required to take advantage of the wide variety of stimulating programs.

Fields covered by Extension courses include public administration, business and management, environmental studies, data processing, wilderness recreation and international travel, toxics and hazardous substances, social services, engineering, labor relations, liberal arts, foreign languages, health sciences, veterinary medicine, and agricultural sciences.

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

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

COMMITTEE FOR ARTS AND LECTURES (CAL)

Introduction

104 Freeborn Hall
752-2323

The Committee for Arts and Lectures presents cultural events to enrich and supplement the educational experiences of campus and community members.

In 1983-84 CAL will be presenting music and dance concerts, films, plays, poetry readings, lectures, solo recitals, orchestral performances, and free nighttime entertainment on the Quad.

Tickets are available to UCD students at reduced prices for events for which there is a charge.

“The small-town atmosphere mixed with its rural setting makes Davis a nice place to live. It’s a small college town hosting one of the finest universities in the world.”
The Committee, which is composed of students, faculty, and staff members, welcomes program suggestions and interested volunteers.

**CAMPUS EVENTS AND INFORMATION**

Information:
Campus Events and Information Office
4th Floor, Memorial Union
752-1920

Student and non-student campus organizations and off-campus groups desiring to use campus facilities to sponsor meetings, recreation activities, workshops, conferences, or similar events should contact the Campus Events and Information Office. A one-stop reservation service, this office provides a single location for assistance with arranging all the various components of meetings and conferences.

Information Services, a unit of the Campus Events and Information Office, provides campus information to visitors, staff, and students at its three locations, the Memorial Union Desk located in the first floor lounge and in Room 129, Mrak Hall, and at the Visitor Information Kiosk on Old Davis Road. Tours of the campus can be arranged through the Information Services Office, telephone (916) 752-0539.

**PUBLIC SERVICE RESEARCH AND DISSEMINATION PROGRAM**

Information:
436 Mrak Hall
752-3224

The Public Service Research and Dissemination Program is an outgrowth and continuation of a five-year grant from the W.K. Kellogg Foundation. The present funding of the program is by a combination of private grants, including the W.K. Kellogg Foundation, and University funds.

The program will continue to link faculty, graduate students, and decision makers from outside agencies in collaborative research projects on issues of public policy. It will also encourage the dissemination of research information on public policy issues through publications and policy conferences.

**SUMMER SESSIONS**

Information:
376 Mrak Hall
752-1647

Summertime affords students the opportunity to accelerate progress toward a degree, or work on a teaching credential, or take advanced special study courses or do research. You can complete up to 24 units of credit by attending both summer sessions.

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

In 1984 there will be two six-week sessions at UC Davis: June 18 through July 27, and July 30 through September 7. For the Summer Sessions Bulletin and application materials (available about mid-March), write to the address above.

**WORK-LEARN INTERNSHIPS**

Information:
Work-Learn and Career Planning and Placement
2nd floor, South Hall
752-2855

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

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

Here is how it works: participation may be full-time or part-time, credit or non-credit, voluntary or with a salary — depending on your needs and interests and the availability of opportunities. The work-learn experiences must emphasize learning rather than routine activities, include field supervision by a qualified professional, and, where appropriate, the faculty member responsible for giving credit. Academic credit is awarded only for experiences planned and approved in advance.

You can initiate an internship on your own, or take advantage of the organized programs at Davis which include internships in:

- agricultural and environmental sciences
- education and related areas
- engineering and physical sciences
- health and biological sciences
- liberal arts

In either case, a notation describing the internship can be made on your transcript by obtaining prior approval from Work-Learn and Career Planning and Placement. Approval for transcript notation is granted for completed internships which meet prescribed University standards as advertised by this office.

**EDUCATION ABROAD**

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

Academic Advice:
Robert A. Fehrer, Ph.D., Campus Coordinator
Dean’s Office, College of Letters and Science
752-0892

The United Kingdom, Japan, Sweden, Norway, Mexico, Brazil, Hong Kong, Ireland, Egypt, France, Austria,
Taiwan, China, Germany, Italy, Israel, Spain, Kenya, India, Peru, the USSR, Australia, and West Africa.

An around-the-world itinerary for madcap travelers? No. These are the places where you can study as a participant in the University's Education Abroad Program (EAP).

Most EAP experiences are for undergraduates for an academic year. Exceptions are the one-semester programs in Leningrad (USSR) and Peking (China), and the spring-quarter study and field experience program in Mexico.

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

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

Eligibility requirements include:

- At least three regular session quarters completed in residence at UCD by the time of participation
- At least 90 quarter units completed by the time of participation
- At least a 3.0 grade-point average for coursework completed in the University of California at the time of application and departure
- In most cases, 2 years (6 quarters) of University-level foreign language or the equivalent, with a 3.0 grade-point average (not applicable where classes are in English), but consult EAP Office for specific requirements
- An academic plan approved by your major adviser and the campus coordinator
- Endorsement of the Academic Senate Committee on the Education Abroad Program

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

Estimated all-inclusive minimum costs for the nine- to twelve-month program range from $5,200 to $8,600 (varies depending upon the country).

For study abroad during the 1984-85 academic year, the application deadlines are early November 1983 for the United Kingdom and Ireland and mid-to-late January 1984 for all other study centers, except Australia and Kenya which have a May 1984 deadline for a year of study beginning in February of 1985. If you intend to participate in a study program during your senior year, careful advance planning is necessary to make sure that all degree requirements will be met (see also page 61). Consult with your major adviser, the Dean's Office of your college, and the Campus EAP Coordinator. See page 181 for information on EAP centers and study programs.

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

UNIVERSITY PROFESSORS

One of the University's valuable and unique resources is its small roster of University Professors appointed by the Regents upon the recommendation of the President of the University. The title is reserved for certain distinguished faculty members, recognized nationally and internationally as scholars and teachers of exceptional ability. Each University Professor has a home campus but may hold a joint appointment on another campus. All are available to other UC campuses for limited or extended visits, primarily for teaching and lecturing. A University Professor may visit a number of UC campuses during the academic year, holding conferences with students and staff and speaking before public audiences. Arrangements for a visit by a University Professor are made directly by deans and department chairpersons with the University Professor concerned. A small fund, part of the Inter-campus Exchange Program budget, helps defray the University Professor's travel expenses.

At present, the roster includes:

University Professor Melvin Calvin
Laboratory of Chemical Biodynamics
UC Berkeley

University Professor Murray H. Krieger
Department of English and Comparative Literature
UC Irvine

University Professor Josephine Miles
Department of English
UC Berkeley

University Professor Julian Schwinger
Department of Physics
UC Los Angeles

University Professor Glenn T. Seaborg
Department of Chemistry
University of California, Berkeley

Associate Director Lawrence Berkeley Laboratory
UC Berkeley

University Professor Neil J. Smelser
Department of Sociology
UC Berkeley

University Professor Edward Teller
Lawrence Berkeley Laboratory
Livermore, California

University Professor Charles Townes
Department of Physics
UC Berkeley

University Professor Sherwood L. Washburn
Department of Anthropology
UC Berkeley

University Professor John R. Whinnery
Department of Electrical Engineering and Computer Sciences
UC Berkeley

University Professor Lynn White, Jr.
Department of History
UC Los Angeles
LIVING ACCOMMODATIONS

Residence Halls

Information:
Student Housing Office
752-2035

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 2,900 undergraduates and 180 graduate students do just that. Each of the residence hall complexes is staffed with students and professionals who help create and maintain an environment conducive to personal growth and educational achievement.

The total room-and-board rate for 1983-84 is $2,600 for a double-occupancy room and $2,815 for a single room (of which there are very few available to new residents). Nineteen meals per week are provided. Rooms come complete with furniture, study lamps, and private telephones; however, you must pay for your long distance and measured-service toll charges and provide your own linens and towels.

If you check "University Operated Housing" and request the Davis campus as your first choice when filling out your University Admissions Application, the necessary information and applications are mailed to you by the UCD Undergraduate Admissions Office. Students redirected to UC Davis from another UC campus should immediately contact the UCD Housing Contracts Office to obtain a housing application.

Student Family Housing

Information:
Student Family Housing Office
Orchard Park
752-4000

There are 476 apartments on campus for married students and single parents. Both furnished and unfurnished apartments are available. Sorry, only small caged pets kept inside apartments are permitted.

Considering that apartments in the Davis community generally cost $70 to $160 more per month than student family housing, you can see why on-campus apartments are assigned only from a waiting list. Since a wait of 5-9 months for a Fall Quarter assignment is common, your application may be submitted prior to admission to UCD.

Rents for 1983-84 (including all utilities except telephone) are about:
- 1-bedroom unfurnished, $198/month
- 2-bedroom unfurnished, $225/month
- 2-bedroom furnished, $268/month (air conditioned)

Community Housing

Information:
Student Housing Office
752-2483

If you choose to live off campus — about 75 percent of UC Davis students do — the Community Housing Office will probably turn out to be a very valuable resource. Many special programs, including grievance counseling and roommate selection services, are provided. Useful publications, such as Housing Viewpoint, leasing information, and the Davis Model Lessee, are also available here.

In addition, the Office maintains listings of private rooms, apartments, mobile homes, and houses for rent in the Davis area, as well as roommates wanted and roommates available. Because the listings change from day to day, prepared lists are not furnished by mail.

Independent living groups — fraternities and sororities — are among your other housing options. Such groups offer an opportunity to participate in a self-governing residential environment where maintenance, food preparation, social planning, and educational activities are shared by the members.

THE ARTS AT DAVIS

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

The Department of Music (752-0666) sponsors the University Symphony, Chorus, Chamber Singers, Early Music Ensemble, Concert Band, and small ensemble groups. Music majors and other interested students can receive credit for participation in these groups, which perform at concerts and recitals open to the University community. The Department also sponsors an artist-in-residence for one quarter each year who gives concerts, recitals, and lectures, and who works with music classes and individual students. Free noon concerts featuring individual performers and ensembles — both professional musicians and music students — are a favorite weekly event during the school year. The Robert Bloch String Quartet is in residence on campus, and the Department enjoys a close relationship with the Sacramento Symphony, which presents several concerts on campus each year. The Department of Music sponsors nearly one hundred public concerts each year.

The Department of Dramatic Art has one of the best theatre facilities in California. The excellent faculty and special guest artists, the presence of graduate students working on Master of Fine Arts (MFA) degrees in acting, directing, playwriting, and technical theatre, and an unusually good stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year's drama schedule includes University Theatre Season (five major productions of established plays); one major production of an experimental piece; Premiere Season (five smaller productions of plays written by students); Studio Season (three smaller productions of established plays); and dozens of class-related projects. These productions are part of the academic program of the Department and serve an important purpose in the study of dramatic art. Participation is open to all students.

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

The Richard L. Nelson Gallery (752-0105), named in honor of the first chairperson of the Department of Art, was dedicated in 1976. Located on the first floor of the Art Building, the Gallery organizes regularly changing exhibitions of historical and contemporary works of art. The Gallery’s program of high quality and rich variety reflects and complements the teaching program of the Department of Art and provides aesthetic enrichment to the University community and the Northern California area at large. The Nelson Gallery space includes the Main Gallery, which features sculpture and painting, and the Small Gallery, which features photographs and prints. The Basement Gallery (752-0105) in the Art Building shows work by undergraduate UCD art students.

The Carl N. Gorman Museum (752-6567), established in 1973 in honor of Carl Gorman, an advocate of Native American Studies at UCD, features the work of Native American artists. The museum, located in Temporary Building 111 (across from 194 Chemistry Building), has a permanent collection as well as exhibits that change throughout the year. The Design Gallery (752-6223) on the first floor of Walker Hall, organizes changing exhibitions which are planned from the designer’s own viewpoint and creative environment and from special themes in the area of environmental design — architecture, interiors and landscape, graphics, costume, textiles, folk art — as well as the annual student show and biennial faculty show. The Department of Environmental Design also utilizes exhibit space in the College of Agricultural and Environmental Sciences Office on the second floor of Mrak Hall.

The Committee for Arts and Lectures (CAL) brings a wide variety of performing groups to campus, in addition to sponsoring lectures, films, and free noon-time events on the Quad. Various departments such as English, the foreign languages, and History sponsor lectures, poetry readings, and exhibits open to the University community. The Campus Record, a weekly information sheet published by the Office of Public Affairs (752-1930) and Special Events, a monthly flyer distributed by the Campus Events and Information Office (752-1920) list upcoming activities, and bulletin boards, kiosks, the student radio station KDVS, and the California Aggie also advertise programs and local events.

RECREATIONAL FACILITIES AND PROGRAMS

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

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

Memorial Union and Campus Recreation

Information:
Coordinator, MU Business Services and Facilities
483 Memorial Union
752-2524

Coordinator, MU Programs and Campus Recreation
483 Memorial Union
752-1730

The Memorial Union (MU) complex, at the north end of the Quad, serves as the community center for the campus by providing campus services and a variety of extracurricular activities. Bring yourself up-to-date on local events by stopping at the Information Desk in Griffin Lounge on the main floor. A valuable resource for current students as well as new students and visitors, the Information Desk can also be reached by telephone, 752-2222. Other first-level facilities include the UCD Bookstore, Corral gift shop, Coffee House, The Last Resort Restaurant and Pub, MU Dining Commons, and Freeborn Hall. Freeborn, an 1,800-seat assembly hall used for dances, dramatic and musical events, banquets, lectures, and conferences, also houses the Committee for Arts and Lectures and the Campus Box Office, where you can purchase tickets for campus events and cash checks. Lower Freeborn is home to the Women’s Resources and Research Center, the University Haircutters, and several ASUCD services.

Recently redecorated, King Lounge on the second floor features music listening and periodicals in a comfortable and relaxed atmosphere popular for studying. The MU Art Gallery and a newly remodeled complex of meeting rooms, the MU II Conference Center, complete the second floor. In addition to the administrative offices of Memorial Union and Campus Recreation, the offices of ASUCD, Campus Events and Information, the Graduate Student Association (GSA), and Student Activities and Judicial Affairs can be found on the third and fourth floors of the MU tower.
Outdoor patios furnished with wooden benches and umbrella tables offer open-air seating and the enjoyment of a wisteria arbor and giant eucalyptus to the north of the MU and a five-story Aleppo pine to the south.

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

The **Craft Center**, located just behind the Silo and adjacent to Parking Lot 43, is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or quarterly passes may be purchased to use equipment and laboratories. Workshops and classes are offered each quarter in such varied crafts as woodworking, weaving, textiles, jewelry making, media, auto mechanics, ceramics, photography, silkscreening, oxycetylene welding, leatherworking, and stained glass. More information about the Center can be obtained by calling 752-1475/1730.

The **Equestrian Center**, southwest of the Veterinary Medical Teaching Hospital off Garrod Drive, is active all year round providing trail rides and instruction in both English and Western riding. The lessons are available at beginner's through advanced levels, and an extensive volunteer program has been designed to provide an educational experience for those interested. The Equestrian Center sponsors clinics and horse shows and also coordinates a number of teams for student participation. Telephone 752-2372/1730 for further details.

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

The **Games Area**, located in the basement below the UCD Bookstore, is a recreational facility consisting of 16 bowling lanes, 11 billiards tables, pinball and table soccer machines, video games, a TV cardroom (with large screen TV), vending machines, storage lockers, and a pro shop. The Games Area has sign-ups for bowling leagues, classes,clinics, and tournaments for all ages from beginning through advanced skill levels. Details are available by calling 752-2580/1730.

The **Outdoor Adventures**, in Temporary Building 24 on the corner just west of 194 Chemistry Building, is a valuable resource center for planning your outdoor excursions. Rental equipment of professional quality is available as well as resource information from an up-to-date file. Group rates and custom designed trips can be arranged, and classes, excursions and clinics in backpacking, rock-climbing techniques, white-water rafting, kayaking, boardsailing, mountaineering, and cross-country skiing are offered throughout the year. Specialty features such as wilderness emergency-care clinics, white-water river guide training, and programs conducted by outdoor experts are held to develop specific outdoor skills. Stop in and share your own outdoor experiences! For more information call 752-1995/1730.

The **Recreation Swimming Pool**, at the corner of LaRue Road and Hutchison Drive, is a large free-form pool with a separate wading pool, bathhouse, snack bar, and shuffleboard courts. The staff offers lessons to all age groups and arranges for special events such as "family nights." The pool opens for the season in April and closes in October. The Hickey Gymnasium is also available for recreational lap swimming. More information regarding these services can be obtained by calling 752-2695 or 752-1995/1730.

The Memorial Union has several facilities that can be rented for group gatherings. The **Recreation Pool Lodge**, adjacent to the Pool, is equipped with a kitchen, meeting rooms, and a lounge with a fireplace. The **Silo Student Center**, southwest from the corner of California Avenue and Hutchison Drive, features a snack bar, a large multipurpose room, and video machines. The Silo is open daily for students who want to just relax or study and is reserved most evenings by one of the many student organizations holding meetings, dances, or other group functions. Finally, the **Putah Creek Lodge**, equipped with outdoor barbecue pits and tables as well as an indoor fireplace, kitchen, and multipurpose room, is situated on the south side of campus along Old Davis Road. It is surrounded by a large grassy area suitable for group recreation and outdoor activities. The bicycle and walking trails, which runs parallel to Putah Creek and directly in front of the Lodge, offers much enjoyment as you pass along the Arboretum and view trees, shrubs, and other plant life used in research and teaching. To reserve these facilities call 752-1920. For more information, call 752-2524.
Recreation Hall
Entrance 1B  
752-6073 for information

Recreation Hall is a multi-use facility for intramural and informal recreation play, intercollegiate athletics practice and contests, physical education classes, sports clubs, and special events. The three-level hall has locker rooms; an equipment room; handball, racquetball, wallyball, and squash courts; a weight room; an arena area for basketball, volleyball, and badminton; and areas for wrestling and martial arts, table tennis, gymnastics, and dance. A recently installed outdoor fitness cluster, located near Entrance 1B, is available for stretching and strengthening exercises.

Students can use Rec Hall facilities by showing their current, valid Registration Card. Nonstudents may purchase a privilege card to use Rec Hall lockers, equipment, and facilities. Patrons may also purchase a daily pass at the Hall. Recreation Hall is available to campus affiliated organizations for special events.

Recreation Hall maintains the tennis courts on La Rue Road, just north of the Rec Pool, and the volleyball and basketball courts west of the Segundo residence hall complex. While these courts are primarily for student use, they are also available to the general community when not being used for campus programs. No reservation is required as the courts are available on a first-come, first-served basis.

ASSOCIATED STUDENTS (ASUCD)

Information:
ASUCD Office  
3rd floor, Memorial Union  
752-1990

The Associated Students of the University of California, Davis (or ASUCD), authorized by The Regents and the Chancellor, represents all undergraduate students. From the fees paid to the University each quarter, The Regents allocate $13.50 per student to ASUCD to support the organization and its many activities. Graduate and professional students may have access to all ASUCD activities and services by paying the fee although certain services are available to these students by their participation in the Graduate Student or Law Student Associations. Funds allocated to ASUCD by the University provide activities and services that will make life as a student a little easier, less expensive, or just more fun.

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

Four commissions make recommendations to the Executive Council. Members of the commissions are appointed by a subcommittee of the Executive Council. The four commissions are:

- **External Affairs** deals with off-campus concerns (City of Davis, The Regents, social responsibility, etc.).
- **Internal Affairs** is concerned with nominating students to the Chancellor’s Administrative Advisory Committees, as well as monitoring campus issues.
- **Academic Affairs** acts as an advocate of student rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure, and teacher evaluations.
- **Business and Finance** makes recommendations to the Executive Council on all financial matters.

The judicial branch consists of the Student Judicial Board whose members are appointed by the President of ASUCD.

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

Some of the services operated by the ASUCD for University students include the Unitrans bus system, California Aggie newspaper, Student Viewpoint evaluation of professors and classes, Just Your Type word-processing service, the Bike Barn repair services, travel service, free legal advice, and the Coffee House in the Memorial Union. The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. Other ASUCD activities include Radio KDVS stereo FM, Classical Notes, Rabbit Reproductions, Student Forums, Entertainment Council, and Picnic Day. ASUCD also cooperates with Associated Student groups on other University of California campuses to operate a full-time Student Lobby in Sacramento to represent student interests to State government.

STUDENT ACTIVITIES AND JUDICIAL AFFAIRS

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

There are more than 300 registered student organizations at UCD with a combined membership of over 17,000. These organizations represent a wide variety of student interests, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall, and service groups. **Student Activities** is a resource office staffed by professionals in student development and higher education who provide advising on activities, resources, and campus policies. In addition to the subunits described below, Student Activities administers a number of campus programs: Club Finance Council, Film Co-Op, Activities Fair, Cultural Days, and Leadership Training Workshops. Student Activities staff assists individual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the office to review the resources available to them.
The **Judicial Affairs** office supports the standards of the campus by responding to alleged violations of University policies or campus regulations. In addition, the office is a contact point and referral agent for student grievances based on impermissible discrimination (sexual, religious, handicap, etc.), and a resource for conflict resolution; and it can provide interpretations and information related to campus policies and regulations.

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

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

### ADVISING AND COUNSELING

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

### Advising Services

*Information:

109 South Hall
752-3000

Advising Services coordinates the student service groups listed below. Professional staff and more than 60 student advisers are available to help you with your immediate concerns and with plans and possibilities for your future.

**Academic Peer Advising** places peer advisers in more than twenty-five departments to help students find the answers to their questions about major requirements, courses, and University regulations. The Academic Peer Adviser complements faculty advising by providing a student perspective on the department. The Academic Peer Advising staff is trained to provide information and assistance concerning graduate schools, career opportunities, and college requirements. For more information contact the main APA office in 109 South Hall, 752-3000.

**The First Resort** is a place to go if you are feeling bogged down by University red-tape, registration procedures, course selection, choosing a major or other academic questions. The student advisers here can either answer your questions or put you in contact with others who can. The staff can give you advice and assistance from the point of view of someone who has “been there.” The First Resort also maintains a tutor listing and referral service for use by all students. If you have a problem, remember—start with the First Resort which is open from 10 a.m. to 5 p.m. throughout the academic year. (Temporary Building 115, corner of Peter J. Shields and California Avenues, 752-2807.)

**The Orientation and Summer Advising Office** provides coordination for the Summer Advising and Registration Program, Fall Quarter Orientation activities, Preview Day, and many other student assistance and orientation programs for new students. The staff seeks to help students learn about the campus environment, procedures, and opportunities, and to offer programs relevant to students’ changing needs. Your contribution to orientation programs, through ideas and assis-
Student Life

In close proximity, is always welcome. The Coordinator’s office is located in 109 South Hall, 752-3000.

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

The Pre-Law Advising Office is the place students interested in legal careers can come for information. The staff can advise you about admission requirements and program planning. The office maintains a reference library of law school bulletins, legal assistant information, admission test materials, and general career information. Many seminars and workshops are also held each year to provide students with more information for preparation for law school and a legal career. The Pre-Law Adviser may be contacted in 109 South Hall, 752-3009.

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

Counseling Center

Information:
219 North Hall
752-0871

The Counseling Center offers professional and peer counseling through psychological services, The House, and the EOP/SAA Information Office. Counselors help students deal with personal concerns, problems in interpersonal relations, and questions that arise in choosing an academic major or clarifying vocational goals. In an atmosphere of understanding and confidentiality, individual feelings, values, and concerns can be explored.

The Counseling Center offers individual and group counseling, vocational interest testing, personality testing, information about graduate school admissions tests, and counseling for EOP and affirmative action students. The Center also helps students wishing to participate in the Planned Educational Leave Program clarify their reasons for temporarily leaving the University.

The Counseling Center is staffed with psychologists and counselors who provide services to students directly and work as consultants, trainers, and advisers to other groups and agencies within the campus community.

Students can see counselors immediately through the walk-in service or can make an appointment to fit their schedules.
The House
Temporary Building 16 (next door to the Housing Office)
24-Hour Hotline: 752-2790
Business Line: 752-5655

The House is a 24-hour peer counseling center which offers a comfortable, supportive, non-judgmental environment for UCD students who wish to explore personal issues and interpersonal problems. Student volunteers are trained to provide counseling, support, clarification, information, and appropriate referrals. Through supportive services we hope to help students improve their problem-solving, coping, and personal growth abilities.

Also offered are a variety of workshops and support groups, training in basic counseling and communication skills, and free tea and coffee.

Counseling services are available on a drop-in or phone basis. The House is open seven days a week and is accessible by ramp. Counseling is provided for on-going problems as well as crisis situations, and all services are confidential. The House is a student-funded student service. Use us!

Educational Opportunity Program/Student Affirmative Action (EOP/SAA)
Information:
311 North Hall
752-3472

The EOP/SAA Information Office is an important part of the Counseling Center and its primary goals are to assist students with their academic, social, and personal adjustments to the University environment; to collect and disseminate information about students' needs; to serve as a liaison between students, staff, faculty, and administration; to coordinate EOP/SAA orientations; and to provide training and experience for students who are pursuing the "helping" professions.

The peer staff is an invaluable academic resource for students and is particularly sensitive to their social, cultural, and ethnic backgrounds and concerns.

The Information Office is concerned with making counseling and advising more open to the immediate needs of students and the staff is involved in "outreach" activities throughout the campus. So feel free to stop by or telephone to find out more about the available services.

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

Special Transitional Enrichment Program (STEP)
(Learning Skills Center, The Basement, South Hall, 752-2013). New EOP/SAA students (freshmen and trans-
fers) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). The program begins in summer and continues through the first academic year, providing preparatory coursework and developing academic skills. It helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

**Learning Skills Center (LSC)**

Information:
The Basement, South Hall
752-2013

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

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

In addition to the above areas of assistance, the Center provides individual tutoring sessions to various segments of the student population: members of the under-represented ethnic groups, handicapped students, veterans, and students on academic probation or subject to dismissal. Group and drop-in tutoring is available to the general student body.

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

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

**Academic Reentry Program**

Information:
175 Mrak Hall
752-2971

If you are a nontraditional student, you can find help through the Academic Reentry Program. Preadmission and reentry advising are offered. The Program's resource area contains information on major programs, and staff is available to discuss ways of combining past study with future academic and career goals. Referrals to major advisers and campus services are made.

Once admitted, the campus provides additional assistance with an orientation to campus life through Advising Services and through study skills workshops at the Learning Skills Center. Financial Aid offers workshops and a special packet for reentry students. The Counseling and Women's Resources and Research Centers are places where reentry students can share common interests and concerns through support groups.
STUDENT SERVICES

Student Health

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

Your health is important to you and to the University. Consequently, every new full-time student and every full-time student who returns after an absence must file, in person, a medical history form and the results of a tuberculin skin test at the Health Center as part of registration. A medical evaluation of the information on the form is then made in order to safeguard your health and the health of the University community.

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

The services of the Health Center are made possible, for the most part, by your registration fees. As a regularly enrolled student paying full registration fees, you are entitled to such outpatient and inpatient medical care as the Health Center is staffed and equipped to provide from the first day of the quarter through the last day of the quarter or to the date of official withdrawal.

Some of the Health Center services and facilities are:
- General outpatient and hospital care
- 24-hour emergency service
- Regularly scheduled clinics
- Major and minor surgery facilities
- An intensive-care unit
- X-ray, laboratory, and pharmacy services
- Physical therapy facilities
- Contraceptive information

The Health Center does not assume the responsibility for treating chronic physical defects, illnesses present at the time you enter the University, dental problems, or non-emergency remediable disorders.

When, in the opinion of the Health Center’s Director, a serious illness or injury obviously prevents you from continuing class work during the current quarter, you will be returned to your community or home for definitive treatment.

If you are not enrolled during a quarter, or if you spend the summer in the Davis area, you can maintain your Health Center eligibility by paying an appropriate fee. Enrollment in this program can be initiated only during the registration period for each quarter or summer session.

The facilities of the Health Center are open to your dependents on a fee-for-service basis. A Dependents’ Health Insurance Plan for your spouse and children can be purchased at the beginning of each quarter in the Health Center.

Health Education. Because maintaining good health is vital for the successful pursuit of your educational goals, Student Health’s Health Education Program provides information and services in the areas of nutrition, exercise, sexuality, stress management, and drug and alcohol use. The Program is located in the Student Health Trailer Annex. Telephone 752-1151 or 752-6335 for information.

International Student Services (SISS)

Information:
Services for International Students and Scholars
3rd floor, South Hall
752-0684

The UC Davis campus currently has a community of international students and scholars from 96 different countries studying, teaching, and researching in a wide variety of fields. Assistance for international students at UC Davis is provided by the staff of Services for International Students and Scholars.

The functions of the SISS Office are to assist incoming international persons in preparing to come to the U.S., to monitor their legal status after arrival, to provide them with financial information, and to facilitate the international transfer of money in order to help them maintain their academic enrollment. Advising and counseling services, orientation, and intercultural activities are provided while at UCD.

Prior to Fall Quarter registration, a special orientation program is held for new international students. The program provides assistance with registration, class enrollment, housing, cultural adjustment, and immigration regulations as well as an introduction to campus services and community resources. All new and transfer foreign students are urged to attend this program.

Careful budgeting is essential for international students. A minimum allowance of $11,250 per year for a single student is recommended to cover nonresident tuition and fees, and living expenses (see page 35). A married student must budget an additional $2,500 per year for a spouse and $1,000 for each child accompanying the family.

The University of California, Davis, expects the international student to be responsible for the above costs. Prior to admission, the student must complete the Financial Certification Form certifying availability of funds for twelve months. Prior to registration, the student will be required to sign either the Statement of Responsibilities for Privately Funded Student or the Statement of Responsibilities for Sponsored Student. It is also important to note that tuition and fees may be increased without advance notice. General living expenses may also reflect yearly inflationary increases.

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

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

Students are obligated to report to Services for International Students and Scholars as soon after their arrival as possible. This office can help with immediate needs and assist in locating fellow countrymen as well as introducing new students and scholars to Davis’s international community.

Services to Handicapped Students

Information:
Services to Handicapped Students (SHS)
101 1st Student Center
752-3184 (voice)
752-6TY (telephone device for the speech and hearing impaired)

If you have a physical disability, either permanent or temporary, you may find the advice, assistance, and specialized resources available from the Services to Handicapped Students Office very useful. Disabled people established this resource program to help students manage physical limitations in order to achieve
maximum participation in campus life. You can establish a partnership with experienced SHS staff to accommodate your individual circumstances and explore and develop alternatives for expanding your own choices.

Counselor and student peer support can help you on disability management issues, career choices, and personal development. You can also find assistance in obtaining financial aid to meet special needs. Advising is available to address such problems as living options, attendant recruitment and management, and adaptations for maximum independent living.

Educational support includes specialized academic advising, emergency educational equipment loans, tutoring services, a library resource center with specialized equipment, and arrangements for locating and funding readers, note takers, and clerical or research assistants. SHS also arranges for sign language and oral interpreters for academic needs. Other resources include:

- Priority registration and enrollment in classes
- Educational support equipment: reading machine; reading, typing, and television aids for visually impaired; amplification equipment; computer access devices; etc.
- Orientation tours and mobility advising for maximum independence
- Repair services for wheelchairs and mobility equipment
- Emergency loan of electric carts and wheelchairs
- Accessible transportation services

Most architectural barriers to participation in campus activities have been removed. Accessible on-campus housing is available, as well as a campus map showing physical accessibility features. Most of the campus is flat and has a good curb ramp system. Ease of mobility, plus specialized scheduling methods, can better ensure that you’ll make it from one class to another on time. Accessible buses link the campus with the community of Davis.

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

Veterans Affairs

Information:
Veterans Affairs Office
200 Slio
752-2020

As a veteran or veteran’s dependent, you may be entitled to various benefits under state and federal laws. If so, the Veterans Affairs Office can assist you.

To initiate a benefit claim, write the Veterans Affairs Office or drop by 200 Slio with your letter of admission, preferably before registration. The office can give you forms, information, and advice, and will also certify your attendance to the Veterans Administration. Remember to visit the office each quarter (bring your validated registration card for recertification) in order to avoid any delay in receiving benefits. If other delays occur, the office will help resolve the problem.

Other special services veterans and veterans’ dependents may be eligible for are coordinated by this office. These include admission assistance, counseling, tutorial assistance, employment, financial aid, VA Work-Study, and correcting military records.

Selective Service Information

Information:
Student Special Services
200 Slio
752-2007/2020

The Office for Selective Service Information assists students who have inquiries and problems regarding their Selective Service status.

Students will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures. Even during periods when induction is not in effect, draft-eligible students still have legal responsibilities for registration and status changes. This Office provides individual advising and consultation on legal obligations and classification options and conducts group workshops in all areas relating to the draft.

If you are confused or unsure of your current Selective Service status, the Office can help by offering information, assistance, alternatives, and support.

Women’s Resources and Research Center (WRRC)

Information:
10 Lower Freeborn
752-3372

The Women’s Resources and Research Center serves the UCD community by providing information and programs aimed at increasing awareness of the educational, career, and personal needs of women. WRRC’s services are wide-ranging and include:

- Workshops, lecture series, forums, conferences, and events on issues of particular interest to women
- Classes in assertiveness training
- Problem-solving groups
- Resource files and referrals for birth control information, marital problems, legal rights, legislation, child care, sexuality, mental health, health care, employment
- Original research on sex roles and women’s concerns
- Research consultation (assistance with designing and conducting research on women and sex roles)
- Assistance in obtaining academic credit; help in finding faculty members to sponsor 198, 199, and 299 courses

A library containing books and research materials on subjects related to women and changing sex roles, and a monthly newsletter, Women’s Writes, are also services of WRRC.
The Women's Studies major and minor programs are administered at the WRRC. For information and program advising, see page 333 of this catalog or telephone 752-3307.

The Center is staffed by professionals, and student interns. You are encouraged to drop by and talk with the staff. Internships are available in legislative work, publicity, program planning, and graphic arts.

**Student Employment**

Information:
Student Employment Center
1st floor, South Hall
(916) 752-0520

Need a part-time job to get yourself through school? Do you occasionally run short of funds or need a few extra dollars for a special weekend event? Or are you looking for experience in a job that is related to your major? If so, the Student Employment Center can probably assist you.

The Center assists regularly enrolled students (including Part-Time Degree students), students on Planned Educational Leave, students' spouses, and students who have received a letter of acceptance for the following quarter but have not yet registered. The Center also coordinates the College Work-Study Program for eligible financial aid recipients.

A wide variety of employment opportunities are offered on campus and in Davis and the adjacent communities. Part-time and temporary full-time positions are available during the school year and vacation periods. New listings are posted twice daily. Extensive listings of summer opportunities in government agencies, camps and resorts throughout California are located at the Center and students are encouraged to begin in January looking for summer employment.

The Center is open from 8:30 to 11:45 a.m. and 1 to 4 p.m.

**Career Planning and Placement**

Information:
Work-Learn and Career Planning and Placement
2nd floor, South Hall
752-2855

Worried about your career plans? Do you know what kind of a job you want when you graduate? Or are you one of the many students unsure about the career you want after graduation? If so, the advisers in Work-Learn and Career Planning and Placement (WL/CPP) may be able to help you.

WL/CPP assists undergraduates, graduates, and alumni in skill assessment, development of career or employment goals and experience, and placement into full-time employment. If you are considering dropping out of the University for a term or longer, an adviser can also give you information about internships and employment opportunities.

Some of the resources you can find here include:
- Individual career advising and group seminars
- Workshops on communication, interviewing, and job-seeking skills
- Seminars to explore career fields and employment trends
- A Career Resources Library
- System of Interactive Guidance and Instruction (SIGI), self-help computerized guidance system which aids in values clarification and career decision making
- A manual for job-seekers
- Listings of current job vacancies

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

To assist students in finding jobs after graduation, this office solicits and maintains files of vacancy listings, arranges employment interviews, and schedules on-campus recruiting by employers.

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

Any student enrolled in the teaching credential program should establish a placement file with the Office of Educational Placement. By using the information you provide about your background, training, and professional experience, advisers can match your qualifications with available positions. The University reserves the right to refer only those persons who are considered to be fully qualified. Advisers counsel candidates, communicate with employers, receive job listings, and arrange interviews. Students not pursuing a credential are encouraged to talk with an adviser to explore education as a potential career field or internship opportunity. Contact the Office in person or by telephone, 752-0724.

CHILD CARE PROGRAMS

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

- The City of Davis Child Care Services Office provides free child care referral and information and is funded jointly by the University of California, Davis, the City of Davis, and the State Department of Education. Up-to-date information is maintained regarding preschools, day care homes, child care centers, babysitting co-ops, playgroups, and other family related services. It is located at 23 Russell Boulevard (756-3747/3740, extension 300).

- The Office of Financial Aid assists student parents who qualify for financial aid with allowances for dependent children (food, clothing, housing, basic medical costs), direct child care costs (babysitting or child care center charges), and unanticipated medical expenses. This office is located on the first floor of North Hall on campus (752-2390).

- The Early Childhood Laboratory is a teaching and research facility associated with the Human Development Program. Four different programs accommodate children from the ages of 6 months to 5 years. Enrollment is limited. It is located on campus in Temporary Building 117 (752-2888).

- The Student Family Housing Office has parent cooperative associations in Orchard Park and Solano Park Student Family-Housing units on campus. Two daycares are sponsored for children ages 2 to 5 years. Parent participation is limited to family housing residents. This office is located in Orchard Park (752-4000).

CAL AGGIE ALUMNI ASSOCIATION

Information:
The Alumni Center
University House
752-0286

In choosing the University of California, Davis as your University, you are making a life-long commitment . . . you will be identified with the Davis campus for the rest of your life. After graduation many people choose to continue their association with UCD through participation in the Cal Aggie Alumni Association.

The Association and its alumni members have aided the Davis campus through support and sponsorship of many activities and programs including the Alumni Scholarship Program, Alumni Day, Picnic Day, the UCD Annual Giving Program, legislative relations programs, and a student loan fund. In addition, the Association maintains a professional staff dedicated to meeting the needs of UCD's more than 60,000 alumni.

Each graduate of UC Davis is considered important as an alumnus and is given the opportunity to become a sustaining member of the Cal Aggie Alumni Association. For those who become sustaining members, the Association offers many special programs and benefits. Contact the Alumni Center for more information.
Fees, Expenses and Financial Aid
FEES AND EXPENSES

It is extremely important to consider carefully the total financing of your University education. If you will need funds beyond those that you and your family can provide, you should apply for aid well in advance of enrollment. The deadlines for financial aid (grants, loans, work-study, and scholarships) can be found in the following pages.

While the needs and resources of each student are different, the following information will give you an idea of the basic expenses students at UCD will incur. Legal residents of California are not required to pay tuition at the University. Students classified as nonresidents must pay tuition of $1,120 per quarter. (See page 342 for the nonresident tuition fee statement.)

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

<table>
<thead>
<tr>
<th>Undergraduate students (excluding Law*)</th>
<th>Graduate students (excluding Law*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University registration fee</td>
<td>$170.00</td>
</tr>
<tr>
<td>Memorial Union</td>
<td>3.50</td>
</tr>
<tr>
<td>Associated Students fee</td>
<td>13.50</td>
</tr>
<tr>
<td>Graduate Student</td>
<td></td>
</tr>
<tr>
<td>Association fees</td>
<td>4.50</td>
</tr>
<tr>
<td>Education fees</td>
<td>264.00</td>
</tr>
<tr>
<td><strong>Total for California residents</strong></td>
<td><strong>$451.00</strong></td>
</tr>
<tr>
<td><strong>Tuition for nonresidents</strong></td>
<td><strong>$1,120.00</strong></td>
</tr>
<tr>
<td><strong>Total for nonresidents</strong></td>
<td><strong>$1,571.00</strong></td>
</tr>
</tbody>
</table>

These fees are for the 1983-84 academic year and are subject to change without notice.

Additional Fees and Expenses

Students may be subject to the following fees for optional services:

Parking (per year: $36 to $48 for cars, depending on the type of permit; $18 for motorcycles; $7 for nighttime only permit)

Bicycles (annual fee for the required California State License, $2)

Late payment registration fee ($50)

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

Transcripts ($3 for the first and $1 for each additional copy requested at the same time)

Diplomas can be mailed to an address left with Registrar's Office (fee varies with current mail costs)

Applications for readmission, Planned Educational Leave, or intercampus transfer ($30)

For details concerning fees and deposits, consult the publication 1983-84 Student Fees and Deposits, available from the Registrar's Office. Current fees are also published in the Class Schedule and Room Directory.

*Students in the School of Law should not refer to the School announcement for explanation of fees.

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

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

(Fees are subject to change without notice.)

Explanation of Fees and Expenses

University Registration Fee: $170 per quarter; $255 per semester for law students. Revenue from this fee is used to support a portion of the cost of student services programs including recreational services (Mu and Rec Hall), counseling and advising services, career planning and placement services, student organization and activities services, Learning Skills Center services, and health services. The health services portion of the fee can be treated as a medical expense deduction from income tax.

Education Fee: $264 per quarter for undergraduates; $284 per quarter for graduate students; $426 per semester for law students. Revenue from this fee is used for financial aid and related student programs.

Nonresident Tuition: $1,120 per quarter; $1,680 per semester for law students (see the nonresident tuition fee statement on page 342).

Memorial Union: $3.50 per quarter; $5.25 per semester for law students. Paid by all students.

Associated Students Fee: $13.50 per quarter. All undergraduate students, both full-time and part-time, are represented by the Associated Students of the University of California, Davis (ASUCD). Graduate and professional students may receive access to all services and activities by paying the fee (see also Graduate Student Association Fee following).

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

Law Student Association Fee: $5 per semester.

Costs for a Year at UCD

The Financial Aid Office estimates that the average 1983-84 expenses of a single UCD undergraduate living on campus will total $6,300, including $1,353 for fees, $428 for books and supplies, $1,753 for housing, $1,420 for food, $1,102 for personal expenses, and $244 for transportation. Estimated expenses for other single students are: graduate students, $6,800; Graduate School of Administration, $6,750; Law, $6,900; Veterinary Medicine, $7,100 to $7,700, depending upon the year in school (first, second, etc.); Medicine, $7,450 to $8,900, depending upon the year in school. For married students, these categories range from an undergraduate low of $9,425 to a high of $12,300 for second-year students in the School of Medicine.

These costs are average costs, and your own living expenses may differ somewhat from these. More information on living expenses can be found in the section on housing or obtained from the Financial Aid Office.
Transportation
Transportation is included in the cost of living estimates given above. See pages 7 and 35 for an idea of what types of transportation are available. Information on automobile parking and bicycle regulations can be obtained through the Parking Operations Office located in the Police Department on campus (752-0659). Car pools are encouraged and the Car Pool Information Office (752-MILE) can help you find a ride or riders.

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

Refund Procedures
New Undergraduate Students:
Prior to Day 1, Registration Fees paid are refunded except for the $50 Acceptance of Admission Fee, and other fees paid are refunded in full.
Day 1 and After, the $50 Acceptance of Admission Fee is withheld from the Registration Fee and the Schedule of Refunds is applied to the balance of fees assessed.
All Continuing and Readmitted Students and New Graduate Students:
There is a service charge of $10 for cancellation of registration or withdrawal before the first day of instruction. After the first day of instruction the Schedule of Refunds is applied to the total of fees assessed.

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

<table>
<thead>
<tr>
<th>Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-14</td>
<td>80%</td>
</tr>
<tr>
<td>15-21</td>
<td>60%</td>
</tr>
<tr>
<td>22-28</td>
<td>40%</td>
</tr>
<tr>
<td>29-35</td>
<td>20%</td>
</tr>
<tr>
<td>36 days and over</td>
<td>0%</td>
</tr>
</tbody>
</table>

FINANCIAL AID
Information:
Financial Aid Office
1st floor, North Hall
(916) 752-2390

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

To ensure priority consideration, you should file your application for the 1984-85 academic year no later than February 9, 1984 (see bold-faced note below). Due to limited funds, students who miss the priority filing date may not be able to receive assistance. Complete application instructions for prospective undergraduate students are contained in the UC Undergraduate Admissions and Financial Aid Packet. Continuing UCD students and prospective graduate students should obtain application forms and instructions from the Financial Aid Office in December 1983.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. Scholarship applications for the 1984-85 academic year are available in October and must be filed by January 13, 1984. (See the Scholarship section beginning on page 38.)

Graduate students are eligible for most of the same types of financial aid as undergraduates. In addition, graduate scholarships, fellowships, and teaching and research assistantships are administered through the Graduate Division (see page 99).

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

For more information about awarding of financial aid, contact the Financial Aid Office. (Note: Regulations and deadlines are subject to change.)

TYPES OF FINANCIAL AID
Grants
A grant is gift aid that does not have to be repaid. Whenever criteria and funding levels permit, a student's financial aid award includes grants.

Pell Grants are federally funded awards. All undergraduate financial aid applicants are required to apply for a Pell Grant each year by following the instructions in the financial aid application packet. Recipients must be enrolled at least half-time and must maintain good academic standing and make satisfactory academic progress.

- Amount depends on financial need

Supplemental Educational Opportunity Grants are awarded to U.S. citizens or permanent U.S. residents who are at least half-time students in good academic standing and have exceptional financial need.

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

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

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

- Cal Grant A pays all or a portion of the registration fees
- Cal Grant B pays all or a portion of the registration fees plus a monthly stipend for living expenses

University Grants including Educational Opportunity Grants are available to both graduate and undergraduate students.

- Maximum varies each year depending on funds available

Bureau of Indian Affairs (BIA) Grants are awarded to students who are at least one-fourth American Indian, Eskimo, or Aleut, as recognized by a tribal group served by the Bureau of Indian Affairs and who show financial need. Applicants must submit a regular financial aid application and provide supporting documents to the campus. In addition, applicants should write to the agency which administers their tribal affairs and request a BIA Higher Education Assistance application. An appointment may be made with the BIA Financial Aid Counselor on campus for assistance in completing the application.

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

Loans

A loan is an award which permits you to postpone paying part of the cost of your education until you have completed school. A financial aid offer almost always includes a long-term, low-interest loan. Repayment of these loans begins after you graduate or withdraw from school.

University Student Loans of up to $12,000 per student are available. If graduate studies are undertaken, payment may be deferred until completion or termination of studies. (Co-signer is required for annual amounts above $1,000.)

- $3,000 undergraduate maximum for first 2 years
- $6,000 undergraduate maximum during 4 years
- $12,000 maximum for graduate students, including loans taken out as undergraduates
- 5 percent interest (subject to change)
- Repayment begins 6 months after graduation or withdrawal

National Direct Student Loans are for U.S. citizens or permanent U.S. residents. Students may be limited to a percentage of their need because of heavy demands and limited funds. Repayment starts six months after graduation or withdrawal from school and may be extended over 10 years. Under certain circumstances, deferment is possible. For example, deferments may be granted for temporary total disability or volunteer service in a private, non-profit organization (VISTA or Peace Corps). Some teachers of students from low-income families, and full-time teachers of handicapped children, may also qualify for partial loan cancellation.

- $3,000 undergraduate maximum for first 2 years
- $6,000 undergraduate maximum during 4 years
- $12,000 maximum for graduate students, including loans taken out as undergraduates
- 5 percent interest (subject to change)

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

- $2,500 maximum for veterinary medicine and first-year medical students
- $3,333 maximum for second-, third-, or fourth-year medical students
- 9 percent interest (subject to change)
- Repayment begins 12 months after receipt of the degree or withdrawal

Health Education Assistance Loan (HEAL) Program provides federally insured loans to graduate students attending the Schools of Medicine and Veterinary
Fees, Expenses and Financial Aid

Independently undergraduate students may borrow $2,500 per year, less any amount received as GSLs, up to a maximum aggregate under both programs of $12,500.

Graduate/professional students may borrow $3,000 per year up to a maximum aggregate of $15,000.

12 percent interest (subject to change)

No interest subsidy for this loan.

Repayment begins 60 days after loan disbursement.

Short-Term and Emergency Loans, provided by UCD alumni, ASUCD, and private donors, are designed to meet temporary, emergency financial needs of registered students. Apply at the University House Annex any time during the academic year.

$200 maximum, short-term loan

$50 maximum, emergency loan

Interest-free if repaid on time

Employment

The College Work-Study Program enables students to earn part of their financial aid award by part-time employment. To participate, you must first be awarded Work-Study as a part of your financial aid package. Your Work-Study award contributes more than financial assistance for your college education. It offers you a double bonus — money for your education plus experience. In increasingly competitive job markets, employers want applicants who are qualified by employment as well as academic experience. College Work-Study is coordinated by the Student Employment Center (see below).

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

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

The Student Employment Center helps students and their spouses find both part-time and temporary full-time employment on and off campus during the school year and vacation periods. Job opportunities are available in many fields of interest and require a wide range of skills, from entry level to highly technical. For further information, see the Student Employment Center section on page 32.

Scholarships and Awards

Information:
Scholarship Office
University House Annex
(916) 752-2393

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

Scholarships are awarded on the basis of academic excellence and exceptional promise. Recipients are chosen by committees made up of both students and faculty. In addition to academic records (a minimum grade-point average of 3.25 is required for college students, 3.5 for students submitting a high school transcript), selection is based on a letter of recommendation and a personal essay in which your University goals and objectives are stated. Some awards may be limited to students in specific majors or colleges, residents of certain geographical areas, students of a particular class standing, or students with demonstrated financial need. Most scholarships are not renewable and you must re-apply each year for scholarship aid.

Applications for scholarships are available at the start of each Fall Quarter for the following academic year. Deadline for submission of application materials is January 13 for academic year 1984-85. Announcement of winners is usually made beginning in mid-April. A Scholarship Office brochure provides more detailed information on specific scholarships.

Graduate students are also eligible for various scholarships and fellowships. (See also page 99.)

Regents Scholarships, among the highest honors that undergraduates at the University can receive, are granted to exceptionally promising freshmen or juniors enrolling in the Fall Quarter. Awards may be honorary (a $300 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs (see page 35). The Regents Scholarship Administrative Committee conducts personal interviews during the final selection process. These scholarships are renewable as long as you maintain a 3.25 grade-point average.

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

Alumni Scholarships, provided by the Cal Aggie Alumni Association in cooperation with the University, are based primarily upon leadership and scholastic achievement. Your financial need and extracurricular activities may also be considered.

- $500 maximum
- New undergraduates only
- Selection by local Alumni Association chapters

Military Scholarships are awarded to outstanding high school seniors without regard to financial need, as well as to UC Davis students who have demonstrated exceptional leadership and scholastic achievement during their freshman and/or sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UCD scholarship students participate in the Military Science (ROTC) program. Information and applications are available from the Department of Military Science, 125 Hickey Gymnasium, 752-0543.
APPLYING TO UC DAVIS

With careful reading you should find most of the answers to your admissions questions in the following sections. The key to preparing a successful application is supplying us with accurate, complete, and timely information.

The first step in applying for admission is to select a major or area of interest within a college that best suits your academic goals. To assist you in this choice you will find an overview of undergraduate studies listed within each College section. (See also Undergraduate Studies entry on page 45 and “How to Use this Catalog,” inside front cover.) The second step is to determine the admission category to which you belong. (Admission categories are defined on page 44.) This is a very important step because entrance requirements and filing dates may vary depending upon your category of admission. The third step is to obtain and complete the Undergraduate Application Packet and return it during the appropriate filing period. (On the application form there is a question that allows you to request information on financial aid and housing. Once your admissions application has been submitted you should keep in contact with the Financial Aid and Housing Offices since admission to the University does not guarantee the awarding of financial aid or housing.) The final step is to arrange to have all supporting documents (official test scores and transcripts) forwarded to the Undergraduate Admissions Office as early as possible.

Application and admission procedures are outlined beginning on page 42. A summary of the steps in the application procedure appears on page 52. Use this checklist to follow your application through the admissions process.

The Services to Handicapped Students Office encourages applicants with a physical impairment to contact that office (see page 30) for further information concerning admission or assistance if needed.

OFFICE OF RELATIONS WITH SCHOOLS/EOP

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

- Visiting schools to provide information about UCD to prospective students, counselors, school administrators, teachers, and parents
- Presenting conferences to acquaint the public with University programs
- Developing and distributing publications describing UCD’S programs and academic majors
- Coordinating information about course equivalencies and credit between the community colleges and UCD
- Administering a recruitment program designed to attract minority and low income students to the University

The Educational Opportunity Program/Student Affirmative Action (EOP/SAA) is a major effort of the Office. These special programs in the junior high schools, high schools, and community colleges are aimed at encouraging students from under-represented groups to become eligible for regular admission to the University. Programs include The Partnership Program’s “Early Outreach” in the junior high schools and “Immediate Outreach” in the high schools and community colleges; the Academic Enrichment Program, which provides encouragement for students to take science and mathematics courses in high school; the MESA program which introduces students to the field of engineering; and UPWARD BOUND, a pre-college motivational program in the high schools. The office also sponsors summer residential programs on the Davis campus to give students the opportunity to experience the diversity of University life through residence hall living, special classes, trips, and lectures.

VISITING THE CAMPUS

You may wish to arrange a visit to UC Davis sometime before you apply. If you have specific questions about application procedures or entrance requirements, it is a good idea to write or visit the Undergraduate Admissions Office. No appointment is necessary. For scheduled or individual tours of the campus, contact the Information Services Office, either in person or by telephone. If you would like to visit classes, the Information Services Office can make the appropriate arrangements.

PREPARING FOR UNIVERSITY WORK

A carefully planned program of high school courses provides you with the best preparation for University work. It can give you a definite edge in your undergraduate studies and the opportunity to do advanced preparation for your chosen field of study. Most important, if you master certain basic subjects and skills in high school, you substantially increase your chance of success at the University.

As a prospective University student, you should give priority to completing the high school courses required for admission — the "A-F" requirements described on page 46. In addition, you should give careful thought to the general field of study, if not the specific major, that you want to pursue at the University. If you can make this decision in advance, you can then plan to take additional high school courses related to your field. Your school counselor or one of your teachers can help you select the courses you should take.
Admission

You should understand that the "A-F" requirements for admission are minimum entrance standards. Completing the required high school courses with satisfactory grades will not automatically prepare you for freshman work in every subject, much less in your major or program of study. Many entering students discover to their dismay that they are not adequately prepared for basic courses, such as English composition and calculus, which they are expected to take in their freshman year. Also, many undergraduate majors, particularly those in sciences and mathematics, require more high school preparation than that necessary for admission. This lack of preparation can cause problems for students who do not choose a major until after they enter the University, or for those who prepare for one major but later decide to change to another.

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

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

Writing: Effective critical thinking and proficiency with the written language are closely related, and both are skills which every University student must master. By University standards, a student who is proficient in English composition is able to: a) understand the assigned topic; b) select and develop a theme by argument and example; c) choose words which aptly and precisely convey the intended meaning; d) construct effective sentences, i.e., sentences that economically and successfully convey the writer's ideas and display a variety of structures; e) demonstrate an awareness of the conventions of standard written English, avoiding such errors as sentence fragments, run-together sentences, faulty agreements, and improper pronoun references; and f) punctuate, capitalize, and spell correctly.

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

Mathematics: Many undergraduate majors require preparation in mathematics beyond the two years necessary for admission to the University. All majors in the natural and life sciences, engineering, and mathematics require preparation for calculus. Many majors in the social sciences, for example, require preparation for statistics or calculus, sometimes both. If you have selected a major that requires either calculus or statistics, you should expect to take that course during your freshman year at the University, and take the necessary mathematics in high school.

Calculus is also required for undergraduates preparing for careers in environmental sciences, dentistry, medicine, optometry, pharmacy, and biostatistics. Many students are not aware of the large number of fields outside the natural and mathematical sciences which require calculus or statistics as prerequisites.

You should prepare yourself for University courses in calculus while you are still in high school. In addition to the two years of mathematics required for admission, you should take a second year of algebra and a year of precalculus mathematics. These courses should include: a) basic operations with numerical and algebraic functions; b) operations with exponents and radicals; c) linear equations and inequalities; d) polynomials and polynomial equations; e) functions and their graphs; f) trigonometry, logarithms, and exponential functions; and g) applications and word problems. Students who plan to enter a field which requires statistics should take at least the second year of algebra in high school.

If you are not proficient in basic and intermediate algebra, you will be at an enormous disadvantage in the University. You will have to take one or more precalculus courses before beginning calculus, and may also have to take preparatory courses before beginning statistics. The necessity to take these preparatory courses could seriously delay your undergraduate studies.

APPLICATION PROCEDURES

Undergraduate application packets may be obtained from any California high school, community college, or University of California Admissions Office. Completed application materials and communications concerning admission to UC Davis should be sent to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis 95616.

A nonrefundable application fee of $30 must accompany your application. Please make your check payable to The Regents of the University of California. If you have applied previously and were ineligible, or if you were admitted previously and did not register, you are required to file a new application for the quarter for which you seek admission and submit a new application fee.

Opening filing dates are the same for all UC campuses and are listed below. All applications filed during the first month of the filing period will be accepted for consideration. This campus may continue to accept applications beyond the initial filing period; however, after the first month, some departments, colleges, or campuses may close to new applicants as enrollment quotas are filled. Once a department, college, or cam-
for admission to more than one campus, admissions processing will be suspended until you notify the Student Academic Services (670 University Hall, University of California, Berkeley 94720) which campus is your first choice. Fees submitted with duplicate applications cannot be refunded.

**Transcripts and Test Scores**

Transcripts and other documents submitted during the application process become the property of the University and cannot be returned or forwarded to another institution or UC campus. Please note that it is your responsibility to arrange for transcripts and to ensure that they arrive promptly.

If you are in high school when you apply, please request that your high school send an official transcript of all work completed through your junior year directly to the Undergraduate Admissions Office. This preliminary transcript should also include a list of work in progress (senior-year courses in which you are currently enrolled or plan to complete before graduation). In addition, you must also submit a final transcript including a statement of graduation, a Certificate of Proficiency or a General Education Development (GED) certificate (see page 51). Freshman applicants (see “Explanation of Application Categories”) are also required to submit results of their SAT or ACT tests and three Achievement Tests (see page 47).

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

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**Duplicate Applications**

Students should file an application with one campus only, listing alternate campus preferences in the space provided on the application. If you file simultaneously for admission to more than one campus, admissions processing will be suspended until you notify the Student Academic Services (670 University Hall, University of California, Berkeley 94720) which campus is your first choice. Fees submitted with duplicate applications cannot be refunded.

**Delays in notification can be avoided if you complete the application accurately, include your essay and filing fee, and arrange for transcripts (including course work in progress) and official test scores to be sent to the Undergraduate Admissions Office as soon as they are available.** Because advanced standing eligibility depends upon the final outcome of quarter or semester course work in progress, this office must receive a final transcript of all work completed before you may register.

**Quarter**

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<tbody>
<tr>
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<tr>
<td>Fall 1984</td>
<td>November 1, 1983</td>
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<tr>
<td>Winter 1985</td>
<td>July 1, 1984</td>
</tr>
<tr>
<td>Spring 1985</td>
<td>October 1, 1984</td>
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</tbody>
</table>

*An applicant seeking admission to the Spring Quarter may not enroll in any semester system school for the Spring Semester immediately preceding the UCSC Spring Quarter.

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

If, after you have applied to the Davis campus, your plans change and you prefer to be considered for admission on another UC campus, you are required to write to the Admissions Office of the campus you prefer to attend. In your letter to the new campus, you should state (1) your intended major, (2) the quarter for which you are applying, (3) the level for which you are applying (i.e., freshman or advanced standing), (4) the name of the campus to which you originally applied, and (5) the reasons for your change. The new campus will ask the Davis campus to transfer your records, provided the new campus still has openings for admission at the time of your letter.

Processing a change of campus preference takes several weeks; however, your admissions priority will be assigned based on the date your request for a change is made. You should be aware that special program commitments (such as the EOP/SAA or UCLA's Academic Advancement Program) do not transfer from one campus to another.

If you requested housing or financial aid information at UCD, you should inquire of the new campus housing and financial aid offices whether pertinent records have been transferred and about the new campus's priorities, deadlines, and availability of financial aid and housing.

Notification

After returning your application materials you may be wondering,

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

Our notification procedures answer these questions in order. First, you will be mailed a notice acknowledging receipt of your application; later, you will receive a letter confirming your admission status.

As to your chances of being admitted, during the last academic year well over 90 percent of the eligible applicants who applied on time to UC Davis were admitted.

The length of time before admission notification varies, depending upon the completeness of your application. For example, most applicants for Fall Quarter will receive final notification by early spring, provided records have been received promptly.

Acceptance of Admission

When you receive your notification of admission you will also receive an important form called the "Statement of Intention to Register" (SIR). You must fill out the form and return it to this office, along with the required nonrefundable $50 deposit, in order to complete the admissions process. There is no specific deadline for submitting your SIR; however, if you plan to attend the Summer Advising Conference, you should submit this form by the end of April. The deposit is applied to your University Registration Fee as long as you register in the quarter to which you are admitted. Intercampus transfer, EOP/SAA, and readmission applicants (see Explanation of Application Categories below) are not required to submit the $50 deposit.

EXPLANATION OF APPLICATION CATEGORIES

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

A freshman applicant (page 45) is a student who has graduated from high school or who has earned a Certificate of Proficiency or a General Education Development Certificate, but has not enrolled since high school attendance in a regular session of any collegiate-level institution (with the exception of summer session attendance immediately following high school graduation).

An advanced standing (transfer) applicant (page 48) is a student who has been registered in a regular or extension session of a college or university since high school graduation.

An Intercampus transfer applicant (page 50) is an undergraduate student who is currently, or was previously, registered in a regular session at another campus of the University of California and has not since been registered in another collegiate institution.

An Intercampus transfer reentrant applicant is an undergraduate who was formerly registered at UC Davis, then registered at another UC campus, and is now transferring back to UC Davis from a UC campus. This student follows the filing deadlines established for readmission applicants.

An Educational Opportunity Programs/Student Affirmative Action applicant (page 49) is a low-income or minority student who may or may not meet the standard admission requirements for freshman or advanced standing status.
A readmission applicant (page 55) is a student who was formerly registered on the Davis campus, who has interrupted the completion of consecutive quarters of enrollment and who is not currently participating in the Planned Educational Leave Program. (See page 49 for reentry for the nontraditional student.)

A reentry applicant is an undergraduate student age 25 or over or a graduate student age 30 or over (see page 49).

A limited status applicant (page 50) is a college graduate (or near-graduate) who is not a candidate for an advanced degree, but who has the limited objective of enrolling in certain courses on the Davis campus.

A special status applicant (page 50) is any person 21 years of age or older who is prepared, by reason of special attainment or background, to undertake limited course work toward a specific objective.

A part-time status student is a person who wishes to complete a degree at UC Davis on a part-time enrollment basis. See page 51 for details.

Employee-student status is for a UC career employee who wishes to work toward a degree through the Employee-Reduced Fee Program. See page 51 for details.

A second baccalaureate applicant (page 50) is a college graduate who seeks an additional bachelor's degree. Approval is granted only to students who have completely changed their educational objectives.

An international applicant (page 50) is a student who is not a U.S. citizen, immigrant, or refugee.

A concurrent enrollment applicant (page 51) is a community member who wishes to fulfill an academic interest or to test academic ability by enrolling in a limited number of regular University courses on a space-available basis. This program is offered through University Extension and does not require the applicant to meet regular admission requirements.

A graduate applicant is a college graduate who wishes to complete a program of studies leading to an advanced degree, i.e., the master's or doctorate. See the section beginning on page 95 for details.

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

UNDERGRADUATE STUDIES

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

The College of Agricultural and Environmental Sciences focuses on seven areas of concentration: animal science; plant sciences and pest and disease man-

agement; food; nutrition, textile, and consumer sciences; applied economic and behavioral sciences; resource sciences and engineering; environmental studies; and biological sciences (majors are listed on pages 67-69). The College of Engineering focuses its curricula on the engineering sciences (majors are listed on page 77). The College of Letters and Science curricula encompass the humanities, including the arts, and the social, physical, and biological sciences. They enable the student to pursue fundamental knowledge and to learn those basic intellectual disciplines which lead to a liberal education (majors are found on page 86).

ENTRANCE REQUIREMENTS

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

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

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

ADMISSION AS A FRESHMAN

To be eligible for admission to the University of California as a freshman, you must meet specific Subject, Scholarship, and Examination Requirements. If you have any questions or need assistance in determining your eligibility, please contact your school counselor, the Office of Relations with Schools, or Undergraduate Admissions on the nearest UC campus. Final determination of UC eligibility is made by the campus Admission Office.

Subject Requirement

You must complete certain high school courses in the subject areas listed below with at least a grade of C in each semester of each course. (If your school gives only year-end grades, you must complete each year course with a grade of C or better.) The required course sequence is often referred to as the "A to F" pattern.

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

"You'll find faculty and staff members very willing to help you out, but they can only assist if you let them know you need help."
Admission
(Note: A year course in high school constitutes one unit.)

A. History — 1 year
One year of United States history, or one-half year of United States history and one-half year of civics or American government.

B. English — 4 years
Four years of English — composition and literature (university preparatory in nature). Not more than one year will be accepted from the ninth grade. (See "English proficiency" below.)

C. Mathematics — 2 years
Two years of mathematics — elementary algebra, geometry, intermediate and advanced algebra, trigonometry, calculus, elementary functions, matrix algebra, probability, statistics, or courses combining these subjects. Nonacademic courses such as arithmetic and business mathematics may not be used.

D. Laboratory Science — 1 year
A year course in one laboratory science, taken in the tenth, eleventh, or twelfth grade.

E. Foreign Language — 2 years
Two years of one foreign language. Any foreign language with a written literature may be used.

F. Advanced Course — 1 or 2 years
This requirement must be satisfied by one of the following:

- Mathematics: one year of advanced mathematics — intermediate algebra, trigonometry, or other comparable mathematics courses.
- Foreign language: either an additional year in the same language used for "E" above or two years of a second foreign language.
- Science: a year course in any laboratory science completed subsequent to the laboratory science used for "D" above.

The required courses listed above constitute only 10 or 11 of the total (15) units required for admission to the University. The remaining units provide an opportunity for you to strengthen your preparation for University work. Additional courses in mathematics, especially second-year algebra and trigonometry, are essential for many major programs.

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

English Proficiency

Instead of a fourth year of high school English, you may satisfy the English Proficiency Requirement by achieving above level in one of the following examinations:

- College Board Achievement Test in English Composition (a score of 600 or above);
Examination Requirement

All freshman applicants must submit scores from the College Entrance Examination Board (CEEB) or the American College Testing (ACT) Program. If you are applying for admission to the Fall Quarter, you should take the tests no later than January of your senior year (earlier testing is recommended for prospective engineering students). The following tests are required:

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

  or

- American College Test

and

- Three Achievement Tests (CEEB), which must include (a) English Composition, (b) mathematics (level I or II), and (c) one test from the social studies or science or foreign language, or the test in English Literature.

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

The accompanying table is an eligibility index. If your grade-point average in the "A to F" requirement is less than 3.30 you should refer to this table to see what examination scores you must earn to be eligible for University admission.

<table>
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<th>Grade-Point Averages</th>
<th>ACT Composite Scores</th>
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*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to 35 maximum.
†The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to 1600 maximum.
Admission by Examination Alone

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

Examination Arrangements: Make arrangements to take the required Scholastic Aptitude Test (SAT) and the Achievement Tests by writing to The College Board, 1947 Center Street, Berkeley, CA 94704. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not the University.) Your test scores will be regarded as official only if they are reported directly to the Undergraduate Admissions Office by a Testing Service. Your final notification of admission cannot be released until your scores from all tests have been received by the Undergraduate Admissions Office. (UC Davis's CEEB code is 4834 and the ACT code is 0454.)

Admission to Advanced Standing

An advanced standing transfer applicant is a student who has been registered in a regular or extension session of a college or university since high school graduation. An advanced standing student may not disregard his or her previous college records. The Undergraduate Admissions Office determines an applicant's status by looking at units that are transferable to the University. These units may not be accepted by the Dean of your college for meeting breadth, major, or degree requirements.

Admission Requirements

If you are an advanced standing applicant, the requirements for admission will vary according to your high school record. No examinations are required for admission purposes if you have completed more than 12 quarter or semester units of transferable college credit and graduated from high school before June 1979. If you graduated from high school June 1979 or later and have fewer than 84 transferable quarter (56 semester) units, you may be required to submit examination results. In any case, if you have completed fewer than 12 units since high school graduation, the examination requirements for freshman applicants also apply. If you are a nonresident, you need to meet the additional requirements as described on page 50.

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

- If you graduated from high school before June 1979 and have completed the "A to F" subjects with a grade-point average of 3.00 in those subjects, you may be admitted any time after you have established an overall college grade-point average of 2.00 or better;*

or

June 1979 or later and have completed the "A to F" subjects and met the Eligibility Index (see page 47), you may be admitted any time after you have established an overall college grade-point average of 2.00 or better.

In either case, if you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation, you must also satisfy the examination requirement for freshmen (see page 47).

- If you graduated from high school before June 1979 and your high school scholarship average in the required subjects was 3.00 or better but you had not completed one or more of the "A to F" subjects while in high school, you may be admitted after you have met the criteria, (1) through (3), below;*

or

June 1979 or later and have met the Eligibility Index but you had not completed one or more of the "A to F" subjects while in high school, you may be admitted after you have:

1. established an overall grade-point average of 2.00 or better in another college or university;
2. completed with a grade of C or better, appropriate college courses in the high school subjects that you lacked; and
3. completed 12 or more transferable quarter (or semester) units, or have met the examination requirement.

- If you graduated from high school before June 1979 and were not eligible for admission as a freshman because of low scholarship or a combination of low scholarship and a lack of the required subjects, you may be admitted after you have met the criteria, (1) through (3), below;*

or

June 1979 or later and did not meet the Eligibility Index and lacked the required subjects, you may be admitted after you have:

1. established an overall grade-point average of 2.40 or better in another college or university;
2. completed 84 transferable quarter (56 semester) units of credit in college courses; and
3. completed one of the following:
   a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit = one year-long course) of credit may be waived;
   or
   b. one college course in mathematics; one in English; and one in either U.S. history, a laboratory science, or a foreign language, all with grades of C or better. The mathematics course must complete a sequence of courses at least as advanced as the equivalent of two years of high school algebra (elementary and intermediate) or one year of algebra (elementary) and one year of high school geometry. Courses other than mathematics must be transferable to the University.

SPECIAL PROGRAMS AND ADMISSIONS CATEGORIES

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

The Educational Opportunity Program/Student Affirmative Action is designed to assist and provide opportunities in higher education for students from underrepresented ethnic groups and economically/educationally disadvantaged backgrounds.

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

Each EOP applicant must complete the regular UC admission forms and mark the appropriate places on the application related to EOP. In addition, the applicant is advised to take particular care to elaborate on personal circumstances in the required essay.

The $30 application fee is waived for qualified EOP applicants. If you are eligible for EOP sponsorship you will be notified at the time you receive your official letter of admission. If you are ineligible for EOP you will receive notification as soon as the determination has been made and will be required to submit the nonrefundable $30 fee in order to complete the processing of your application.

Financial aid is available to those individuals with a demonstrated financial need (see page 36). EOP/SAA also provides special assistance in areas pertinent to academic and student life (see page 27).

Academic Reentry Program

The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories who are reentering the University after life and work experience. Preadmission and reentry advising provides assistance in combining past study with current academic and career goals. A reentry student who has not met the entrance requirements but

*If your high school scholarship average in the "A to F" subjects (page 46) was from 3.00 to 3.09 (D or F grades are not acceptable), you must earn a score of 2500 or better on the SAT and Achievement Tests required for freshmen. See test requirements, page 47.
Second Baccalaureate Status

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

Admission to the College of Agricultural and Environmental Sciences and the College of Letters and Science requires the approval of the Admissions Officer and the Dean of the college. (Enrollment pressures have necessitated closing this category of admission for the College of Engineering.)

Limited Status

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

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

Admission to the College of Agricultural and Environmental Sciences and the College of Letters and Science requires the approval of the Admissions Officer and the Dean of the college. You must also submit transcripts from all schools attended. Fees and filing dates are the same as those for new applicants. (Enrollment pressures have necessitated closing this category of admission for the College of Engineering.)

Special Status

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

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

Nonresident Applicants

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

If you lack any of the required high school subjects, and are a nonresident, you must complete college courses in those subjects with a grade of C or higher. If you graduated from high school with less than a 3.4 grade point average in the subjects required for freshman admission you must have completed at least 64 quarter units (56 semester units) of transferable work with a grade-point average of 2.8 or higher. Upon successful completion of that work, you may have the requirement for two units of the required high school subjects waived.

Intercampus Transfer Status

If you are currently registered as an undergraduate student or have been registered on another campus of the University of California, and have not subsequently registered at another institution, you may apply for an intercampus transfer to UC Davis. Intercampus transfer applications are available from and must be returned to the Registrar's Office on the UC campus you last attended. A nonrefundable filing fee of $30 must be submitted with your transfer application. Filing dates are the same as those listed for freshman applicants.

International Student Status

Applicants from other countries will be admitted in accordance with the general procedures governing nonresident admission. You may request an application by writing the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, California 95616. If you are not a United States citizen, immigrant, or refugee, you must return this application with your completed Financial Certification Form and the nonrefundable application fee of $30. Prior to admission, the Financial Certification Form is required to demonstrate the availability of $11,250 for the first year of study and adequate funding for the remaining years in the United States, until such time as the academic program is completed. Prior to registration, the signed Statement of Responsibilities for Privately Funded Student or the Statement of Responsibilities for Sponsored Student is required. It is very important to file your application during the appropriate filing period for the quarter for which you wish to attend (see page 43). Applications received after the first month of the filing period will be processed as space permits.

If your schooling has not been in English, or if English is not your native language, you are required to submit the results of the Test of English as a Foreign Language (TOEFL). Write to the Educational Testing Service, P.O. Box 889, Princeton, New Jersey 08540, to arrange a testing date and location in your home country. The minimum TOEFL score which will be accepted is 500. Prior to registration, international students whose native language is other than English are required to demonstrate that their command of English is sufficient to
profit by instruction at the University. A proficiency examination is given at UC Davis during the week before school begins. If you do not pass this examination, you must enroll in remedial English classes, English 25 or 26, until you have acquired the necessary language skills.

As part of the application process, you are also required to submit your secondary school and college records (English translations must accompany all records). These records should include all certificates and transcripts of grades awarded in each subject. You will receive credit for University studies outside the United States if the course work was completed in an approved university and is considered to be academically equivalent to course work offered at the University of California. The Undergraduate Admissions Office will have the final authority for assessing the transferability of credit.

For additional information, see page 29.

**Part-Time Status**

If you are employed, retired, have family responsibilities, or health problems which preclude full-time study, you may qualify for enrollment in part-time status. Students may change status between full-time and part-time as their circumstances change. To be considered eligible, undergraduate students must be enrolled for ten units or fewer per quarter. Minimum progress requirements are waived for part-time students. A petition, available at the dean's office, must be approved by the Student Health Services, as full-time students. For information on credit applicable to part-time students, see footnotes on page 35.

**Employee-Student Status**

UC career employees who are qualified for admission to the University may enroll for courses or work toward a degree through the Employee Reduced Fee Program. Employee students pay 1/3 of the regular fees and enroll for up to nine units for or for three courses per quarter, whichever is greater. Employee students change to part-time status after admission. Detailed information is in the UC Davis Staff Personnel Policy Manual (Section 260.23) available in department offices, at the Library Reference Center, or the Office of Employee Relations and Development. Petitions can be obtained through the employee's unit.

**Concurrent Enrollment Status**

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

For information, write the University Extension Office, 4485 Chemistry, University of California, Davis 95616.

**For admission to the Graduate Division**, see page 96.

**For admission to the Graduate School of Administration**, see page 107.

**For admission to the School of Law**, see page 109.

**For admission to the School of Medicine**, see page 113.

**For admission to the School of Veterinary Medicine**, see page 117.

**ADDITIONAL INFORMATION**

**Options for Nontraditional Students**

While UCD graduate and undergraduate degree programs are designed primarily for students who can enroll full time on campus, the following programs make it possible for qualified nontraditional students to accumulate credit without enrolling full time:

For students admitted to UCD:

- Part-time status (see this page)
- Employee-student status (see this page)
- Credit by examination (see page 58)

For admitted and non-admitted UCD students:

- University Extension courses (see page 124)
- Summer Sessions courses (see page 123)

For students who have not been admitted to UCD:

- Concurrent courses (see page 124)

Preadmission advising for nontraditional students is available through the Academic Reentry Program (see page 49).

**High School Proficiency Examination**

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

**Subject A Requirement**

The University requires every undergraduate student to demonstrate college-level proficiency in English composition. This requirement is known as "Subject A." See page 61 for a full description of the means by which this requirement may be satisfied.

**Advanced Placement Examinations**

The Advanced Placement Examinations of the College Entrance Examination Board are taken in conjunction with courses taken in high school. You can receive 10 quarter units of University credit for each examination (except mathematics) in which you earn a score of 5, 4, or 3. These credits will apply toward the total required for graduation from the University. See the table on page 59 for course work equivalencies and limitations of credit.
Credit from Another College

The University gives unit credit to transfer students for courses they have taken at other accredited colleges and universities, including some extension courses. To be accepted for credit, the courses must be consistent with those at the University as determined by the Admissions Office. (Students accepted into the College of Agricultural and Environmental Sciences should refer to page 72 in regards to petitioning for upper-division courses evaluation.)

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

Applicants to the College of Agricultural and Environmental Sciences and to the College of Letters and Science who have more than 120 quarter units of credit for transfer must have the approval of the Dean of the College and satisfy University requirements for admission. (College of Engineering applicants should refer to page 75.)

REDIRECTION

If at the end of the first month of the application filing period (see page 43) there are more qualified applicants than a UC Davis college can accommodate within its enrollment quotas, all applications will be reviewed and some applicants may be redirected to another campus of the University.

ADMISSION CHECKLIST

☐ 1. Obtain the undergraduate admissions packet from your high school, a community college, or a campus of the University of California. If you are not a California resident, request an application from the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, CA 95616.

☐ 2. Complete the application, listing the college and major you prefer. Include your essay and a check or money order for $30 with your application forms and return them to the Undergraduate Admissions Office during the first month of the filing period for the quarter in which you wish to enter.

☐ 3. Request that transcripts, including work in progress, be sent from those schools attended. If test scores are required, please arrange to have these forwarded by the testing agency.

☐ 4. Retain for your records the notice received from the Undergraduate Admissions Office acknowledging receipt of your application.

☐ 5. Respond to Undergraduate Admissions Office requests for additional information, such as transcripts, test scores, or confirmation of work in progress. Note: Your eligibility for admission cannot be evaluated until all your application materials are received, i.e., application form, filing fee, essay, transcript, work in progress, and test scores (if required), so it is important to make these arrangements if you want to avoid delay in the processing of your application.

☐ 6. Retain for your records the notification of admission received with your "Statement of Intention to Register" form.

☐ 7. Return your "Statement of Intention to Register," with the nonrefundable advance deposit of $50 (if required), as soon as possible so your registration materials can be ordered before the day you register.
Academic Information
WHEN YOU ARRIVE

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

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

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

Orientation Week, held at the beginning of each Fall Quarter, offers new and continuing students a variety of activities, special events, and meetings to get the new quarter started. Some of the things that are happening include departmental open houses, tours of the campus, concerts and lectures, registration, and meetings with deans and advisers. Orientation activities are also held for students entering in Winter and Spring Quarters.

REGISTRATION PROCEDURES

Information:
Registrar’s Office
124 Mrak Hall
752-2973

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

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

- Submit a Statement of Residence (see page 342).
- Return the completed Medical History form, results of a tuberculin "skin" test, and the Insurance Information Request form. These forms are mailed to each new student from the Student Health Center.

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

Your registration will be complete when you have presented your completed registration forms to the Registrar’s Office by the announced deadline and have received your validated Registration Card. Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of $50 to defray the extra clerical costs of late registration. Permission to register after the tenth day of instruction will be allowed only under conditions where action or inaction on the part of the University delays registration. A recommendation from an appropriate administrative unit will be required.

If you have not satisfied the Subject A requirement, you must enroll in the English A course (see page 204). Consult the current Class Schedule and Room Directory (published about seven weeks before the beginning of the quarter and available in the campus bookstore) for more detailed information.

It is the responsibility of each student to be familiar with announcements and regulations printed in official publications.

Study List Unit Limitations

Undergraduate students must carry a study load of at least 12 units each quarter in order to be certified as full-time students for social security, insurance, and financial aid purposes, or to compete in intercollegiate athletics. Graduate students must carry a study load of at least 4 units each quarter in order to be certified as full-time students.

Undergraduate students who qualify for part-time status (see page 51) enroll for ten units or fewer per quarter; and graduate students with part-time status enroll for one-half course load (see page 98). Employee-students (page 51) may enroll for up to nine units or three courses, whichever is greater, any given quarter.

Students should familiarize themselves with the quarterly minimum-progress requirements on page 60. Undergraduate students should refer to College sections for quarterly maximum-unit allowances. Students should also refer to the Advanced Placement chart on page 59 to eliminate the possibility of duplication in credit.

Adding or Dropping Courses

You are officially enrolled in all courses listed on your individual class schedule and will be held responsible for completing each of the courses. You must file a Drop-Add petition in order to add or drop courses after this initial enrollment. Petitions are to be filed with the office of the department offering a course to be added or dropped. See page 4 of this catalog for final dates for filing petitions each quarter, and refer to the appropriate Class Schedule and Room Directory for filing procedures. After published deadlines permission to change your study list may only be granted by the dean of your college or school and only in special circumstances. Graduate students must have their advisor's approval in order to drop courses. A course which is on your study list and for which you did not gradable work will be reflected on your official transcript. A verification of your study list is available some time after the fifth week of each quarter.

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. Petitions for this purpose may be obtained from the Registrar's Office (Letters and Science major change petitions are obtained from department offices).
Petitions for a change of College must be filed in the first five weeks of the quarter. See under various college or school sections in this catalog for eligibility and major change requirements.

**Change of Name**

Petitions for this purpose may be obtained from the Registrar. (Students planning to graduate should file this petition during the first five weeks of the quarter in which they intend to graduate.)

**Withdrawals**

Withdrawals may be granted by the University for emergency reasons or for good cause. In order to withdraw approval must first be obtained from the dean of the student's college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades. Forms for requesting authorization for withdrawal are available at the Registrar's Office. Information on fee refunds is on page 36. (See below for a planned temporary leave.)

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

**Readmission after an Absence**

If you are a former UC student planning to return to the University of California on the Davis campus, you must file an Application for Readmission with the Registrar along with the nontransferable, nonrefundable fee of $30. (You are a former student if you have interrupted the completion of consecutive terms of enrollment on the Davis campus.) Official transcripts of all work you may have attempted in the interim must be submitted.

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

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deadline Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1983</td>
<td>August 19, 1983</td>
</tr>
<tr>
<td>Winter 1984</td>
<td>December 9, 1983</td>
</tr>
<tr>
<td>Spring 1984</td>
<td>March 9, 1984</td>
</tr>
<tr>
<td>Fall 1984</td>
<td>August 17, 1984</td>
</tr>
</tbody>
</table>

Graduate students applying for readmission should refer to page 97 of this catalog for filing deadlines.

**Planned Educational Leave Program (PELP)**

A Planned Educational Leave is defined as a planned interruption or pause in your regular, full-time education during which you temporarily cease formal studies at Davis while pursuing other activities that may assist in clarifying your educational goals. The intent of the program is to make it possible for a student to suspend academic work, leave the campus, and later resume studies with a minimum of procedural difficulties.

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

Each applicant for enrollment in PELP is required to file an application form, including a brief explanation of the reasons for leaving the campus, and must state in writing when he or she intends to resume academic work. Applications for Planned Educational Leave should be filed with the Registrar's Office (Admissions Office for new students) no later than the tenth day of instruction.

A fee of $30 is charged, payable when you enroll in the program. This fee is identical to that paid by a student who withdraws and is required to pay a readmission fee upon return.

The minimum Planned Educational Leave is one full quarter; the normal maximum is one full academic year. You may, however, request an extension of your leave. For purposes of this program, leave of one full quarter is defined as a leave beginning no later than the second week of instruction in a quarter. (See page 36 for fee refunds.)

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

At the end of the leave, you are guaranteed readmission as long as you resume regular academic work at the agreed-upon date. Students who do not return at the prearranged time and do not extend their leave will be considered to have withdrawn.

You will not be eligible to receive normal University services during the planned leave. Certain limited services, however, such as placement and student employment services, counseling, and faculty advising are available. Students on Planned Educational Leave may purchase a health care card from the Student Health Service and may retain library privileges by purchasing a library card. International students should consult Services for International Students and Scholars to find out what effects the Planned Educational Leave will have on their status. Grants and other financial aids will be discontinued for the period of the leave, but every effort will be made, where legally possible, to allow you to renegotiate loan payment schedules and to ensure the availability of financial aid upon your return.

Applications and specific information about the Planned Educational Leave Program are available from the Counseling Center in North Hall. For those students who have been admitted but have not attended classes, applications and information are available from the Office of Admissions, Mrak Hall.

**SCHOLASTIC REQUIREMENTS**

The academic year consists of three ten-week quarters. Two six-week summer sessions are also offered. Students normally attend the University three quarters per school year, but you may accelerate your progress by enrolling in one or both summer sessions (see page 18).
Credit for academic work in the University is evaluated in quarter units. One quarter unit represents three hours of work per week by the student, including both class attendance and preparation. Laboratory and discussion sections may or may not be given unit value. To convert quarter units to semester units, multiply by 2/3; from semester to quarter units, multiply by 3/2.

**GRADING**

Every instructor is required to assign a grade for each student registered in a course. The following grades are used to report the quality of a student's work at UCD:

- A, excellent
- B, good
- C, fair
- D, barely passing
- F, not passing (work so poor that it must be repeated to receive recognition)
- I, incomplete (work is satisfactory but incomplete for a good cause)
- IP, in progress
- P, passed (grade C– or better)
- NP, not passed
- S, satisfactory
- U, unsatisfactory

The grades A, B, C, and D may be modified by a plus (+) or minus (−).

**Grade Points**

Grade points are assigned each letter grade as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A+</td>
<td>4.3</td>
</tr>
<tr>
<td>A−</td>
<td>3.7</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
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<td>B−</td>
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<tr>
<td>C</td>
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<tr>
<td>C+</td>
<td>2.0</td>
</tr>
<tr>
<td>C−</td>
<td>1.7</td>
</tr>
<tr>
<td>D</td>
<td>1.3</td>
</tr>
<tr>
<td>D+</td>
<td>1.0</td>
</tr>
<tr>
<td>I</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Grade-Point Average (GPA)**

The grade-point average is computed on courses undertaken in the University of California, with the exception of courses undertaken in University Extension. The value of grade points over units attempted determines your grade-point average. The (grade-point) balance represents the number of grade points above or below a C average. The grades IP, P, S, NP, and U carry no grade points and are not included in grade-point computations. Grades I are not included in the GPA at the end of the quarter, but are counted as F in determining if a bachelor's degree candidate has earned the minimum 2.0 GPA required for graduation.

A student at Davis is expected to maintain a C (2.0 GPA) or better in all work undertaken in the University. If you fall below a C average, you are considered "schoastically deficient" (see page 58).

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

Subject to regulation by the faculties of the various colleges and schools, an undergraduate student in good standing can petition to take specific courses on a Passed/Not Passed basis. Petitions are available in deans' offices as of dates published in the Class Schedule and Room Directory and must be filed before the end of the fifth week of instruction.

The grade P is assigned for a grade of C– or better. Units thus earned are counted in satisfaction of degree requirements but are disregarded in determining your grade-point average.

The intent of this option is to encourage exploration in areas in which you have little or no previous experience by alleviating grading pressures. The maximum number of units graded P that will be accepted for degree credit is ⅓ of the units completed in residence on the Davis campus. Consequently, at least ⅔ of the units completed in residence at Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade. Your quarterly transcript will show the total number of units graded P you have accumulated, as well as the number of units graded P that are in courses taken on a P/NP basis at your option.

If you are planning to take courses on a P/NP basis, you should also familiarize yourself with the requirements of your particular school or college which may have introduced conditions or restrictions in addition to the University requirements.

If you elect the P/NP grading option for courses graded upon completion of a two- or three-quarter sequence (in-Progress grading), a petition submitted by the end of the fifth week of the first term applies to all terms of the course. A petition submitted during the second term but before the end of the fifth week of the second term applies to the second and any remaining terms of the course.

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

**Satisfactory/Unsatisfactory (S/U)**

Graduate students, under certain circumstances, may be assigned grades of S or U, but units gained in this way will not be counted in calculating the grade-point average. The grade of S is awarded to graduate students for work in graduate courses which otherwise would receive a grade of B− or better, and in undergraduate courses for work which otherwise would receive a grade of C− or better.

Petitions are available from the Graduate Division and must be signed by your graduate advisor. (See page 122 for Individual Study Courses.) Courses in which a C, D, or F grade is received may not be repeated with the S/U option.

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

In specific courses which have been approved by the respective departments and by the appropriate committees on Courses of Instruction, individual instructors will assign only Passed or Not Passed grades. (See pages 121-22 for Special Study courses.)
In-Progress (IP) Grading

For a course extending over more than one quarter (designated "deferred grading only, pending completion of sequence" in course descriptions), evaluation of student performance is deferred until the end of the final quarter. Provisional grades of IP are assigned in the intervening quarters and are replaced with the final grade at the completion of the sequence. In order to gain credit toward graduation, a student must successfully complete the entire sequence in successive quarters.

Incomplete Grades

The grade of I may be assigned when a student's work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause as determined by the instructor. (Good cause may include illness, serious personal problems, an accident, a death in the immediate family, a large and necessary increase in working hours, or other situation of equal gravity.) You may replace an I grade with a passing grade and receive unit credit (and grade points if the instructor assigns a letter grade) provided you satisfactorily complete the course work as specified by the instructor. In order to change your records, you must obtain a petition from the Registrar's Office and present it to your instructor for completion and mailing. An I grade must be replaced with a letter grade (or F or S grade) before the end of the third succeeding term of the student's academic residence, or the grade will revert to an F (or NP or U). If a student's degree is conferred before the expiration of the time limit for an I grade conversion, and the I grade has not been replaced, the I grade will remain on the student's record.

Courses for which an I grade has been assigned may not be repeated except on an audit basis. An undergraduate student whose record shows more than 16 units of I grades will be subject to disqualification (see page 60). A graduate student who accumulates more than eight units of I grades will be subject to probation.

Incomplete grades will not be included in your grade-point average at the end of a quarter. At the time of graduation, however, any remaining I grades are included when your grade-point average is computed, in order to determine whether you have achieved the 2.0 average required for the bachelor's degree. An Incomplete grade, in these computations, has the same effect as a grade F, NP, or U, depending on what option you have exercised. Therefore, it is recommended that students not delay the clearance of incomplete grades so as not to jeopardize graduation.

Changes of Grade

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

If, however, a "clerical" or "procedural" error in the reporting of a grade can be documented, you may request a change of grade with a petition available from department offices.

Repetition of Courses

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

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

Mid-Term Grade Standing

Students wishing to know their grade at the mid-quarter should inquire with the instructor. Those who have deficient grades (D, F, or Not Passed) are urged to confer with their advisers.

Final Grades

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

Transcripts

A record of each student's academic work at UCD is prepared and retained permanently by the Registrar's Office. Copies of your official transcript may be obtained from the Registrar's Office for $3 for the first copy and $1 each for additional copies requested at the same time. Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University Extension Office, 64485 Chemistry. Transcripts of work completed at another campus of the University or at another institution must be requested directly from the campus or institution concerned.

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

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

<table>
<thead>
<tr>
<th>Class Level</th>
<th>Unit Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0 - 40</td>
</tr>
<tr>
<td>Sophomore</td>
<td>40½ - 83½</td>
</tr>
<tr>
<td>Junior</td>
<td>84-134½</td>
</tr>
<tr>
<td>Senior</td>
<td>135 -</td>
</tr>
</tbody>
</table>

EXAMINATIONS

Final Examinations

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

Except under certain specified circumstances, Academic Senate Regulations require that final examinations be given in all undergraduate courses. Final examinations may be given in graduate courses. Exceptions to the regulation would be independent study courses, courses which consist of laboratory work only, and courses in which the examination has been waived (course descriptions will include the statement, "no final examination").

At the instructor’s option, the final examination may be completely or in part a take-home examination. The writing time (in undergraduate courses) of a take-home and an in-class final examination together should not exceed three hours. In each course in which a final examination is required, the students have the right to take the final examination (and/or submit the take-home examination) at the time published in the Class Schedule and Room Directory. The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student enrolled in the course. Any student who does not consent in writing to a different time must be permitted to take an examination (or submit the instructor-opted take-home examination) at the officially scheduled time. A student who consents in writing to a change in the final examination time waives the right to take the examination as originally scheduled. Departures from the published examination schedule should be carried out so as not to disadvantage students who are unable to accept the alternate schedule. A student who is improperly denied the right to take a required final examination on the published date (or submit the take-home examination as opted by the instructor) may file a petition with the Executive Council of the Davis Division of the Academic Senate by the end of the next regular term for appropriate action.

An instructor may release each student’s original examination, or a copy, at any time, or the instructor may option to retain final examination materials, or copies thereof, until the end of the next regular term, during which period students may have access to their examinations.

Midterms

In undergraduate courses for which a midterm examination is required, each student has the right to take the midterm (or submit the take-home examination as opted by the instructor) during one of the regularly scheduled meetings of the class as published in the Class Schedule and Room Directory. The scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual consent of the instructor and each student enrolled in the course. A student who does not consent in writing to the different time must be permitted to take the examination (or submit the take-home examination) at the officially scheduled time. A student who consents in writing to the change of examination time waives the right to take the midterm at the officially scheduled time.

Credit by Examination

Under certain prescribed conditions, currently enrolled students in good standing may receive course credit by taking an examination without formally enrolling in a course. You may obtain a petition and a copy of the prescribed conditions from the Registrar’s Office. The petition is subject to the approval of the instructor giving the examination and the department involved.

The completed petition, accompanied by a fee of $5, must be presented for final approval to the dean of your college or school, or if you are a graduate student, to the Dean of the Graduate Division.

The credit received for the examination may not duplicate any credit you have already applied toward your degree. The final results will be reported to the Registrar who will assign you the appropriate grade and grade points. Since failure to pass the examination will be recorded as an F, you are encouraged to prepare fully for such an examination before attempting it.

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

SCHOLARSHIP DEFICIENCIES

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

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

A student will be placed on probation for qualitative reasons if, at the end of any term, the student’s grade-point average (GPA):
- is less than 2.0, but not less than 1.5, for the term
- is less than 2.0 for all courses taken within the University of California
**College Entrance Examination Board (CEEB) Advanced Placement Examination Credit**

You are awarded 10 quarter units of credit toward the 180-unit bachelor's degree requirement for CEEB Advanced Placement Examinations satisfactorily passed, usually during the junior or senior year in high school. (Exception: 5 units are awarded for a score of 5, 4, or 3 earned in the Mathematics AB exam and each Latin exam, and 10 units for one or both of the Physics B and BC exams.)

You may not earn University credit for courses which duplicate credit already allowed for Advanced Placement Examinations (see UCD Course Equivalencies column below). Exceptions for biology and chemistry are noted below. If you have not received your exam results, carefully avoid enrolling in a UCD course for which credit may not be granted. Exam scores will be posted on the bulletin board opposite Room 175, Munk Hall as soon as they are made available to the University.

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

<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>SCORE</th>
<th>UCD COURSE EQUIVALENCIES</th>
<th>CONTINUING COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>5, 4, 3</td>
<td>English 1 and 3</td>
<td>English/Humanities Credit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 units English credit. Four additional units required in English or Rhetoric in consultation with major adviser.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>College of Engineering:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 units English credit. Satisfies English 1, and 4 units of Humanities &amp; Social Sciences elective and 2 units of Unrestricted electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>College of Letters &amp; Science:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 units Humanities credit. Partially satisfies English Composition requirement (course route option).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FOREIGN LANGUAGES</th>
<th>SCORE</th>
<th>COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>5, 4, 3</td>
<td>French 6</td>
</tr>
<tr>
<td>German</td>
<td>5, 4, 3</td>
<td>German 4, 6A or 6B</td>
</tr>
<tr>
<td>Latin (Vergil)</td>
<td>5, 4, 3</td>
<td>Latin 103</td>
</tr>
<tr>
<td>(Lyric)</td>
<td>5, 4, 3</td>
<td>Latin 105</td>
</tr>
<tr>
<td>Spanish</td>
<td>5, 4, 3</td>
<td>Spanish 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HUMANITIES</th>
<th>SCORE</th>
<th>COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art Studio</td>
<td>5</td>
<td>Art 2, 5</td>
</tr>
<tr>
<td>Art History</td>
<td>4</td>
<td>Art 2</td>
</tr>
<tr>
<td>Art History</td>
<td>5, 4</td>
<td>Art 1A, 1B, 1C</td>
</tr>
<tr>
<td>Art History</td>
<td>3</td>
<td>Art 10HA</td>
</tr>
<tr>
<td>American History</td>
<td>5, 4, 3</td>
<td>History 17A, 17B</td>
</tr>
<tr>
<td>European History</td>
<td>5, 4, 3</td>
<td>History 4B, 4C</td>
</tr>
<tr>
<td>Music</td>
<td>5, 4, 3</td>
<td>Music 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NATURAL SCIENCES</th>
<th>SCORE</th>
<th>COURSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>5, 4</td>
<td>Biological Sciences 1 and Botany 2 or Zoology 2-2L</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5, 4, 3</td>
<td>Chemistry 1A, 1B</td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>5, 4, 3</td>
<td>Mathematics 11, 21A</td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>5, 4, 3</td>
<td>Mathematics 21B</td>
</tr>
<tr>
<td>Physics B</td>
<td>5</td>
<td>Physics 1A, 1B, 10, 2A, 2B, 2C</td>
</tr>
<tr>
<td>Physics B</td>
<td>4, 3</td>
<td>Physics 10</td>
</tr>
<tr>
<td>Physics B</td>
<td>5</td>
<td>Physics 1A, 2A or 8A</td>
</tr>
<tr>
<td>Physics B</td>
<td>4</td>
<td>Physics 1A or 2A</td>
</tr>
<tr>
<td>Physics B</td>
<td>5</td>
<td>Physics 1B, 2B, or 6B</td>
</tr>
<tr>
<td>Physics B</td>
<td>4</td>
<td>Physics 1B or 2B</td>
</tr>
</tbody>
</table>

**HUMANITIES Credit/Unrestricted Electives**

<table>
<thead>
<tr>
<th>COURSE</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>4 units</td>
</tr>
<tr>
<td>German</td>
<td>4 units</td>
</tr>
<tr>
<td>Latin</td>
<td>4 units</td>
</tr>
<tr>
<td>Spanish</td>
<td>4 units</td>
</tr>
</tbody>
</table>

For each foreign language examination passed:

In the College of Letters & Science, these examinations also satisfy the Foreign Language requirement.

**HUMANITIES Credit/Unrestricted Electives**

<table>
<thead>
<tr>
<th>COURSE</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 2</td>
<td>4 units</td>
</tr>
<tr>
<td>Art 3</td>
<td>4 units</td>
</tr>
</tbody>
</table>

Satisfies American History & Institutions requirement.

**NATURAL SCIENCES Credit/Preparatory Courses for Science Majors**

<table>
<thead>
<tr>
<th>COURSE</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 1 and Botany 2 or Zoology 2-2L</td>
<td>10 units</td>
</tr>
<tr>
<td>Biological Sciences 2 or Botany 2 or Zoology 2-2L</td>
<td>10 units</td>
</tr>
<tr>
<td>Bacteriology 2, Botany 2 or Zoology 2-2L</td>
<td>10 units</td>
</tr>
<tr>
<td>Chemistry 1A, 1B</td>
<td>4 units</td>
</tr>
<tr>
<td>Mathematics 11, 21A</td>
<td>4 units</td>
</tr>
<tr>
<td>Mathematics 21B</td>
<td>4 units</td>
</tr>
<tr>
<td>Physics 1A, 1B, 10, 2A, 2B, 2C</td>
<td>10 units</td>
</tr>
<tr>
<td>Physics 10</td>
<td>10 units</td>
</tr>
<tr>
<td>Physics 1A, 2A or 8A</td>
<td>4 units</td>
</tr>
<tr>
<td>Physics 1A or 2A</td>
<td>4 units</td>
</tr>
<tr>
<td>Physics 1B, 2B, or 6B</td>
<td>4 units</td>
</tr>
<tr>
<td>Physics 1B or 2B</td>
<td>4 units</td>
</tr>
</tbody>
</table>

Student has option of taking Botany 2 or Zoology 2-2L, for full credit. In the College of Engineering, 5 units apply toward the "Basic Science and Mathematics" or "Technical electives."

Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C with the instructor's consent. While 1A and/or 1B may be taken for full credit, the 4A-4B-4C sequence is preferred.

Students who achieve a score of 5 or 4 may, with the instructor's consent, enroll in Mathematics 21G.

No credit for laboratory parts of Physics 4 or 3.

Course equivalents may be used as prerequisites for succeeding courses of same or different series by consent of the instructor. Any equivalent course may be taken for full credit.

With consent of the instructor and curriculum committee, but probably disallowed if a high score is achieved on the examination.

**Note:** In the College of Engineering only a score of 5 on the CEEB (CI and CII) Examinations applies toward the physics requirement.
A student will be subject to disqualification for qualitative reasons if, at the end of any term,

- the student’s grade-point average (GPA) is less than 1.5 for the term
- the student has attempted more than 16 units graded "I" (Incomplete)
- the student has spent two consecutive quarters on academic probation without achieving a cumulative grade-point average of 2.0.

The quantitative standards, referred to as minimal progress requirements, define scholarship in terms of the number of units that must be satisfactorily completed. Minimal progress requirements do not apply to students who have part-time status or to students who have their dean's approval to carry less than the minimum program load because of medical disability, employment, a serious personal problem, a death in the immediate family, or an accident.

"Below minimum progress" will be noted on the transcript the first time the total number of units passed at UCD is less than:

- 36 at the end of the third term of enrollment
- 72 at the end of the sixth term of enrollment
- 108 at the end of the ninth term of enrollment
- 144 at the end of the twelfth term of enrollment
- 180 at the end of the fifteenth term of enrollment

"Below minimum progress; subject to disqualification. Continued registration will be at the discretion of the dean of your college, and any questions should be directed to the dean," will be noted the second consecutive time the total number of units passed at UCD is less than those listed above.

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

It is assumed that a student will earn 180 units and obtain a degree prior to the fifteenth term.

The following courses may be counted toward unit minimums:

- Required non-credit courses, e.g., Mathematics B, will be evaluated according to the "Carnegie unit" rule and counted as units passed (see page 121)
- Repeated courses passed to improve D or F grades
- Courses passed during Summer Session at UCD or at another accredited school and transferred to UCD shall be counted as units passed (applied to quarter of enrollment just preceding the Summer Session)
- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to quarter in which examination is taken)
- Courses graded IP (in progress) will be counted as units passed.

The faculty of a college may grant a student a minimum progress variance of one or more quarters for an acceptable reason. A student is given a warning on the first instance of failing to make minimum progress but is not removed from scholastic good standing. The second consecutive time a student fails to complete the required minimum number of units, continued registration will be at the discretion of the student's dean. Students who fail to make minimum progress may continue to take courses using their Passed/Not Passed grading option. Advising assistance should be obtained either through the student's faculty adviser or in the college Dean's Office.

Transfer with Scholastic Deficiencies

To transfer from one University campus to another, or from one college or school to another on the same campus, a disqualified or probational student must obtain the approval of the dean whose jurisdiction is being sought. Following the transfer, the student is subject to supervision by the faculty of the new college, school, or campus.

STUDENT RESPONSIBILITY

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

You will not receive grades, transcripts of record, teaching credentials, or diplomas until you have met all University obligations. Any past obligations which you have not satisfied or had officially extended may prevent your registration.

Student Conduct and Discipline

Students enrolling or seeking enrollment in the University assume an obligation to act in a manner compatible with the University’s function as an educational institution. Rules concerning student conduct, student organizations, use of University facilities, and related matters are set forth in both University policies and campus regulations. A standard for student conduct is outlined in the booklet University of California Policies Applying to Campus Activities, Organizations, and Students. The operation of the campus student disciplinary system is outlined in the booklet UCD Administration of Student Discipline. These policies and regulations are available from the Office of the Vice Chancellor—Student Affairs, 541 Mrak Hall, and the Coordinator of Student Judicial Affairs, 459 Memorial Union.

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

Alleged violations of campus or University standards will be investigated by appropriate officials, and may
be referred to a hearing before the Student Conduct Committee, Campus Judicial Board, the Coordinator of Student Judicial Affairs, or another appropriate officer. The President of the University, through the Chancellor, has ultimate authority for the administration of student discipline.

**BACHELOR'S DEGREE REQUIREMENTS**

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

1. University requirements, which are general and apply to all schools and colleges;
2. College or school requirements; and
3. Individual major requirements.

For information on college, school, or major requirements, see the appropriate section of this catalog, the Registrar's Office, or college and school deans' offices.

**UNIVERSITY REQUIREMENTS**

**Subject A: English Requirement**

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

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

- By achieving a score of 600 or higher on the College Entrance Examination Board (CEEB) Achievement Test in English Composition.
- By achieving a grade of 5, 4, or 3 in the CEEB Advanced Placement Examination in English.
- By entering the University with credentials showing the completion of an acceptable 3-semester or 4-quarter unit college-level course in English composition with a grade of C or better.
- By passing with credit the California State University and Colleges English Equivalency Examination. (Note: the CSUC English Placement Test may not be used to satisfy the Subject A requirement.)
- By writing a passing essay on the Subject A Diagnostic Examination. This examination may be taken only once. It is offered during the Summer Advising sessions and the Orientation period at the beginning of each quarter. Consult the "Orientation Calendar and Registration Events" published prior to the beginning of each quarter for time and location of the Orientation Week examination.

If you have not satisfied the requirement in one of the ways described above, you must enroll in English A during your first quarter of residence at the University, or as soon thereafter as space is available in the course. A grade of C - or better in English A will satisfy the Subject A requirement. (Note: While this course awards only 2 units toward graduation, it counts as 4 units on your study load and toward minimum progress.)

International students whose native and school language is not English, and some students whose schooling combines work in the United States and in another country, must demonstrate proficiency in English. The level of proficiency must meet the standards of both the English for International Students program and the Subject A program. The results of a special examination in English composition determine whether a student has met the Subject A requirement or must take specific course work before meeting that requirement.
American History and Institutions

The American History and Institutions Requirement ensures that every graduating student will have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic, and social interrelationships of its way of life.

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

- By offering one high school unit in American history, or ½ high school unit in American history and ½ high school unit in civics or American government, with a grade of C or better in each course.
- By completing any one of the following courses:
  - Afro-American Studies 10, 100, 120, 121
  - Asian American Studies 1, 2
  - Economics 111A, 111B
  - Native American Studies 10, 55, 116, 130A, 130B, 130C
  - Political Science 1, 5, 5D, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163

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

- By presenting evidence that the requirement has been accepted as satisfied at another campus of the University.
- By presenting evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to the Davis campus.
- By successful completion of the Advanced Placement Examination in American History.

International students studying at the University with F class (student) or J class (exchange visitor) visas should contact the Registrar's Office to secure exemption from this requirement. Bring your passport, visa, and registration card with you.

Further information may be obtained from the Supervisor of the American History and Institutions Requirement, 124 Mrak Hall.

Residence Requirements

The minimum residence requirement for a bachelor’s degree at the University of California is one academic year (three quarters). Each summer session in which a student completes a course of at least 2 quarter units may be counted as half a quarter’s residence. Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the Davis campus. Not more than 18 of these 35 quarter units may be completed in summer session courses at UCD.

There are additional residence requirements for students enrolled in the colleges of Letters and Science and Engineering. If you are planning to study abroad during your senior year, you should consult your college dean’s office.

With the approval of the dean of a student’s college or school, a candidate for the bachelor’s degree who was in active service in the armed forces of the United States in the year preceding the award of the degree may be recommended for the degree after only one quarter of University residence in which the candidate completes at least 16 units or passes a comprehensive examination in the major or field of concentration.

Scholarship Requirement

To receive a bachelor's degree, you must obtain twice as many grade points as units for all courses you have attempted in the University. An exception to this rule is authorized for those students undertaking certain honors courses. For specific college and school requirements consult the appropriate sections of this catalog.

Unit Requirement

A minimum of 180 quarter units is required for graduation. These must be distributed according to the minimum requirements set forth by the faculty of your college or school (see individual college and school sections of this catalog).

The acceptability of transfer courses for unit credit is determined by the Office of Admissions. The acceptability of such courses toward specific requirements is determined by the individual college or school.

Filing for Degree Candidacy

Each candidate for an undergraduate degree must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which the candidate plans to receive the degree. The dates for filing are published in the calendar on page 4.

HONORS AND PRIZES

Deans' Honors List

According to Davis campus regulations, the quarterly Dean's Honors List is comprised of names of students who have completed, for a letter grade, a minimum of 12 units in a specific term with a grade-point average equal to or higher than the minimum grade-point average attained by the upper 16 percent of those registered in the same class-level and college during the preceding term. Any additional regulations set by a particular college will be stated within that section of this catalog. Honors Lists will be posted quarterly on bulletin boards outside Dean's Offices, and a notation of these honors will be placed on each student's permanent record by the Registrar's Office.

Scholarships

Students with outstanding academic records and who show promise of continued scholarly achievement are encouraged to apply for scholarship recognition and awards. Awards are accompanied by a financial honorarium or stipend (see page 39).
Graduation Honors

Honors at graduation will be awarded to students who have completed units of credit in the University with a grade-point average which places them in the corresponding top percent of the graduating class of their college or school, based on the most recent grade report available (normally winter term grades for candidates for June in each year) as shown in the following table:

<table>
<thead>
<tr>
<th>Total Units Completed at UC</th>
<th>Highest Honors</th>
<th>High Honors</th>
<th>Honors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-89</td>
<td>2%</td>
<td>2%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>90-134</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
<td>12%</td>
</tr>
<tr>
<td>135+</td>
<td>4%</td>
<td>4%</td>
<td>8%</td>
<td>16%</td>
</tr>
</tbody>
</table>

All students having the same grade-point average as that of the student who falls at each percent cut-off point as specified in the table above will be awarded the same category of honors as that student. The grade-point averages which mark the cut-off points for each honors category for the June graduating class will be used as minimum criteria for the award of the same category of honors to students who graduate in September (at the end of Summer Sessions) and fall and winter terms immediately following. Students should refer to specific college sections of this catalog for any additional requirements.

A notation of awards is made on the student's diploma and on permanent records in the Registrar's Office.

Prizes

The University Medal is the highest honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College or School Medal is given to the outstanding graduating student in each of the colleges and professional schools.

Departmental citations, special awards, and prizes are also awarded to students for superior achievement and scholarship.

Honorary Societies

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

- Alpha Epsilon (Agricultural Engineering)
- Alpha Kappa Delta (Sociology)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (Agriculture)
- Omicron Nu (Home Economics)
- Order of the Coif (Law)
- Phi Beta Kappa (Liberal Arts)
- Phi Kappa Phi
- Phi Zeta (Veterinary Medicine)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Prytanean Society (Upper-Division Women)
- Sigma Xi (Research)
- Tau Beta Pi (Engineering)
College of Agricultural and Environmental Sciences
Challenges and opportunities arising from social and technological changes characterize these times. Today's challenges — protecting the environment from man's diverse activities, improving nutrition in major segments of the population, developing and utilizing human and renewable natural resources — are reflected in the programs and offerings of the College of Agricultural and Environmental Sciences.

Teaching and research in the College now extend far beyond the traditionally important mission of food and fiber production. Activities range from the soil to the home, from the farms to the cities. The best uses of land and forest areas, as well as the management of water for home, agriculture, wildlife, recreation, and industry are studied. These areas, reflected in the 41 majors and three programs in the College, offer interesting and practical career opportunities.

Social problems as well as technological advances are major College considerations. The goal is to develop concern within people; a concern not only with the technology but with the human problems that such technology might create. Through the application of the biological, physical, and social sciences to resource management, farming, ranching, business, education, conservation, recreation, the family, and the community, College programs are designed to meet today's challenges and contribute significantly to effective solutions for tomorrow's problems.

**ADMINISTRATIVE STRUCTURE**

The College's administrative structure was designed by students, faculty, and administrators to ensure the flexibility, responsiveness, and rigor of programs in the face of continually changing educational needs. An ongoing review and updating of teaching programs is the result of faculty and administrative concern not only with providing good teaching, but also with student receptiveness to subjects being taught.

The College is organized to help students determine what they want and need to learn — and then to assist them in learning it. Furthermore, the focus of the College's programs is on activities for which there is a societal demand, and on providing opportunities to explore the usefulness of classroom work in study-internship situations.

**STUDENT RESPONSIBILITY**

In recent years, student point of view has had a significant impact on both educational programs and College governance. Students participate in designing the College's programs and are included on College, departmental, and general faculty committees that determine a wide spectrum of educational and administrative policies. If you want to take part in the committee system, let us know in the College Office, 228 Mrank Hall.

Teaching excellence depends on constructive help from all students. As full participants in the educational process, students are expected to provide faculty ad-
in other colleges. This is not true. Within the boundaries of enrollment limitations and Academic Senate policy — and your ability to acquire useful knowledge as a result of taking a particular course — you may enroll in almost any course listed in this catalog.

**College Services**

University life is a complicated, sometimes bewildering experience. For example, although you may have the academic side of your life under control, you may need a small "assist" to deal with some other area, such as registration. The College offers a variety of ways that you can obtain advice or help in solving such problems. Some of these are described in the sections following.

**Faculty Advisers**

You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The assignments are made by Master Advisers, each of whom is responsible for coordinating advising within a major. If you have not decided on a specific major, you will be assigned to the Exploratory Program. In this case, you will have a faculty adviser especially familiar with the breadth of course offerings available in this and other colleges. On the other hand, if you have well-defined educational objectives, you will be assigned a faculty adviser with the training and experience required to facilitate your program planning.

The function of faculty advisers is to sensitize students to the educational opportunities at Davis, to discuss the implications of one option or another, and generally, on the basis of experience, to help students achieve their educational goals. The great potential which a faculty adviser-student relationship can have has long been recognized within the College, and you are strongly urged to consult with your faculty adviser each quarter prior to selecting your courses.

As educational objectives evolve, you may, in consultation with the Master Adviser for your major, choose a new faculty adviser whose area of expertise corresponds more directly to your specific objectives.

**Advising Centers**

General advising on academic programs is available at the College's Academic Advising Center, 122 Hoggland Hall, where all advising activities in the College are coordinated.

Each of the Subject Matter Areas (SMA) of the College have advising centers staffed by advising associates knowledgeable in all aspects of University and College rules and regulations, courses, specific requirements of majors in that SMA, career opportunities, etc. Peer advisers for the SMA are also available at each location.

**Peer Advisers**

Student advisers are available in the College's Academic Advising Center, in other advising centers, and at The First Resort. These peer advisers keep themselves up to date on the "how's," and "where's," and "why's," of University operating procedures. They are prepared to answer a variety of questions about courses, requirements, and enrollment procedures, and are both a source of information and a means of referral to the right person or office for action.

**Associate Deans of Resident Instruction**

The College has associate deans responsible for each of the following subject matter areas: Animal Science; Applied Economic and Behavioral Sciences; Biological Sciences; Food, Nutrition, Textile, and Consumer Sciences; Plant Sciences and Pest and Disease Management; and Resource Sciences and Engineering. They welcome the opportunity to become acquainted with individual students and to talk informally with them. They can also help you with academic problems if you are placed on probation or subject to dismissal.

**Orientation Class**

Each quarter the College offers an orientation class (see page 283) to introduce students to the University, to aid them in formulating educational objectives, and to help them identify the many educational opportunities at UC Davis. Although not required, this course is recommended as a useful means for discovering what the Davis campus and the College of Agricultural and Environmental Sciences are all about.

**Expanded Course Descriptions**

You may find that, because of space limitations, the descriptions in the Catalog will not include all the information you would like about a course. The faculty of the College has responded to this need by writing the "Expanded Course Descriptions" giving more detailed explanations about each of its course offerings. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as course goals, texts used, preparation required of students, bases for grading, course format, special assignments (papers, field trips, etc.), and a topical outline of the material to be covered.

Copies of the "Expanded Course Descriptions" are available for on-campus use at the Shields Library Reference and Periodicals desks, the College Dean's Office, advisers' offices, advising centers, departmental offices, The First Resort, and in the dormitories at the head residents' offices.

**Work-Learn Opportunities**

The Work-Learn and Career Planning and Placement Office assists students in arranging supervised internships — full-time or part-time — for the summer or for any quarter of the academic year. By participating in a work-learn experience students have an opportunity to try various work situations and test their career aspirations and objectives.

Some work experiences are introductory in nature and demand a limited time commitment and have no academic credit involved. Others require more intensive involvement of an academic nature and may offer credit. Students who wish to secure credit for an internship may arrange for enrollment in a 92 or 192 course through the appropriate department and Work-Learn and Career Planning and Placement Office. Stu-
students must complete at least 84 units in order to enroll in a 192 course. (See page 123 for details.) A maximum of 12 units of internship courses and a total of 20 units of variable-unit courses (see College requirement, pages 70-71) may be counted toward the 180 units required for graduation.

MAJORS AND SPECIAL PROGRAMS

Choosing a Program

There are several alternatives available to undergraduate students in the College of Agricultural and Environmental Sciences:

- A regularly established major program
- An individually designed major program
- A preprofessional program
- The exploratory program eventually leading to one of the first two alternatives above

The majors and special programs in the College are listed below according to Subject Matter Areas. Questions regarding a major should be addressed to the appropriate associate dean. Complete outlines of these majors and programs are presented in the Majors and Courses section of this catalog.

If you fulfill the requirements for more than one major in the College, that accomplishment can be noted in the memorandum section on your transcript. Requests for certification of multiple majors should be made in the College Office. These additional majors should also be indicated on the Candidacy Card when filing for graduation.

ANIMAL SCIENCE
J. Warren Evans, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-6970

Majors in Animal Science
Animal Science
Avian Sciences
Wildlife and Fisheries Biology

Advising Centers:
177 Animal Science Building, 752-6118 (Animal Science)
205 Asmundson Hall, 752-3532 (Avian Sciences only)
94 Briggs Hall, 752-6979 (Wildlife and Fisheries Biology only)

Interdisciplinary Major
Agricultural Science and Management
Advising Center:
177 Animal Science Building, 752-6118

APPLIED ECONOMIC AND BEHAVIORAL SCIENCES
Hoy F. Carman, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-6360

Majors in Applied Economics
Agricultural and Managerial Economics
Development, Resource and Consumer Economics

Advising Center:
105 Voorhies Hall, 752-6185

"I wish I could emphasize to students the importance of taking four years of math and lots of science and foreign language in high school. That way they can keep all their options open to go in any direction."
Majors and Programs in Behavioral Sciences
Agricultural Education
Applied Behavioral Sciences
Asian American Studies (non-degree program)
Design
Environmental Planning and Management
Environmental Policy Analysis and Planning
Human Development
Landscape Architecture
Native American Studies

Advising Centers:
101 or 103 Academic Office Building-4, 752-2244
152 Walker Hall, 752-1166 (Design, Landscape Architecture)
2132 Wickson Hall, 752-3026 (Environmental Planning and Management only)
2134 Wickson Hall, 752-3088 (Environmental Policy Analysis and Planning)

BIOLOGICAL SCIENCES (an Intercollege Division)
Donald L. McLean, Ph.D., Divisional Dean
Division Office, 171 Mrak Hall, 752-0410

Majors in Biological Sciences
Bacteriology
Biochemistry
Biological Sciences
Botany
Genetics
Physiology
Zoology

Advising Centers:
171 Mrak Hall, 752-0410
196 Briggs Hall, 752-0203 (Animal Physiology only)
151 Robbins Hall, 752-0617 (Botany only)
2320 Storer Hall, 752-7468 (Zoology only)

ENVIRONMENTAL STUDIES (an Intercollege Division)
Paul A. Sabatier, Ph.D., Acting Associate Dean
2132 Wickson Hall, 752-3026

FOOD, NUTRITION, TEXTILE AND CONSUMER SCIENCES
Michael J. Lewis, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-6971

Majors in Food Sciences
Fermentation Science
Food Biochemistry
Food Science

Advising Centers:
126 Cruess Hall, 752-1468 (Food Science only)
2467 Chemistry Annex, 752-2169 (Food Biochemistry only)
3013 Wickson Hall, 752-0387 (Fermentation Science only)

Majors in Nutrition
Community Nutrition
Dietetics
Nutrition Science

Advising Center:
109 Everson Hall, 752-2512

Majors in Consumer Sciences
Consumer Food Science
Home Economics
Textiles and Clothing
Textile Science

Advising Centers:
126 Cruess Hall (Consumer Food Science 752-1468)
109 Everson Hall 752-2512

Exploratory Program
Exploratory (non-degree program)

College Academic Advising Center:
122 Hoagland Hall, 752-0610

INDIVIDUAL MAJOR
College Academic Advising Center
122 Hoagland Hall, 752-0610

PLANT SCIENCES AND PEST AND DISEASE MANAGEMENT
Calvin O. Qualset, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-0819

Majors and Programs in Plant Sciences
Plant Science
Preforesty (non-degree program)
Range and Wildlands Science

Advising Centers:
258 Hunt Hall, 752-1715
271, 273 Hoagland Hall (Preforesty only), 752-1511
(Fall Quarter)/6215 (Winter and Spring Quarters)

Major in Pest and Disease Management
Entomology

Advising Center:
265B Briggs Hall, 752-0489

Interdisciplinary Major
Agrarian Studies

Advising Center:
2039 Wickson Hall, 752-0926

RESOURCE SCIENCES AND ENGINEERING
Dennis E. Rolston, Ph.D., Associate Dean
College Office, 228 Mrak Hall, 752-0110

Majors in Resource Sciences
Atmospheric Science
Environmental Toxicology
Resource Sciences
Soil and Water Science

Advising Centers:
122 Hoagland Hall, 752-1669
210 Environmental Toxicology Building, 752-1142
(Environmental Toxicology only)
Adviser for the Individual Major, you then plan your major with at least two faculty advisers. The proposed program must be submitted to a special committee for review at least four quarters before you plan to graduate.

Titles of some individually designed major programs developed recently by students are: Business Management and Human Relations, Creative Therapeutic Recreation, Human Ecology, Physical Therapeutic Science, Psychobiology, Environmental Design, Winery and Vineyard Management, Energy Economics, and Textiles and Business Management.

Additional information may be obtained by contacting the College’s Academic Advising Center, 122 Hoagland Hall. (Also see page 239.)

Preprofessional Programs

The preprofessional program in forestry is a two-year plan which prepares students for entering a degree program in forestry or conservation. Davis does not offer a bachelor’s degree in forestry; however, advisers in the College can help you prepare a lower-division program that will provide a basis for continuing work at another school. (Also see page 102.)

Preprofessional training requirements for application to professional schools, such as schools of veterinary medicine, law, or medicine, may be satisfied through programs in the College. You should select an undergraduate major on the basis of individual interest and aptitude; no one major will give you an advantage toward admission. Advisers in the College are well-informed about professional requirements and will help you integrate them into your major program. You can obtain more information by contacting the College Office, 228 Mrak Hall; the Office of the Associate Dean — Student Services, School of Veterinary Medicine, 1024 Haring Hall; the Health Sciences Advising Office, South Hall; or the Pre-Law Advising Office, South Hall.

Declaration of Major

Students who have not declared a major must do so by the time 120 units have been acquired. Failure to declare a major at this point will result in a hold on your further registration. In order to declare a major, you must meet with your faculty adviser, fill out a Change of Major petition obtainable at the Registrar’s Office, and file the petition with the Dean’s Office. If you have completed 120 units you must arrange at the same time a Study Plan with your adviser (see page 71). You are accepted into a major only after both your adviser and the Dean have approved the Change of Major petition.

Change of Major

Within the College. You may change from one major to another within the College by obtaining approval from a faculty adviser of the new major you have selected and the Dean. Admission into a major program may be denied or deferred if your grade-point average in courses that are required for the selected major or your overall grade-point average is below 2.00. Procedures for changing a major within the College are the same as those for declaring a major (see above), and the same conditions apply.*

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* Individually Designed Major Programs

You may design an individual major if you have a specific academic interest not represented by an established major. Such a major requires the selection of interrelated courses totaling 45 upper-division units from two or more areas of study. After preliminary consultation about this special program with the Master in Agricultural Engineering

(See College of Engineering, page 184)

Interdisciplinary Major

International Agricultural Development

Advising Center:
139 Academic Office Building-4, 752-1804

Exploratory Program

Sometimes you may be undecided about the major you really want to pursue. Or you may want to learn more about the alternatives available to you in the College. The Exploratory Program permits you, with the assistance of selected advisers, to choose courses in order to pinpoint your interests and aptitudes. This is not a degree program, but is an aid in finding the major that best meets your needs. You should not expect to stay in the program beyond 120 units, however, as it may delay graduation. For registration purposes, indicate Exploratory on your admissions materials and study list cards. Advising information is available from the College’s Academic Advising Center, 122 Hoagland Hall.

Policies and procedures for declaring a major are to the right.
Accompanied by Change of College. Petitions for a change of major involving change of college should be filed within the first five weeks of the quarter. A change petition, available at the Dean's Office, must be endorsed by a faculty adviser of the new major you are selecting and signed by the Dean of the college from which you wish to transfer. In addition, admission to the new college will require that Dean's approval. Permission to transfer from one college to another may be denied or deferred if you are in academic difficulty or have less than 2,000 in courses that are required by the new major.

Multiple Majors

Because of similarity in course requirements for many of the major programs, requests for multiple majors within the College are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major (page 69), or of adopting one or more of the minor programs (below) offered by the College to complement your major. You may also request that your transcript note that you have completed all the requirements for study of a major in addition to your selected major.

The College does encourage multiple majors between colleges whenever your academic interests and abilities indicate this to be the best route. After endorsement of the Change of Major petition by the appropriate faculty in the colleges involved, each dean may approve the petition if there are sufficient differences between the requirements for the major programs you wish to study. At least 80 percent of the upper-division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of another major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

Teaching Credentials

Inquiries concerning preparation for teaching credentials in agriculture and home economics should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616.

For general information on obtaining the teaching credential, see page 99.

MINOR PROGRAMS

Departments in the College of Agricultural and Environmental Sciences and in the College of Letters and Science may offer optional minor programs. Completion of a minor is not required for graduation. However, when your total educational objectives cannot be met through a major alone, you may wish to complete the requirements for one or more minor programs and have this certified on your records.

Following is a list of approved minor programs within the College. Requirements for each program can be found under the department offering the minor (in parentheses). See page 88 for minors approved by the College of Letters and Science.

Aging and Adult Development (Applied Behavioral Sciences)
Agricultural Entomology (Entomology)
Apiculture (Entomology)
Asian American Studies (Applied Behavioral Sciences)
Biological Sciences (Biological Sciences)
Community Development (Applied Behavioral Sciences)
Community Nutrition (Nutrition)
Energy Policy (Environmental Studies)
Entomology (Entomology)
Environmental Policy Analysis (Environmental Studies)
Environmental Toxicology (Environmental Toxicology)
Food Service Management (Nutrition)
Insect Ecology (Entomology)
Insect Systematics (Entomology)
Medical-Veterinary Entomology (Entomology)
Native American Studies (Applied Behavioral Sciences)
Nematology (Entomology)
Nutrition and Food (Nutrition)
Nutrition Science (Nutrition)
Textiles and Clothing (Textiles and Clothing)
Textiles Science (Textiles and Clothing)

A minor normally consists of a minimum of 18 units of upper-division course work. In some cases one lower-division course may be substituted to meet minimum requirements. Only one course can be used to satisfy a requirement of both your major and your minor. No course can be counted toward minimum requirements for more than one minor program. Transfer units cannot normally be used to satisfy minor requirements. Exceptions in use of transfer units require approval by your adviser for the minor program and the College Committee on Majors and Courses of Instruction. Even though a minor program is not required, you may choose to complete one or more minors in either this college under the guidelines above or the College of Letters and Science according to guidelines in effect for that college.

Satisfactory completion of a minor program must be certified by your adviser. If you wish to have a minor authorized and entered on your records, obtain the appropriate form from the Dean's Office, have your adviser certify the minor, and return the form to the Dean's Office. The filing period coincides with that for filing for degree certification (see page 4).

REQUIREMENTS FOR THE BACHELOR'S DEGREE

It is your responsibility to see that all requirements for graduation are fulfilled. In brief, these are:

University Requirements: See page 61.
College Requirements: You must fulfill the Bachelor of Science requirements in a major as prescribed by, or individually designed and approved by, the faculty. Of the required 180 units counted toward a degree
- Not more than 6 units can be Physical Education 1
- Not more than 20 units can be courses numbered 92, 99, 190C, 192, 197T, 197TC, or 199
- Not more than 12 units can be courses numbered 92 and/or 192
- 54 units must be upper-division work
- Not more than 9 units of professional courses (numbers 300-499) may be used toward the 54 upper-division units
- At least 8 units (which must be earned before you have completed 120 units) must be earned in courses in English, or English and rhetoric, or their equivalent, that emphasize written or oral expression. The following UCD courses have been approved for satisfaction of this College requirement:
  1. 4 units must be selected from English 1, 2, 20, or 103 (courses with primary emphasis on writing skills).
  2. 4 units from one of the unused courses above or from English 3, 104; Comparative Literature 1, 2, 3; Philosophy 5, 10; Rhetoric 1 or 3 (courses emphasizing either writing or speaking skills).

Residence Requirement: This requirement is the same as for the University requirement (see page 62).

Major Requirements: See requirements under specific majors in the Programs and Courses section of this catalog.

In addition to the general requirement of a C average (2.000) for all University work undertaken, the faculty for the Agricultural and Managerial Economics major requires that certain courses of the major be completed with a C average. You should contact the Master Adviser of this major for details.

Natural Sciences, Social Sciences, and Humanities Requirements (Breadth Requirements): Since the broadening effect of any particular course is dependent on your major and general interests, it is not possible to be specific as to what is desirable and what is not. (For example, natural science courses would add more breadth to an Agricultural and Managerial Economics major than they would to a Biochemistry major.) Your faculty adviser has guidelines for each major showing what courses you should consider.

Filing for Graduation: You must file a Candidacy Card with the Registrar's Office during the specified filing periods (see page 4). You must also see your faculty adviser and complete your Major Certification; this form must be received and evaluated by the Dean's Office before your candidacy for a degree can be finalized.

**COLLEGE POLICIES AND PROCEDURES**

**Study List and Study Plan**

The study list is a record of the courses in which you enroll during a particular quarter. It should be part of a larger plan for attainment of specific long-term goals and should allow for (a) the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters, (b) the fulfillment of College and major requirements, (c) a proper balance between the demands of
the courses and your ability to master the subject matter, and (d) meeting the minimum progress regulation (see page 60).

In conjunction with a faculty adviser, you must prepare a written plan that specifies your goals and shows how the graduation requirements will be met. Your Study Plan must be approved by and filed with your faculty adviser by the end of the second quarter of your junior year (before completing 120 units, in residence or by transfer). Your adviser will then notify the Dean that you have filed your plan.

You will be denied registration for future quarters if you do not comply with this regulation. However, filing this Study Plan does not preclude a change of major or program modifications.

**Probation and Disqualification**

Students are expected to make reasonable progress toward fulfilling the degree requirements. You must pass at least 36 units during each three terms of enrollment on the Davis campus in order to maintain a good standing status. Refer to page 60 for minimum requirements for subsequent quarters of enrollment and regulations on probation and disqualification.

**Passed/Not Passed Option**

If you are a regular student in good standing, you may elect to take certain courses on a Passed/Not Passed basis. (See page 56 for complete information.)

By using the Passed/Not Passed option, you can take courses in new areas without the pressure of competing with students who are majoring in the subject. This option should be used only for elective courses, however, not for courses taken to fulfill major requirements. When in doubt, check with your faculty adviser before electing to take a course Passed/Not Passed.

**Credit by Advanced Placement Examinations**

(See page 59.)

**Credit in Extension Courses**

Students in residence may apply a maximum of 9 units of credit earned in some University Extension courses toward the 180-unit requirement provided written approval has been obtained from the Dean prior to enrollment. Units of credit allowed by the Dean may be less than the number of units listed for a course. No grade points are assigned for courses completed through University Extension.

**Transfer Students**

If you transfer to UCD from another institution, the Admissions Office will determine the unit credit you will be awarded for previous work. The College evaluates the credit awarded by the Admissions Office and, upon your request, determines how many units will be counted as upper-division work. You must file a student petition for this evaluation if these courses have not been evaluated previously. Your faculty adviser then determines how the credit applies toward completion of the major requirements.
in order to make program planning easier for transfer students, the major requirements listed in the Majors and Courses section of this catalog have preparatory subject matter set out in a special category. These preparatory courses may be taken at the University of California or elsewhere. You can generally determine the area of knowledge covered by a specific requirement by reading the course descriptions. You need not present identical courses, only ones that have substantially similar content. If you are attending a community college, consult your counselor to determine which community college courses are appropriate and acceptable for fulfilling College of Agricultural and Environmental Sciences requirements.

If you have questions as to the best way to prepare for transfer to the Davis campus, you are encouraged to write directly to the associate dean responsible for your intended major (see pages 67-68) or plan a visit to the campus to discuss your program with a faculty adviser.

Withdrawal
A student may be permitted to withdraw from the College for emergency reasons or for good cause (see page 55 for University policy and procedures). Consultation with the Dean is required prior to obtaining the Dean’s permission to withdraw.

Registration Beyond 195 Units
A minimum of 180 units is required for a bachelor’s degree. Normally, all degree requirements will be fulfilled by taking 180 to 195 units. The College of Agricultural and Environmental Sciences has discontinued its 195-unit-limitation rule. However, the College encourages you to meet your educational objectives in the most efficient manner commensurate with your educational goals.

HONORS
Undergraduate Honors
The Dean’s Honors List, published at the end of each quarter, includes the names of all students in the College of Agricultural and Environmental Sciences who have completed at least 12 units of graded courses on the Davis campus during any quarter and who have a grade-point average equal to or higher than the minimum grade-point average attained by the upper 16 percent of students registered in the same class and college during the preceding quarter.

Honors at Graduation
Graduating students who are completing their majors with distinction may be recommended for honors, high honors, or highest honors. The names of these students are announced at commencement, and this distinction is noted on their records and diplomas. Honors at graduation will be awarded according to the conditions specified on page 63.

College Medal
Each year the outstanding graduating senior in the College is awarded a silver medal, known as the “Agricultural and Environmental Sciences Medal.” Scholar-
ADMISSION TO THE COLLEGE OF ENGINEERING

Admission to Freshman Standing

There are no special requirements for admission to the College of Engineering other than the general University requirements beginning on page 45. It is recommended, however, that you take the following subjects (or integrated courses covering substantially equivalent material) during high school:

**Subject Areas** | **Years**
--- | ---
Algebra | 2
Plane geometry | 1
Trigonometry | ½
Analytic geometry | ½
Chemistry and/or physics | 1

These subjects are prerequisite to certain basic courses in the freshman engineering program. You will be required to make up equivalent work if you are admitted without this preparation. As a result, graduation could be delayed. A year of high school mechanical drawing is also recommended, but not required. You may be limited in your freedom to change majors within the College once you have been admitted.

Advanced Placement Examination

Credit toward the total unit requirement for the degree is awarded for CEEB Advanced Placement Examinations satisfactorily passed, as indicated in the table on page 59. Except as otherwise noted in the table, these units may be used to satisfy specific graduation requirements in the College of Engineering.

**Admission to Advanced Standing**

While it is possible for community college students to transfer to UC Davis after completing only the freshman year, the highest priority is given to applicants who have completed the entire lower-division program. If you choose to complete the lower-division engineering curriculum at a California community college, your studies at Davis can normally be completed within two academic years. Questions about community college programs should be directed to your school counselor, or you can contact the UC Davis College of Engineering Undergraduate Office directly. (For information on admission to the University in advanced undergraduate standing, refer to the Admissions section of this catalog.)

If you are admitted with **fewer than 84 quarter units** of college work (56 semester units), you are classified in lower-division standing, and must complete one of the three Lower-Division Programs listed on page 183. You are advanced to upper-division standing after completing 84 units.

If you are admitted with **84 or more quarter units**, you are classified in upper-division standing, but you are required to complete the minimum number of quarter units in the subject areas specified before your Lower-Division Program is considered complete. You may, however, start your Upper-Division Program while completing your Lower-Division Program.

**A.B.E.T. Accreditation**

The following Engineering curricula are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.: Agricultural Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering.
College of Engineering

Subject Areas

Mathematics (calculus, differential equations, vector analysis) .................................................. 18

Physical and biological sciences (at least 10 units must be in general chemistry and at least 12 units in physics for engineering and science students) ............................................. 26

Engineering (lower-division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Chemical Engineering majors may elect to take only 12 units of engineering in their Lower Division Program) .................................................. 15

Written and oral expression (courses equivalent to English 1, and Rhetoric 1 or 3) ................. 8

Humanities-social sciences (must be selected from a list of course groups approved by the Committee on Undergraduate Study) ................................................................. 9

Unspecified subjects (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year; Agricultural Engineering—Forest Engineering option majors should take courses in biology, botany and statistics) ................................................. 8

Total ................................................. 84

Once you have completed the Lower-Division Program on this basis, it is not necessary to take additional lower-division courses, except those that are prerequisite to upper-division courses in your curriculum.

The minimum number of required units in the Lower and Upper-Division Programs varies from 180 to 212.

When there are more applicants than space available in the College, priority is given to transfers from California community colleges who have completed the lower-division program for engineering with a high grade-point average. Once admitted, you may be limited in your freedom to change majors within the College.

Engineering is closed to Limited Status, Special Status, and Second Baccalaureate applicants.

CHANGE OF COLLEGE AND MAJOR

Petitions for a change of major and transfer into the College of Engineering from another UCD college will be considered only from students who have completed at least 40 units of work while registered on the Davis campus, and who have completed Mathematics 21A, 21B, 21C, and Physics 8A or the equivalent on a letter-grade basis. It may be necessary to limit the number of applications that are approved, in which case selection will be based on UC grade-point averages. See page 54 for details on filing petitions.

Enrollment in Engineering 45 and in certain upper-division courses in engineering is restricted to Engineering majors. It may be necessary to restrict enrollment in other courses offered by the College without prior notice.

ACADEMIC ADVISING

In establishing the College of Engineering's undergraduate programs, every effort has been made to provide for maximum flexibility consistent with rigorous preparation for professional practice or graduate study. The key to developing a flexible program for each student is an effective system of advising.

Every undergraduate in Engineering is assigned to a faculty member for academic and career advising. Initial adviser assignments are made through the Engineering Undergraduate Office prior to your first term on campus. Engineering majors usually keep the same faculty adviser throughout the undergraduate years, but you may change to a new adviser of your choice whenever you wish. It is necessary to keep the Undergraduate Office informed of adviser selections.

You are expected to meet individually with your faculty adviser at least once each quarter. New freshmen are required to do so each quarter of the first year of enroll-
Electrical Engineering (Electronics, Circuits and Signal Processing)
Electrical Engineering (Solid-State, Microwaves and Quantum Electronics)
Materials Science and Engineering
Mechanical Engineering
Agricultural Engineering/Materials Science and Engineering
Chemical Engineering/Materials Science and Engineering
Civil Engineering/Materials Science and Engineering
Electrical Engineering/Materials Science and Engineering
Mechanical Engineering/Materials Science and Engineering
Individual Engineering Major

Degree requirements for each of the five double majors, listed above, can be completed within four academic years.

The Individual Engineering major is designed by you with the help of your adviser after initial enrollment in the College, and is subject to approval by the Engineering Undergraduate Study Committee. Additional information is available through the Undergraduate Office in Bainer Hall. (See also page 239.)

You are encouraged to make use of the many advising and counseling sources available to students if you are uncertain about your choice of a major. Guidance within the College is available through faculty and student advisers, instructors, and the academic deans. The Career Planning and Placement Office, Advising Services Office, Counseling Center, and other sources listed in the index under Advising are also good places to seek assistance.

**Introductory Courses**

A number of freshman engineering courses are designed to describe the engineer's role in society and to show the similarities and differences among various engineering branches. Included are:

- Engineering 3 (Introduction to Engineering Systems)
- Agricultural Engineering 1 (The Agricultural Engineer in Tomorrow's World)
- Chemical Engineering 1 (The Scope of Chemical Engineering)
- Civil Engineering 1 (The Civil Engineer in Society)
- Electrical and Computer Engineering 1 (Introduction to Electrical and Computer Engineering)
- Mechanical Engineering 1 (Mechanical Engineering)

**PLANNING YOUR PROGRAM**

You are held responsible for planning your program. But that does not mean you are simply on your own. Your faculty adviser, with whom you are strongly urged to consult prior to registration each quarter, is the primary source of assistance. The Undergraduate Office
of the College is willing to assist, as are the many advising offices throughout the campus.

Specific degree requirements for the various engineering curricula are given beginning on page 182. The minimum number of required units ranges from 180 to 212, depending on the curriculum. Programs normally require a minimum of 12 quarters of study averaging 15 units each. A regular full-time student must satisfy the requirements for minimum progress (see page 60).

Sample arrangements that list the Lower-Division and Upper-Division Programs in a quarter-by-quarter sequence may be found in the College of Engineering Bulletin, available from the Engineering Undergraduate Office.

Program Flexibility

In the Lower Division Program for all curricula except Chemical Engineering, only mathematics, Physics 8A and 8B and the lower-division engineering courses are prerequisite to required upper-division engineering courses. These courses should be taken during the first two years. The remaining physics courses and the chemistry and humanities-social sciences courses in the Lower-Division Program are requirements for graduation, and can be scheduled to suit your individual study program.

In planning your four-year program, be sure to observe course prerequisites in order to avoid a delay in graduation. Course prerequisites are specified to help you avoid courses for which you are unprepared and to help the instructor establish a starting point for a given course. The prerequisites for any course may be waived by the course instructor, for good cause, for individual students.

Course Priorities for Freshmen

An extensive background in mathematics is a prerequisite to upper-division engineering courses. Therefore, if you are enrolled in engineering or are considering future enrollment, you should include mathematics in your program from the outset. Course priorities for the first quarter of your freshman year are suggested below.

- Mathematics 11 (if not completed in high school)
- Mathematics 21A (if not completed in high school)
- English A (if the Subject A requirement is not yet otherwise satisfied)
- Other (Engineering 3 or 4, English 1 or 3, or Comparative Literature 1, 2, or 3, Chemistry 1A or 4A, Rhetoric 1 or 3, or humanities-social sciences electives)

If you have not satisfied the Subject A requirement before entering the University, you must do so as early as possible during your first year of residence. If you have not done so after three quarters of enrollment, you will not be eligible to enroll for a fourth quarter.

If you plan to graduate in the Chemical Engineering or the Chemical Engineering/Materials Science and Engineering major, or are considering the possibility, you should take Chemistry 4A-4B-4C in your freshman year.

Expanded Course Outlines

A file of expanded course outlines for all courses offered by the various engineering departments is available for student use at the Undergraduate Office of the College.

Special Courses

Special Study Courses: You are limited to five special study units (courses 99 and 199) per quarter. (See page 122.)

Work-Learn Programs: Internship courses numbered 92 and 192 are designed to provide internship experience through the Internship Program (see page 123). Further information is available from your adviser, the respective Engineering department offices, or Work-Learn and Career Planning and Placement.

University Extension Courses: Appropriate courses taken under University Extension may be used for degree credit. Simultaneous enrollment in resident courses and Extension courses requires prior approval by the Dean of the College. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

DEGREE REQUIREMENTS

YOU ARE RESPONSIBLE FOR PLANNING YOUR PROGRAM AND FOR SATISFACTORY COMPLETION OF DEGREE REQUIREMENTS.

Degree Requirement Check Sheets for each of the curricula are made available to students and advisers. The Undergraduate Office will prepare only one unofficial degree check for you (preferably at the end of your junior year). In order to have this done, you must submit a signed Degree Check Request. Further information and forms concerning this service are available in the Engineering Undergraduate Office.

General University Requirements

University requirements for the bachelor's degree are explained beginning on page 61.

College Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. Each curriculum consists of a specified Lower-Division Program (or an approved equivalent program for students who transfer into the College with 84 or more quarter units), and a specified Upper-Division Program. Detailed requirements for the approved curricula are given beginning on page 182.

In addition to the University residence requirements, at least 35 of the final 45 units characteristic of your curriculum in engineering must be completed while you are registered in the College of Engineering.
You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, available in the Undergraduate Office, can be a valuable aid in solving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Study Committee, a body of five professors and five (non-voting) students. A negative decision by the Committee may be appealed to the College faculty for action at a regular meeting.

**English Composition Requirement**

Upon completion of 84 quarter units of college work, the English Composition requirement must be satisfied. The requirement may be fulfilled in one of two ways:

1. By passing the English Composition Examination administered by the College of Letters and Science. (It should be taken early in the junior year and must be taken prior to the last quarter before graduation.)
2. By completing English 103A with a grade of C — or higher.

This requirement is in addition to the expository writing course (English 1, 3, Comparative Literature 1, 2, or 3) specified in the Lower Division Programs.

During the 1983-84 academic year, the English Composition Examination will be offered on the following three Saturdays: October 29, January 28, and April 28. Sign-up rosters will be posted on the Letters and Science Dean's Office bulletin board, Mrak Hall foyer, Monday through Thursday just preceding each Saturday examination date.

**Degree Requirement Changes**

Degree requirements in the various curricula in Engineering can change every year. Any student is free to choose to graduate under the requirements printed in the General Catalog in effect at the time of graduation, or under any of the three preceding catalogs.

**Electives**

There are three kinds of elective courses in the engineering curricula: humanities-social sciences, technical, and unrestricted.

**Humanities-Social Sciences electives:** Because engineers are significant agents of social change, they must be sensitive to the human setting in which that change takes place. The humanities-social sciences (HSS) electives are emphasized within the engineering curricula to increase your awareness of the human and societal implications of engineering practice. The humanities include subject areas such as literature, philosophy, history and the fine arts. The social sciences include areas such as anthropology, political science, sociology, psychology and economics.

Each engineering program must include at least 24 quarter units from subjects in the humanities and social sciences areas. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical skills.
All undergraduate courses in the following list are suitable as HSS electives. You may petition for HSS credit for 92, 98, 99, 192, 197T, 198, and 199 courses in appropriate cases. If you repeat a course which may be repeated for credit, not more than 4 units of that course may be counted toward this requirement.

Afro-American Studies 10, 15, 100, 105, 106, 107, 110, 120, 121, 150A, 150B
Agrarian Studies 2
Agricultural Economics 1, 18, 100A, 100B, 112, 120, 150, 151, 169
American Studies 1A, 1E, 1F, 2, 45, 101A-H, 111, 120, 140A, 140B
Anthropology 2, 4, 101 through 108 through 119 through 147, 162, 163, 190, 191
Applied Behavioral Sciences 17, 18, 19, 152, 153, 154, 162 through 172, 174, 175, 176, 177
Art 1A, 1B, 1C, 1D, 10HA, 20, 150 through 188C
Asian American Studies 1, 2, 100, 111, 112, 150A, 150B, 155
Chinese 101, 111
Classics 4A, 10, 17A, 17B, 17C, 20, 40, 41, 139B, 141, 142, 150, 174
Comparative Literature 1 through 53A-B, 135 through 161C, 163 through 169
Consumer Science 100
Design 140A, 140B, 142A, 142B, 143, 144
Dramatic Art 15 (but not 15L), 20, 115, 150 through 159
East Asian Studies 1, 9
Economics 1A, 1B, 101, 105, 110A through 175
Education 110, 116, 120, 122, 123, 130, 140, 145
English 3, 30A, 45, 46A, 46B, 46C, 110A through 183, 185, 187, 188, 189
Environmental Studies 25, 141, 142, 161
Food Science and Technology 20
French 25, 45, 107, 115 through 150
Genetics 10
Geography 2, 5, 6, 7, 10, 50, 121, 122A through 127, 141 through 161, 170, 171, 172, 173, 175
German 48, 50, 51, 52, 106, 108, 110 through 133
History 1 through 900, 101 through 191B, 193, 194A, 194B, 194C, 194D, 195
Human Development 100A, 100B, 100C, 101, 102, 103, 110, 130, 131, 132
Integrated Studies 1A through 9
Italian 25, 107 through 139C
Linguistics 102, 106, 112, 113, 114
Mathematics 10
Medieval Studies 20A, 20B, 20C, 120A-F
Mexican-American (Chicana) Studies 10, 101, 102
Native American Studies 1, 10, 32, 33, 55, 70, 101 through 161, 180, 181A, 181B, 181C
Nutrition 20
Philosophy 1, 10A-Q, 14, 21, 22, 23, 100 through 109, 114A, 114B, 117, 118, 123, 132, 143 through 181
Physical Education 36A, 36B
Political Science 1 through 7, 100 through 113, 115 through 191
Psychology 1, 16, 112, 115, 120, 131, 132, 136, 137, 143 through 150, 157, 159, 168, 171, 177, 183
Religious Studies 1 through 75, 100 through 172
Rhetoric 10, 103 through 143
Russian 30, 41, 42, 120 through 154
Sociology 1 through 25, 102, 110 through 176, 180, 182, 185
Spanish 34, 35, 103A through 109, 111 through 129, 134, 135, 136, 138, 149, 150, 151
Textiles and Clothing 7
Women's Studies 50

Technical electives permit you to tailor a program to your own academic and career objectives. For some, the technical electives offer the opportunity to prepare for a specific occupation. For others, it is an opportunity to broaden their background in the sciences and engineering.

Technical elective credit up to a maximum of 6 units is allowed for any combination of engineering courses numbered 190C, 192, and 199 (research conference, internship, and special study courses). Academic credit for 199 courses is limited to a maximum of 5 units for each substantially different project. Academic credit for engineering internship courses (192's) is limited to a maximum of 5 units per quarter.

All upper-division courses in engineering, physics, chemistry, statistics (except Statistics 102), and mathematics (except Mathematics 101) are suitable as technical electives. In addition, the following courses may be used as technical electives:

Agricultural Economics 113, 114, 140, 147, 148, 176
Agricultural Engineering Technology 161A, 161B
Animal Science 1, 105, 118B, 133, 160
Art 121A, 121B, 121C
Astronomy 127
Atmospheric Science 20, 20L, 105, 120, 121A, 121B, 124, 125, 133, 149A
Bacteriology 2, 102, 130A
Biochemistry and Biophysics 101A, 101B
Biological Sciences 1
Chemistry 1C, 4C, 5, 8A, 8B
Community Health 151
Ecology 20A, 20B
Economics 11A, 11B
English 104
Environmental Planning and Management 110
Environmental Toxicology 131
Food Science and Technology 102, 104, 108, 111, 131, 150
Geology 100A, 100B
Geography 106, 110
Geology 1L, 17, 50, 50L, 60, 105, 116, 117A, 117B, 123, 124, 134, 150A, 175
Physiology 2, 110, 120B, 120E, 149
Resource Sciences 100, 131
Soil Science 100, 102, 107, 120
Textiles and Clothing 100
Vegetable Crops 101
You are urged to discuss the selection of technical elective courses with your academic adviser.

Unrestricted electives: Any course for which University credit is allowed is acceptable as an unrestricted elective in the engineering curricula.

GRADING

Passed/Not Passed Option
(For general information on Passed/Not Passed grading, see page 56.)

While registered in the College of Engineering, you may enroll in a maximum of one course per quarter in which you choose the Passed/Not Passed (P/NP) grading option. Courses that are graded P/NP only may be taken simultaneously with the courses for which you exercise the Passed/Not Passed option.

In the engineering curricula, only unrestricted electives and units taken to satisfy the humanities-social sciences electives and English and rhetoric requirements, or requirements identified in the appropriate Upper Division Program as "Technical electives," may be taken on a Passed/Not Passed basis. All others must be taken for a letter grade.

You must meet the following conditions to exercise the Passed/Not Passed option:

- Be in good academic standing (not on probation or subject to dismissal)
- Carry at least 12 units, including the course to be taken P/NP
- Have a P/NP petition approved by the Dean or a designated representative

HONORS

The Dean's Honors List

The Dean's Honors List is posted quarterly on the bulletin board outside the College of Engineering Undergraduate Office. This list includes the names of all undergraduate Engineering students who have completed at least 12 units during the preceding quarter, exclusive of courses taken on a Passed/Not Passed basis, and who have achieved a grade-point average equal to or higher than the minimum grade-point average attained by the upper 16 percent of those registered in the College at the same class level during that quarter. A notation is made on the student's records each time the student qualifies for the Dean's Honors List.

Honors at Graduation

Graduating students in the College of Engineering who have achieved distinguished scholarship while at the University may qualify for honors, high honors, or highest honors. The names of these students are announced at Commencement and this distinction is noted on their records and diplomas. Honors at graduation will be awarded to students who have completed
at least 45 units of work at the University with a grade-point average that places them in the appropriate top percent of the graduating class in the College of Engineering. (See page 63 for details.)

**College Medal**

Each year outstanding senior students in Engineering are recommended by the faculty of the College as nominees for the College of Engineering Medal. Academic excellence is the primary basis for selecting the recipient of the award.

**GRADUATE STUDY IN ENGINEERING**

The following departments offer courses of study leading to both the Master of Science and Doctor of Philosophy degrees. Programs in these departments are particularly appropriate for those wishing to prepare for careers in teaching, research, or analytical design.

- Agricultural Engineering
- Applied Science (Davis-Livermore)
- Chemical Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Mechanical Engineering

Professional programs emphasizing design and leading to the Master of Engineering and Doctor of Engineering degrees are offered by the following departments:

- Agricultural Engineering
- Civil Engineering
- Electrical and Computer Engineering (Doctor of Engineering degree only)
- Mechanical Engineering

Graduate students in engineering are permitted wide latitude in selecting courses and research or design subjects at both the master's and doctoral levels. A purposeful and well-integrated course of study is planned with the help of an adviser or guidance committee.

More general information may be found in the *Announcement of the Graduate Division*, obtainable from the Dean of the Graduate Division. Detailed information on graduate study in engineering is contained in the *College of Engineering Bulletin*, available from the College Undergraduate Office.

**Off-Campus Learning**

Many courses in engineering, predominantly graduate-level courses, are available on the campus television network at receiving sites in Livermore and the Sacramento area. Those interested in TV classes should contact individual Engineering departments at addresses listed in the courses section.

**Graduate Certificate Program**

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects, and requires fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas and to explore new fields of technical interest.

General requirements for the program are:

- 15 units from courses not specifically required of UC Davis undergraduate engineering majors
- At least 9 of these 15 units must be from formal graduate courses
- Graduate Division acceptance

Further information on the Graduate Certificate Program may be found in the *College of Engineering Bulletin*. 
College of Letters and Science
The College of Letters and Science offers programs of study that expose a student to the worlds of human experience, of ideas, of artistic accomplishments, and of matter and things. These four worlds are the domains of the social sciences, the humanities, the fine arts, and the natural sciences, respectively. Although separate and distinct to the casual observer, these areas are interconnected and may be studied in a coherent curriculum. It is within this curriculum that you will be able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge primarily for its own sake, and gain the capacity for independent study and thought.

A well-balanced liberal education, including in-depth study of a major field, should prepare you for a satisfying life, whatever your career. And since more and more career opportunities depend on the completion of a basic letters and science curriculum, such an education will also have a vocational value.

The main emphasis in the College remains, however, on the ends of living rather than on the means. Undergraduate education in the College stresses breadth rather than specialization.

Within the specific standards of scholarship and unit distribution that the College has established for its programs of study, there are three groups of requirements crucial to the realization of the College's educational goals: the English Composition Requirement, the Breadth Requirements, and the Major Requirements.

The English Composition Requirement is designed to ensure that you are well versed in the skills of written communication.

The Breadth Requirements provide you with a broad background of knowledge, help you to explore the interdependencies of knowledge, and acquaint you with other cultures.

The Major Requirements enable you to gain intellectual depth and competence in a selected area of study.

Bachelor of Arts (A.B.) and Bachelor of Science (B.S.) degrees are offered by the College. These degrees are conferred upon your completion of the University's requirements and the College's general education and major requirements detailed on the following pages.

Every student is personally responsible for seeing that these graduation requirements are met. (Changes in graduation requirements, other than those in the major, adopted after publication of the General Catalog, are posted on the Letters and Science bulletin board opposite 175 Mrak Hall.)

STUDENT SERVICES

The primary function of the Dean's Office is to assist students with questions concerning academic matters and program planning. The deans and academic counselors staff an advising service designed especially to assist undeclared students with selecting a study program and in their search for a major. All students are welcome, however, to come in for general academic advising.

This office can also help you with questions concerning College requirements, scholarship (proportion and disqualification), and other academic matters. Problems which cannot be resolved by staff assistants are referred to academic deans or counselors who are regularly available to students by appointment.

The Dean's Office also performs a number of regular functions:

- Maintains a file of your academic record
- Determines how your transfer credits from other institutions apply towards completion of breadth and unit requirements for the bachelor's degree (applicability of transfer credit toward the major is determined by your major faculty adviser)
- Sends you a Status Card outlining transfer credit information
- Prepares a statement of remaining College requirements, on request, for seniors (Senior Degree Check, page 92)
- Acts on petitions requiring the Dean's approval, e.g., petitions for declaration or change of major; change of study list after established deadlines; waiver of minimal progress requirements; permission to take 200-, 300-, and 400-numbered courses for degree credit; withdrawal; reentry on probation or after completion of 120 units
- Reviews the records of students who are subject to disqualification and recommends dismissal from the College or continuation on probation

ADVISING

Faculty Advising

Good advising means the difference between an exciting and an indifferent educational experience. Given the range of programs and courses offered within the College of Letters and Science, good advice is essential if students are to design an educational program that will best fit their needs and individual goals.

In the College of Letters and Science, the relationship between student and faculty adviser is largely a voluntary bond. Thus, the effectiveness of advising depends both on the perceptiveness of the adviser and the initiative of the student.

An adviser can assist you not only in meeting minimal degree requirements, but also in taking maximum advantage of the resources available in the University.
Your transcripts from other colleges (your own copy is necessary) should be made available to your adviser. You are encouraged to talk to faculty advisers in different fields to enable you to make educational decisions on the basis of the broadest possible body of information and ideas. Although degree requirements may appear many and complex, they leave substantial room for individualization of study programs. With the help of faculty advisers, you can keep open as many options as possible while still progressing toward your major degree objectives.

Remember, it is your responsibility to maintain regular contact with your faculty adviser. A good relationship is developed by meeting frequently and discussing honestly and thoughtfully your problems and expectations. A conference at least once a quarter is especially desirable for new students during their first year in the College and for seniors during the final quarters preceding graduation.

Feel free to come to the Dean’s Office for consultation on any academic matter.

**Advising Checkpoints.** You are required to consult with your adviser at a couple of critical stages in your academic career:

- Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and the graduation requirements. You must also have declared a major by this time (see page 86).

  Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.

- Before you complete 135 units of degree credit, including transfer work, you must request a Senior Degree Check (page 92) from the Dean’s Office and consult your adviser concerning course selection and requirements in the major.

- Before you complete 195 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a firm study plan, in the form of a quarter-by-quarter program that will satisfy all remaining degree requirements as expeditiously as possible. This plan will be filed with your adviser. If the plan indicates that you will have to register beyond the 225-unit limit (page 92) in order to achieve your goals and meet the degree requirements, you must contact the Dean’s Office immediately.

If you do not comply with these advising requirements, you will be denied registration for future quarters.

**New students** are assigned to an adviser when the University receives their Statement of Intention to Register. If you indicated an interest in a particular program on your application for admission, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

If your faculty adviser happens to be unavailable at a critical time, you should ask the department or program administering your major for an alternate adviser to assist you temporarily. Department and program offices are listed in the Class Schedule and Room Directory.

New students are required to see their faculty adviser at least once every quarter during their first year on campus to discuss educational goals, course program, and progress.

If you participate in the Summer Advising and Registration Conference, you will be assisted in planning your Fall Quarter program by a temporarily assigned summer faculty adviser. You must contact the regular adviser you have been assigned during Orientation Week of the Fall Quarter.

**Continuing students** who have completed three quarters in residence in the College are no longer obligated to consult an adviser except at checkpoint stages (above); they are urged, however, to maintain regular contact with an adviser in their major to avoid program errors which may delay graduation.

**Undeclared students** who are as yet uncertain of their goals, and especially students lacking a clearly identifiable interest, are urged to make an appointment with one of the deans or academic counselors in the College Academic Advising Office (150 Marak Hall).

**Seniors** should maintain close contact with their adviser in order to ensure that they are meeting the major requirements.

**Peer Advising**

Student-to-student advising is an important part of the University advising services. Refer to the index under "Advising" for information on the various peer advising programs.

**Preprofessional Advising**

The College of Letters and Science does not offer special preprofessional programs. Students who plan to prepare for a professional school undertake a normal program leading to an A.B. or B.S. degree. Most courses required by a professional school are included in the requirements for the bachelor's degree, and additional courses you need may be taken as electives. You should become aware of the requirements for prospective professional schools early in your career in order to plan a suitable program. You may obtain further assistance from the Health Sciences Advising Office, the Pre-Law Advising Office, Pre-Business Advising Office, or the Work-Learn and Career Planning and Placement Center.

**TEACHING CREDENTIAL**

The teacher education program is administered by the Graduation Division. See page 99 for more complete information.

**THE MAJOR**

There are three types of programs which satisfy requirements for the major: departmental majors, interdisciplinary majors, and individual majors.
Major Programs Offered by the College of Letters and Science

Following is a list of the departmental and interdepartmental major programs offered by the College of Letters and Science. All but five of the majors offer a Bachelor of Arts degree. Those which lead to a Bachelor of Science degree as well are indicated by a footnote symbol (see below). Courses listed in this catalog under Astronomy, Chinese, Classics, Education, Integrated Studies, Japanese, Oriental Languages and Civilization, Portuguese, Scandinavian, and Swedish are taught by teaching departments or programs in the College of Letters and Science, but no undergraduate majors with these names now exist.

Afro-American Studies
American Studies
Anthropology¹
Applied Physics²
Art History
Art Studio
Bacteriology¹
Biochemistry²
Biological Sciences¹
Botany¹
Chemistry¹
Classical Civilization
Comparative Literature
Computer Science and Mathematics¹
Dramatic Art
East Asian Studies
Economics
English
French
Genetics²
Geography¹
Geology¹
German
Greek
History
International Relations
Italian
Latin
Linguistics
Mathematics¹
Medieval Studies
Mexican-American (Chicano) Studies
Music
Philosophy
Physical Education
Physics¹
Physiology²
Political Science
Political Science: Public Service
Psychology¹
Religious Studies
Rhetoric
Russian
Sociology
Spanish
Statistics¹
Women's Studies
Zoology¹

¹Offers a program leading to the Bachelor of Science degree as well as a program leading to the Bachelor of Arts degree.
²Offers the Bachelor of Science degree only.

Declaration of Major

Students who have not formally declared a major must do so by the time 90 units have been acquired. If you fail to declare a major, a hold will be placed on your further registration. The hold will be removed only when your Petition for Declaration or Change of Major is on file in the Dean's Office. Petitions can be obtained from faculty advisers or the offices administering the respective major programs. Office locations are published in the Class Schedule and Room Directory each quarter. As a part of the petitioning procedure, you must, in consultation with an adviser, prepare a projected plan of study. You are accepted into the major only after your adviser and the Dean have approved the petition. The department or curriculum committee supervising the major program will assign you to a faculty adviser.

To be accepted into a major, you must have a C average in all courses you have completed that are a requirement for that major, as well as a C average in the upper-division courses you have taken toward the major. Additional requirements, such as completion of a particular set of required courses with a specified grade-point average (usually well above a C average) may be introduced as conditions for acceptance into any major at any time.

As this is written, admission into the following majors and programs is restricted and subject to specific course and grade-point requirements: Computer Science and Mathematics, Geology, Mathematics, pre-Computer Science, pre-Mathematics, pre-Statistics, Statistics. Requirements for other majors are shown in the program entry in the Programs and Courses section of this Catalog. The criteria given are the minimal requirements you must meet in order to apply to the major, but satisfying the minimal criteria does not guarantee admission, which requires approval by the department or program faculty and the Dean. When the number of applications exceeds the number of spaces available — as will be the case in several of these programs — you may expect that the grade-point average needed for admission will be significantly higher than the minimum listed.

Individual Majors

The individual major is a program organized by a student in consultation with faculty advisers who are expert in the requisite fields of interest. If you wish to undertake an individual major, request the appropriate forms, which include detailed instructions, from the Dean's Office, 150 Mrak Hall. Program requirements are outlined on page 239.

Multiple Majors

If you are interested in two or more areas of study, you should consider the possibility of pursuing your goals by completing one or more of the optional minors offered by the College along with your major. This is usually the best approach from an educational point of
view and offers maximum flexibility in planning your program of courses. The alternative, and most common type of multiple major, is the double major, which leaves considerably less freedom of choice.

After endorsement of the major petitions by the appropriate faculty advisers, the Dean may approve declaration of more than one major if there are significant differences between the requirements of the major programs involved. In addition, approval is subject to the following conditions:

1. At least 80 percent of the upper-division units used to satisfy course and unit requirements in each major selected must be unique and may not be counted towards the upper-division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

If the major programs differ in the number of upper-division units required, the major program requiring the smaller number of units will be used to compute the minimal number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter for both majors must have been successfully completed.

It should be possible to complete all degree requirements within the 225-unit limit.

Combination proposals that cannot be approved are two or more majors
1. in the following group: Anthropology (B.S. degree), Bacteriology, Biochemistry, Biological Sciences, Botany, Genetics, Physiology, Psychology (B.S. degree), and Zoology;
2. offered by the same department or program;
3. that include an individual major;
4. subject to admission restrictions by any of the (three) undergraduate colleges; or
5. that do not differ significantly in disciplinary content, independent of actual overlap of courses.

Requests for multiple majors must be based on sound academic and educational considerations. Frequently, when a major (whether departmental, interdepartmental, or individual) is supplemented with a carefully selected program of courses or a minor that supports and amplifies your special interest, your educational goals are better served than when two or more major programs are studied in their entirety.

Cross-College Major

You may simultaneously pursue major programs in two undergraduate colleges on the Davis campus. The same conditions and criteria apply as for multiple majors (see above). Cross-college programs will not be approved if the majors involved are available within a single college as well. For example, cross-college programs between the Colleges of Letters and Science and Agricultural and Environmental Sciences will not be approved if one of the majors is Bacteriology, Biochemistry, Biological Sciences, Botany, Genetics, Physiology, or Zoology.

Change of Major Within the College

You may change from one major to another within the College with the Dean's approval. Consent of the department or committee in charge of your proposed new major is also required. Admission into a major program may be denied if your grade-point average in courses required for the selected major is less than 2.000.

Procedures for change of major within the College are the same as for declaration of major (see page 86), and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units).

Change of Major Accompanied by Change of College

In order to change from one college to another, you must be in good standing (not on probation or subject to disqualification).

If you are in good academic standing and want to transfer into the College of Letters and Science, you must petition to do so within the first five weeks of the quarter. Petitions, which are available at the Registrar's Office and the Dean's Office, must be endorsed by your new faculty adviser and signed by your former College Dean before being submitted to the Letters and Science Dean for consideration and approval.

"The kind of writing students do at the University may be considerably different from the kind they did in high school. We're less concerned with personal expression than we are with explanation and persuasion."
A 2,000 grade-point average in the courses required for the new major is usually necessary at the time of transfer. Requests for changes of major from students in senior standing may be approved only under unusual circumstances.

Grade-Point Averages in the Major

In addition to the general University requirement of a C average (2.000) for all University work, the College stipulates the following additional grade-point criteria for graduation:

You must have an average of at least 2.000 for all UCD courses required for the major; you must also have at least a 2.000 average for all upper division courses required for the major. To obtain these minimal averages in the major, you may, with approval of your adviser, repeat courses that were graded D or F. If you have to repeat a course more than once, you need the Dean's approval.

A department or curriculum committee may refuse to accept you into a major they administer if you do not have at least a 2.000 average in the courses required for the major.

If your performance is unsatisfactory (less than 2.000) after you have declared a major program, you may be required to withdraw from that major by the Dean, upon written recommendation from the chairperson of the department or the curriculum committee that administers the major.

THE MINOR

Teaching departments and programs may offer optional minor programs to students in the College of Letters and Science. Completion of a minor is not required for graduation, but you may elect to satisfy the requirements of one or more minors and have completion of the minor(s) certified on your transcript. Most teaching departments and programs that offer a minor program list course requirements in the Programs and Courses section of this catalog. Following is a list of those minors:

- Afro-American Studies
- American Studies
- Anthropology
- Art History
- Art Studio
- Biological Sciences
- Botany
- Comparative Literature
- Dramatic Art
- East Asian Studies
- Education
- English
- French
- Geography
- Geology
- German
- Greek
- History
- Italian
- Latin
- Linguistics
- Mathematics
- Mexican-American (Chicano) Studies
- Music
- Oriental Languages and Civilizations (by arrangement)
- Philosophy
- Physical Education
- Physics
- Political Science
- Psychology
- Religious Studies
- Rhetoric
- Russian
- Sociology
- Spanish
- Statistics
- Women's Studies

Certification of a minor on the transcript indicates that you have completed a coherent program of courses in an area of interest outside your major. The minor may complement your major, but it is not particularly meaningful unless the field of study is significantly different from that of your major.

A minor consists of 18 to 24 units in upper-division courses specified by the department or program. At least half of these units and courses must be completed in residence on the Davis campus. You are also expected to complete all courses that are prerequisite to the upper-division courses. In order to request certification of a minor, you must have a grade-point average of 2.000 in all courses required for the minor. At most, one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, these minors may not have any courses in common.

Some departments and programs do not offer a minor, while others may offer several. You can elect only one minor in a subject area. If the department or program you are interested in does not list a minor in this catalog, check with that department or program office. Letters and Science students may elect minor programs approved by the College of Agricultural and Environmental Sciences. These programs are listed on page 70.

If you want to have completion of a minor certified on your transcript, you must file a request with the Letters and Science Dean's Office in the quarter preceding graduation. Thus, June graduates have to file during the Winter Quarter. The minor does not have to be completed when you file your request, but requirements must be satisfied at the time of graduation. The Dean's Office has forms available for this purpose. See page 4 for specific deadlines.

REQUIREMENTS FOR THE BACHELOR'S DEGREE

University Requirements

University requirements for the bachelor's degree are described beginning on page 61.

College Requirements

Unit Requirements. A minimum of 180 units is required for the bachelor's degree (see page 90 for restrictions on credits that may be counted toward the 180 units). Of these units, 64 must be upper-division units which include 48 units from Letters and Science teaching departments and programs.
For the A.B. degree, a minimum of 12 of the 48 units of upper-division Letters and Science courses must be from outside the major department or program. Courses not accepted for the area requirements (see next column) do not count toward these 12 units.

**English Composition Requirement.** The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination (see page 91) upon completion of 70 units of degree credit (the examination does not yield credit);  
   **OR**
2. by completing with a grade of C- (or P) or better
   a. one course in English composition from English 1, 2, 3, 20, Comparative Literature 1, 2, or 3;  
   **AND**
   b. English 102 or 103 (which must be taken after 84 units have been completed).

**Breadth Requirements.** The two requirements that comprise the breadth requirements are:

1. **Foreign Language requirement**  
   *A.B. degree*— the 12-unit level or the equivalent in one language (see page 91 for details).  
   *B.S. degree* — none.

2. **Area requirements**  
   *A.B. degree* — a total of 52 units in social sciences, humanities and fine arts, and natural sciences/mathematics with a minimum of 12 units in each area. For this requirement a maximum of 20 units may be counted toward any one area. Twelve units of upper-division courses must be offered by Letters and Science teaching departments other than the major department or program.  
   *B.S. degree* — a total of 90 units in natural sciences/mathematics; and a total of 20 units in social sciences and/or humanities and fine arts.

(All of the courses used to satisfy this requirement must be chosen from those on the Area Requirement List shown in the adjacent column.)

**Major Program Requirements.** Requirements for major programs are described in the Programs and Courses section of this catalog, beginning on page 125. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see page 86 for a list of majors) or an individual major program approved by the College's Committee on Individual Majors (see page 86).

**Scholarship Requirements.** The minimum grade-point average is 2.000 for all courses counted toward the major and for all upper-division courses used to satisfy major requirements. Only grades earned in courses taken at UCD will be included in the grade-point computations.

**Residence Requirement.** While registered in the College of Letters and Science a minimum of 27 upper-division units, including 18 upper-division units in the major, must be completed on the Davis campus. For University requirements, see page 62. (Work completed while enrolled in the Education Abroad Program does not satisfy campus or College residence requirements.)

**Area Requirement List**

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the area requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward area requirements. Courses used to satisfy the English composition and foreign language requirements may not be counted toward the area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling breadth requirements are classified as follows:

**Humanities and Fine Arts**

Afro-American Studies 10.  
American Studies. A.B. degree: equally divide a maximum of 16 units between humanities/fine arts and social sciences. B.S. degree: 12 units allowed toward social sciences and humanities/fine arts.  
Art.  
Asian American Studies 1, 150A.  
Cantonese 2, 3, 4, 5, 6.  
Classics.  
Comparative Literature. All courses except first course taken from either 1, 2, 3 (or English 1, 2, 3, 5F, 5P). All subsequent courses in Comparative Literature may be counted toward humanities/fine arts.  
Dramatic Art.  
English. All courses except A, 25, 26, 28, and first course taken from 1, 2, 3, 5F, and 5P (and Comparative Literature 1, 2, and 3). If English 102 or 103 is used in partial satisfaction of the English composition requirement (course option), it may not be counted toward humanities credit.  
Foreign language. A.B. degree: all courses in foreign language departments, including literature courses, except the first 12 units of course work (course 2 or the equivalent in most languages offered on the Davis campus) in the language offered in satisfaction of foreign language requirement.  
History.  
Linguistics 1, 106, 107, 196.  
Medieval Studies.  
Music.  
Native American Studies 32, 33, 34, 55, 101, 156, 157, 181A, 181B, 181C.  
Philosophy.  
Religious Studies.  
Rhetoric.  

**Social Sciences**

Afro-American Studies 100, 101, 107, 110, 120, 121.  
American Studies. (See Humanities and Fine Arts above.)  
Anthropology. All courses except 1, 5, 151, 152, 153, 154A, 154B, 155, 156, 195, 196.  
Asian American Studies 2, 100, 110, 111, 150B.  
Chicano Studies 10.
Economics. All courses except 12.
Education. All courses except 114.
Geography. All courses except 1, 3, 102, 105, 106, 107, 108, 110, 112, 115, 117.
Linguistics. All courses except 1, 106, 107, 196.
Political Science.
Psychology. All courses except 15, 41, 103, 105, 108, 129, 131, 150, 154, 165, 177, 180B.
Sociology. All courses except 46A, 46B, 106.
Women’s Studies 50.

Natural Sciences and Mathematics
Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157.
Astronomy.
Bacteriology.
Biochemistry and Biophysics.
Biological Sciences. All courses except 19.
Botany.
Chemistry.
Entomology 10, 100.
Genetics.
Geology.
Human Anatomy 101.
Mathematics.
Physical Education 101, 102, 103, 113.
Physics.
Physiology.
Psychology 15, 108, 129, 131, 150, 154, 180B.
Statistics.
Zoology.

COLLEGE POLICIES AND PROCEDURES
Inquiries concerning the policies and procedures listed in this section should be directed to the Dean’s Office, College of Letters and Science, 150 Mrak Hall. See also the section on Registration, beginning on page 54.

CREDIT FOR COURSES
Advanced Placement Examinations. For credit allowed on units earned through Advanced Placement Examinations, see page 59.

Education Abroad Program. Full University credit may be awarded for courses taken through the Education Abroad Program. See page 18 for further information.

Extension Courses. Students in residence may apply credit earned in University Extension courses toward the 180-unit requirement, provided written approval has been obtained from the Dean prior to enrollment. The degree credit allowed by the Dean for Extension courses is usually less than the unit value listed in the course description. A maximum of 9 units may be offered for elective credit only. Such units and courses may not be applied toward fulfillment of the Area, Foreign Language, Upper-Division, or Senior Residence requirements of the College. No grade points are assigned for courses completed in University Extension.

Graduate and Professional Courses. You must obtain the recommendation of the instructor in charge and the department chairperson—in addition to approval from the Dean—prior to enrollment in order to receive elective credit toward the degree for the following kinds of courses:
- Graduate courses 200-298
- Professional courses for teachers (300-398 courses offered outside of the College of Letters and Science)
- Postgraduate professional courses 400-498 offered by professional schools (Courses in this series which are offered by teaching departments and programs in the College of Letters and Science do not require the Dean’s approval)
- All variable-unit courses in the 200, 300, and 400 series

Special-study courses in the graduate and professional series, such as courses 299, 399, and 499 do not satisfy degree requirements. Undergraduate students in the College cannot receive credit for such courses.

Before enrolling in graduate or professional courses, you must meet certain minimal conditions. You must have an overall UC grade-point average of 3.3 and 18 units of upper-division instruction in subject matter basic to the course. Exceptions may be considered if your preparation warrants.

You may count 9 units in courses numbered 200 through 298 and a combined total of 9 units in the 300 and 400 series as elective credit toward the degree. Units earned in courses in the 200, 300, and 400 series do not count as upper-division units and nonstandard
courses in these series are included in the 30-unit limit on nonstandard courses.

**Internship Courses.** Student internships (generally courses numbered 92 and 192) are available through many Letters and Science departments. You must have completed a minimum of 84 units before credit will be allowed for an upper-division internship course.

**Unit Credit Limitations.** For certain courses, limits have been established for the number of units that can be counted towards the 180-unit minimum required for the degree. To avoid discovering just before graduation that you are short units, keep track of the number of units you have taken in each of the following categories:

- Professional courses (300 and 400 series, except numbers 399 and 499): 9 units maximum. (See under Graduate and Professional Courses above.)
- Extension courses: 9 units maximum by petition. (See Extension Courses above.)
- Graduate courses: 9 units maximum by petition. (See Graduate and Professional Courses above.)
- Internship courses (numbers 92, 192): 12 units maximum including internship units taken at other institutions. (See under Nonstandard courses below.)
- Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses): 30 units maximum or one-sixth of the units taken at UCD, whichever is the smaller. (Note separate unit limits on internship, special study, and tutoring courses.)
- Passed/Not Passed Courses: Maximum of ½ of UCD units graded “P” taken at student's option. (Note limitations, page 56.)
- Physical Education 1: 6 units maximum.
- Special Study courses (99, 194H, 199): 5 units maximum in any one quarter. (See under Nonstandard courses above.)
- Tutoring courses (97T, 97TC, 197T, 197TC): 10 units maximum. (See under Nonstandard courses above.)

**Repeated Courses.** You may repeat a course in which you received a D, F, or NP. If the course you would like to repeat is part of a sequence (e.g., Mathematics 16A, 16B, 16C) and you have already passed a subsequent course in the sequence (e.g., you want to repeat Mathematics 16A, but you have already passed Mathematics 16C), you should check with the Dean's Office and the department regarding whether you can receive grade-point and/or unit credit. (See also page 57.)

**Transfer Courses in English Composition.** Transfer courses considered by the Dean to be equivalent or comparable to English 1, 2, 3, 20, 103A-G, or Comparative Literature 1, 2, 3 will be accepted toward satisfaction of the requirement. Note that English 103 or the equivalent must be taken after you have completed 84 units of transferable degree credit.

If your transfer work does not include an acceptable English composition course taken after you had completed or accumulated 84 units, you may fulfill the requirement by examination (see below) or take English 103 at Davis.

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**ENGLISH COMPOSITION EXAMINATION**

The English Composition requirement can be met with a passing score in the English Composition Examination.

This academic year, the examination will be offered on the following Saturday mornings:

- October 29, 1983
- January 28, 1984
- April 28, 1984

You are advised to complete this requirement in your junior year. There are no examinations administered during the summer.

Sign-up rosters will be posted on the Dean's Office bulletin board, Mrak Hall foyer, Monday through Thursday just preceding each Saturday examination date.

The English Composition Examination Form, available at the UCD Bookstore, is required.

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**FOREIGN LANGUAGE REQUIREMENT (A.B. degree)**

**Acceptable Languages.** The Foreign Language requirement may be satisfied in any language offered at UCD, or for which transfer credit is allowed from another academic institution.

You may also satisfy this requirement by examination in a language not offered on the Davis campus. In this case, the Dean’s Office will assist you in making arrangements to take an examination on another University of California campus, with a faculty member who teaches the language in question.

**Satisfaction of the Requirement.** The Foreign Language Requirement should be completed by the end of your first or second year, as program priorities permit. This is particularly important if you plan to apply for the University's Education Abroad Program (junior year abroad).

The Foreign Language Requirement may be satisfied by examination or completion of language courses as follows:

1. **Foreign Language Placement Test.** This test does not yield unit credit — it only determines whether the Foreign Language Requirement has been met, or at which point in the language sequence you should enroll.

   If you are a transfer student, you may validate your knowledge of a language learned in high school by taking this test. A test may not be taken, however, in a language for which you have already received degree credit. Consult your Status Card, which is issued by the Dean's Office prior to admission to the College.

2. **CEEB Achievement Test.** Earning a qualifying score of at least 500 on a College Entrance Examination Board (CEEB) Foreign Language Achievement Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at the Undergraduate Admissions Office you should petition for satisfaction of the Foreign Language Requirement at the Letters and Science Dean’s Office.

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"You have to be creative and willing to experiment to succeed."
3. CEEB Advanced Placement Examination. A score of 5, 4, or 3 on any foreign language College Entrance Examination Board (CEEB) Advanced Placement Examination taken in high school will satisfy the Foreign Language requirement.

4. Course Completion in College (or the equivalent). A.B. degree: 12-unit level in one language (e.g., Spanish 2 or Latin 3). B.S. degree: as required in the major program.

If you have successfully completed (C — or better) the second or third year of a language in the 10th or higher grade in high school you may receive unit credit for course 1 of that language on a P/NP grading basis only.

5. Proficiency Examination. If you have not completed the required level language course, but assume you have attained equivalent knowledge, you may satisfy the language requirement by passing a proficiency examination. For more information consult the appropriate foreign language department.

**PASSED/NOT PASSED GRADING**

Filing Procedures
Passed/Not Passed petitions are available for students in good academic standing in the Dean’s Office, 150 Mrak Hall, on the dates listed in the Class Schedule and Room Directory, and must be filed in person.

No signature other than yours is required on the petition. For detailed information, see page 56.

Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before petitioning for Passed/Not Passed in courses required for the major program.

**Limitation on Credit for Units Graded P**

Excluding courses which are graded on a Passed/Not Passed (P/NP) basis only, the number of units graded P that may be accepted towards a degree in the College of Letters and Science is limited to not more than one-fourth of the units completed in residence on the Davis campus.

The Academic Senate limits the total number of courses graded P, including units earned in courses graded “P/NP only,” to one-third of the units completed on the Davis campus. This limitation applies to all Davis undergraduates, including Letters and Science students (see page 56).

**REGISTRATION BEYOND THE 225-UNIT LIMIT**

A minimum of 180 units is required for the bachelor’s degree, and you are normally expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed, you may register only with the permission of the Dean. Permission may be granted for sound educational reasons and for a limited time. You will be expected to adhere to a program of courses agreed upon and to meet other conditions that may have been set. Approval must be obtained before course enrollment materials can be made available to you for the quarter following completion of 225 or more units.

If you are in good standing, you will be able to complete 12 quarters or the equivalent (e.g., four years) of college work even if you have earned more than 225 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.

**SENIOR DEGREE CHECK**

Before the beginning of your senior year, you should take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly so that you will get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements are left to do. To help you in these efforts, the College requires that you obtain a completed degree check from the Dean’s Office and a check of major requirements from your faculty adviser before you accumulate a total of 135 units of degree credit.

You will be denied registration for future quarters if you do not comply with this requirement. Completion of your senior degree check could take seven or eight weeks. You are advised, therefore, to request a degree check from the Dean’s Office well ahead of the time you will need it in order to avoid a delay in your registration.
UNIT LIMITATIONS

Ordinarily, a full-time student is expected to take an average of no fewer than 12 units a quarter. (Note the Minimal Progress Requirements on page 60.) The normal workload of a full-time student is 15 to 16 units.

Students in their freshman year and transfer students in their first quarter of residence may not take more than 17 units each quarter. For all other Letters and Science students, the study list may not exceed 21 units each quarter.

These unit limitations include non-credit remedial courses and repeated courses, but make-up work to remove incomplete grades is not included.

HONORS

The Dean’s Honors List

In order to be placed on the Dean’s Honors List at the end of a regular quarter, you must satisfy two criteria:

1. Complete at least 12 units for a letter grade during that quarter;
2. Earn a grade-point average, for that quarter, that places you in the upper 16 percent of the students registered in your class level.

To remain on the Honors List you must meet these same standards every quarter. This list is posted quarterly on the College bulletin board in the foyer of Mrak Hall.

Honors with the Bachelor’s Degree

Three categories of honors are awarded at graduation, honors, high honors, and highest honors. For minimum grade-point requirements for each category see page 63.

Recommendation from the major department, requested by the Dean’s Office, is also required if you are eligible for highest honors. In some departments and programs completion of an honors program or thesis is an additional requirement for “highest honors.”

You will not be awarded honors with the bachelor’s degree if more than eight units of grade I (Incomplete) appear on your transcript. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the Dean’s Office.

University and College Medals

Graduating seniors with a distinguished academic record in the College of Letters and Science may be recommended by the faculty as nominees for the College’s Herbert A. Young Medal. Each June, one medalist is selected from among the graduates of the current academic year. Academic excellence is the primary basis for selecting the recipient of this award.

The college also nominates graduates with distinguished academic records for the University Medal.
The Graduate Division
The Graduate Division is the academic home of approximately 4,000 post-baccalaureate students who are seeking advanced degrees in more than 70 graduate programs on the Davis campus.

Graduate study and research are administered by the Graduate Council, a standing committee of the Davis Division of the Academic Senate, and by the Dean of the Graduate Division. A Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

In developing its graduate programs, the Davis campus has taken advantage of a special pattern of organization allowing great flexibility: the creation of graduate “groups” which cut across the usual lines of faculty division into departments and colleges. A “group” is a graduate faculty whose membership is determined by research interest, not by department affiliation. Groups may be organized to offer an interdisciplinary program or to augment the faculty of a department, permitting participation in that discipline by faculty members who hold appointments in other departments.

ADVANCED DEGREE PROGRAMS AT DAVIS

The following advanced degrees are offered at UC Davis: Master of Administration, Master of Agriculture and Management, Master of Arts, Master of Science, Master of Fine Arts, Master of Arts in Teaching, Master of Engineering, Master of Education, Master of Preventive Veterinary Medicine, Candidate in Philosophy, Doctor of Engineering, and Doctor of Philosophy. Those departments or groups offering programs for the degree of Doctor of Philosophy may, if they choose to do so, recommend the degree Candidate in Philosophy for all students formally advanced to candidacy. In addition to these graduate degrees, professional degrees are offered in the Schools of Law, Medicine, and Veterinary Medicine.

Majors for graduate study and the advanced degrees offered in each are shown below. General requirements for degrees are published in the Announcement of the Graduate Division. Specific requirements are available from the office or chairperson of the graduate program or group concerned.

Majors and Degrees

Administration (M.Admin.) — refer to Graduate School of Administration
Agricultural and Environmental Chemistry (M.S., Ph.D.)
Agricultural Economics (M.S., Ph.D.)
Agronomy (M.S.)
Anatomy (M.S., Ph.D.)
Animal Behavior (Ph.D.)
Animal Science (M.S., M.A.M.)
Anthropology (M.A., Ph.D.)
Art (M.F.A.)
Atmospheric Science (M.S., Ph.D.)
Avian Sciences (M.S.)
Biochemistry (M.S., Ph.D.)
Biomedical Engineering (M.S., Ph.D.)
Biophysics (M.S., Ph.D.)
Botany (M.S., Ph.D.)
Chemistry (M.S., Ph.D.)
Child Development (M.S.)
Classics (M.A.)
Community Development (M.S.)
Comparative Literature (M.A., Ph.D.)
Comparative Pathology (M.S., Ph.D.)
Computing Science (M.S., Ph.D.)
Dramatic Art (M.A., M.F.A., Ph.D.)
Earth Sciences and Resources (M.S., Ph.D.)
Ecology (M.S., Ph.D.)
Economics (M.A., Ph.D.)
Education (M.A., M.Ed.)
Endocrinology (M.A., Ph.D.)
Engineering (M. Engr., M.S., D. Engr., Ph.D.)
English (M.A., Ph.D.)
Entomology (M.S., Ph.D.)
Food Science (M.S.)
French (M.A., Ph.D.)
Genetics (M.S., Ph.D.)
Geography (M.A., Ph.D.)
Geology (M.S., Ph.D.)
German (M.A., Ph.D.)
History (M.A., M.A.T., Ph.D.)
History of Art (M.A.)
Horticulture (M.S.)
Immunology (M.S., Ph.D.)
International Agricultural Development (M.S.)
Law (J.D.) — refer to School of Law
Linguistics (M.A.)
Mathematics (M.A., M.A.T., Ph.D.)
Medicine (M.D.) — refer to School of Medicine
Microbiology (M.A., Ph.D.)
Music (M.A., M.A.T.)
Nutrition (M.S., Ph.D.)
Pharmacology and Toxicology (M.S., Ph.D.)
Philosophy (M.A., Ph.D.)
Physical Education (M.A.)
Physics (M.A., Ph.D.)
Physiology (M.S., Ph.D.)
Plant Pathology (M.S., Ph.D.)
Plant Physiology (M.S., Ph.D.)
Plant Protection and Pest Management (M.S.)
Political Science (M.A., Ph.D.)
Preventive Veterinary Medicine (M.P.V.M.) — refer to School of Veterinary Medicine
Psychology (M.A., Ph.D.)
Range and Wildland Science (M.S.)
Rhetoric (M.A.)
Russian (M.A.)
Sociology (M.A., Ph.D.)
Soil Science (M.S., Ph.D.)
Spanish (M.A., Ph.D.)
Statistics (M.S., Ph.D.)
Textiles (M.S.)
Vegetable Crops (M.S.)
Veterinary Medicine (D.V.M.)—refer to School of Veterinary Medicine
Water Science (M.S.)
Zoology (M.A., Ph.D.)
Graduate Group Programs

Programs sponsored by graduate groups with faculty drawn from more than one department are listed below. If you are interested in one of these areas of study, write to the group chairperson for more information. These programs are also entered alphabetically in the Programs and Courses section of this Catalog, along with mailing addresses.

Agricultural and Environmental Chemistry
Agricultural Education
Anatomy
Animal Behavior
Atmospheric Science
Avian Sciences
Biochemistry
Biomedical Engineering
Biophysics
Botany
Child Development
Community Development
Comparative Literature
Comparative Pathology
Computing Science
Earth Sciences and Resources
Ecology
Endocrinology
Engineering
Food Science
Genetics
Horticulture
Immunology
International Agricultural Development
Linguistics
Microbiology
Nutrition
Pharmacology and Toxicology
Physiology
Plant Physiology
Plant Protection and Pest Management
Preventive Veterinary Medicine
Range and Wildlands Science
Soil Science
Statistics
Textiles
Water Science

ADMISSION STANDARDS

Students admitted to graduate status at the University of California must hold a bachelor's degree or the equivalent from an institution of acceptable standing and must have evidence of high scholastic ability. Generally, a minimum grade-point average of B in undergraduate study, or evidence of comparable scholarship, is required. Meeting the minimum requirements does not assure admission; students who are admitted are selected from among those applicants meeting the minimum standards.

Applications for admission are evaluated in terms of scholastic qualifications and formal preparation for the graduate field of study. An applicant whose scholastic record or undergraduate program of study is judged inadequate as a foundation for advanced academic or professional study may be denied admission. This procedure applies to all applicants, whether they come from schools or colleges within the University of California or elsewhere. Departments may have special requirements for admission to graduate status, and some departments and schools require an additional application for admission to their advanced degree programs.

Application for Admission

Application forms may be obtained by writing to the Dean of the Graduate Division, University of California, Davis, CA 95616. APPLICATIONS FROM U.S. CITIZENS MUST BE ON FILE BY THE FOLLOWING DATES:

June 1 for Fall Quarter
October 1 for Winter Quarter
January 1 for Spring Quarter

APPLICATIONS FROM NON-CITIZENS MUST BE FILED ONE MONTH PRIOR TO THESE DATES. HOWEVER, SINCE MANY DEPARTMENTS EFFECTIVELY CLOSE APPLICATIONS WELL IN ADVANCE OF THESE DEADLINES, EARLY FILING (preferably eight to twelve months prior to the date of registration) IS STRONGLY RECOMMENDED.

The application must be accompanied by a money order or bank check for $30 made payable to The Regents of the University of California. This fee is nonrefundable. In cases where complete records are filed later than the above dates, registration may be de-
layed, thus making you liable for a late registration fee of $50.

Official transcripts of record covering all college and university work completed to date, together with official evidence of degrees conferred, should accompany or immediately follow your application. A separate original and official record must be presented from each institution previously attended. Your transcripts and all other official credentials are retained in the files of the Office of the Dean of the Graduate Division. In addition to having your records sent to this office, you must have in your possession an official record for use in conferences with departments and for other purposes here. The Graduate Division office copy may not be borrowed.

Applications for programs leading to a Ryan teaching credential or specialist credential, and for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, Master of Administration, and Master of Preventive Veterinary Medicine must be filed directly with the appropriate department or professional school.

Readmission

If you were formerly enrolled in a regular session as a graduate student and wish to return, you must apply for reentry and pay the Readmission Application Fee of $30 at least six weeks before the beginning of the quarter in which you wish to enroll (see page 5). The application may be obtained from the Graduate Division. Transcripts of all work undertaken since you were last registered in graduate status at Davis must be presented with the application. (There is no assurance of reentry, as applicants for readmission will be considered in competition with other applicants for the program.)

International Students

Applicants for admission to the Graduate Division with credentials from universities and colleges in foreign countries are advised to make their initial inquiry at least one year before the date of intended enrollment to permit processing of records.

If your undergraduate preparation has been in a language other than English, you must furnish positive evidence that your command of both spoken and written English will permit you to profit from the instruction offered. A report from the Test of English as a Foreign Language (TOEFL), which is administered by the Educational Testing Service for the College Board, is required; the minimum acceptable score is 550. The TOEFL is given three times a year at many testing centers abroad, and full information is available from the Educational Testing Service, Princeton, N.J. 08540.

On arrival, international students take the special University examination in English. Those who do not pass are assigned to remedial courses. Even though you have been admitted, registration may be deferred until you acquire an adequate command of English.

Before the University of California will issue a Certificate of Eligibility for a visa, you must prove that you will have sufficient money to meet all your expenses while study-

ing at UC Davis (see page 29 for complete details). You must explain the source of your funds and guarantee that you will receive them while at the University.

No financial aid of any kind (grants, loans, tuition waivers, fellowships, scholarships, or work-study awards) is available to international students during their first year at UCD. International students may apply for fellowships or graduate scholarships only after they have completed one academic year (three quarters). Waivers of the nonresident tuition are very difficult to obtain even after the first year of enrollment. The regular registration fee cannot be waived. Prospective graduate students who have been corresponding with an academic department about a research or teaching assistantship must receive a clearly defined offer in writing before departing for Davis. Unless you have received a definite offer in writing, you should not plan to earn any part of your expenses for the entire length of your stay at UC Davis. If you have been awarded an assistantship, a paycheck will not be received until the month after beginning the assistantship, and it is therefore important to have available the amount of the first quarter's registration fees, nonresident tuition, and housing costs when you arrive in Davis.

Graduate Study Without an Advanced Degree Objective

If you do not wish to become a candidate for a higher degree, you may be admitted to a specified field of study for course work only. Such a program, which requires the approval of the Dean of the Graduate Division, must have a definite scholarly or professional purpose. The academic requirements for admission are the same as those for degree programs.

GENERAL REQUIREMENTS FOR ADVANCED DEGREES

A graduate degree is awarded to recognize a student's command of a wide range of knowledge in an academic field. It is not awarded merely for the fulfillment of technical requirements, such as residence, or the completion of specific courses.

Master's Degree

Students working toward a master's degree must be registered in residence for at least three quarters. Two regular six-week Summer Sessions may count as the equivalent of one quarter. Usually, all work for the master's degree is done in residence on the Davis campus. With the consent of the graduate adviser and the Dean of the Graduate Division, however, some work taken elsewhere may be credited toward your degree. The normal limit for such transfer credit is 6 units from another institution or up to one-half of the unit requirement in courses from another campus of the University — if the units were not used to satisfy the requirements for another degree.

A master's degree may be awarded upon completion of one of two basic plans in which either a thesis or a comprehensive examination is required.
Ph.D. Degree

The degree Doctor of Philosophy as granted at the University of California is not merely certification of having fulfilled technical requirements such as residence and the completion of fundamental courses. It means that the recipient possesses knowledge of a broad field of learning and has given evidence of distinguished attainment in that field; it is a warrant of critical ability and powers of imagination and synthesis. It means, too, that the candidate has presented a dissertation containing an original contribution to the knowledge of the chosen field of study.

Students working toward a doctorate must be registered and in University residence for a minimum of six regular quarters. Experience indicates that it takes considerably longer than this to complete a degree program. Two consecutive regular Summer Sessions may count as the equivalent of one regular quarter.

There is no University unit requirement for the doctoral degree. However, individual programs have course requirements which must be completed prior to your admission to the Qualifying Examination.

The Qualifying Examination is administered by a committee appointed by the Dean of the Graduate Division. The Examination is intended to demonstrate your critical ability, powers of imagination and synthesis, and broad knowledge of the field of study. Upon recommendation of the Qualifying Examination Committee and with the approval of the Graduate Council, you may repeat the Examination one time.

After successful completion of the Qualifying Examination, you are advanced to Candidacy for the degree. At this time, a committee is appointed to direct you in your research problem and guide you in the preparation of the dissertation.

Normative Time to the Ph.D. Degree. The University of California has adopted a policy statement on the normative time in which students are expected to complete the requirements for the Ph.D. degree programs. This policy establishes the period of full-time registration in which a student entering a Ph.D. degree program with a bachelor's degree and without any stated deficiencies should be able to complete the requirements of a particular program. The normative time for Ph.D. programs at Davis is expressed in terms of academic years, each academic year being comprised of three quarters in full-time registered status. The normative time for all Ph.D. programs at Davis is either four or five academic years.

Under the normative time policy, the University policy on continuous registration from the first quarter of enrollment to completion of degree requirements, unless on an approved leave of absence, will be strictly enforced. There is a financial incentive for completing the Ph.D. program within the normative time; students formally advanced to candidacy are currently eligible each quarter for a partial fee-offset grant until completion of the Ph.D. degree or until the cumulative time in graduate status at UCD exceeds the normative time to degree in a student's field of study.

Program of Study

New students are assigned an adviser within the appropriate department or graduate group who assists them in planning a program of study. The program will depend on some degree on the student's undergraduate training, and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Announcement of the Graduate Division. Additional requirements for study may be established by the department or group and approved by the Graduate Council. These requirements often include a core of required courses, but considerable flexibility is permitted to suit individual needs. Undergraduates at Davis who plan to pursue graduate study should consult with their major adviser early in their senior year to guarantee adequate preparation.

Intercampus Exchange Program

As a graduate student registered on any campus of the University, you may become an Intercampus Exchange Student with the approval of your graduate adviser, the chairperson of the department or group in which you wish to study on the host campus, and the Dean of the Graduate Division on both the home and the host campuses.

Although as an Intercampus Exchange Student you have library, health service, and other student privileges on the host campus, you are considered a graduate student in residence on your home campus. The grades obtained in courses on the host campus are transferred to your home campus and entered on your official record.

Application forms may be obtained at the Office of the Dean of the Graduate Division and should be submitted six weeks prior to the beginning of the quarter in which you wish to participate in the program.

Part-time Enrollment

Some advanced degree programs are available to qualified graduate students who for reasons of occupation, family responsibility, retirement, or health are not able to attend full time. Students with part-time status must meet the same standards of quality for admission, and for continuation in a graduate program as other students. Applicants desiring part-time enrollment in an approved program should indicate this request on their application for admission. Continuing graduate students who wish to change status between full-time and part-time must file a petition with the Graduate Division. Fee reductions that apply to part-time students are found on page 35 of this catalog. Application forms are obtained at the Graduate Division Office. See page 4 for filing deadlines.

Employee-Student Status

Regular status employees in career positions who are qualified for admission to the University may work toward a degree through the Employee Reduced Fee Program. Employee students pay 1/3 of the regular
FELLOWSHIPS, ASSISTANTSHIPS, AND LOANS

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants who plan to enter in a Fall Quarter and wish to be considered for a fellowship or graduate scholarship must file the combined Application for Admission and Fellowship no later than January 15 preceding the Fall Quarter to be attended. These applications are considered only once a year. If you are continuing in graduate status at Davis you must file an application for fellowship and graduate scholarship for continuing students with the chairperson of your graduate program on or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mrak Hall.

Teaching assistantships and research assistantships are available in many departments. Interested students should inquire at the office of the department in which they wish to study.

Information regarding Graduate Fellowships that are supported by various Federal and outside agencies is available at the Graduate Division.

The Financial Aid Office has information about loans and work-study for graduate students (see page 36).

TEACHER CREDENTIAL PROGRAM

The teacher education program at UC Davis is administered by the Graduate Division.

Acceptance into the multiple-subject teaching credential (elementary) program does not require any specific campus major. If you are accepted into this program, you can meet the state requirements for a diversified major by completing a regular University major and one of the following alternatives:

- The additional requirements for the approved UC Davis Diversified Waiver Program;
- The additional requirements for the approved Mexican-American (Chicano) Studies Diversified Waiver Program;
- Achieving a passing score on the National Teachers Examination (Common Section).

California State single-subject teaching majors (secondary) for which Davis students can qualify are: agriculture, art, English (including drama and speech), foreign languages, government, history, home economics, life science, mathematics, music, physical education, physical science, and social science. For information concerning University majors and campus waiver programs which satisfy these single-subject majors, or State-approved examinations available to test competence in these single-subject majors, consult the appropriate adviser in the departments of Education or Applied Behavioral Sciences.

Admission to the teacher education program is by the Graduate Division. Eligibility requires a scholarship record of B (3.0). For the 1984-85 program, applications and filing deadlines should be obtained from the Departments of Education, 174 Kerr Hall or Applied Behavioral Sciences (home economics and agricultural education), 106 Academic Office Building-IV.

State legislation makes the teacher education program also available to upper-division students. With careful planning it is possible for some students to finish requirements for a non-renewable preliminary credential at the same time the bachelor's degree is completed. This credential allows you to teach for five years, but within that time you must complete an additional ("fifth") year of study for the clear credential. Specific requirements may be obtained from the Department of Education.

Students considering teaching as a career should consult the departments of Education or Applied Behavioral Sciences as early as their freshman year. Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.
REQUIREMENTS AND PREPARATION

Eligibility for admission to one of the University of California professional schools or curricula is contingent upon the successful completion of an undergraduate program of preprofessional training of 2 to 4 years, depending upon requirements for specific schools. Announcements and information describing admission and course requirements for a particular school are available by writing to the school of your choice in care of the appropriate University campus.

Legend and addresses:

(B) University of California, Berkeley 94720
(D) University of California, Davis 95616
(I) University of California, Irvine 92717
(LA) University of California, Los Angeles 90024
(R) University of California, Riverside 92502
(SD) University of California, San Diego, La Jolla 92093
(SF) University of California, San Francisco 94143
(SB) University of California, Santa Barbara 93106
(SC) University of California, Santa Cruz 93064

Direct inquiries about schools and curricula in San Francisco (except Hastings College of the Law) in care of: Office of Student Admission.

Professional schools and curricula requiring 2 to 3 years of undergraduate preparation:

School of Business Administration (B)
School of Criminology (B)
Curriculum in Cytotechnology (SF)
Curriculum in Dental Hygiene (SF)
Schools of Dentistry (LA, SF)
Curricula in Education (B, D, I, LA, R, SB, SC)
School of Engineering (I)
School of Engineering and Applied Science (LA)
School of Forestry and Conservation (B)
School of Journalism (B)
Curriculum in Medical Illustration (SF)
Curriculum in Medical Technology (SF)
Schools of Medicine (D, I, LA, SD, SF)
Schools of Nursing (LA, SF)
School of Optometry (B)
School of Pharmacy (SF)
Curriculum in Physical Therapy (SF)
Schools of Public Health (LA, B)
School of Veterinary Medicine (D)

Professional schools requiring a bachelor’s degree in appropriate field of study for admission:

Graduate Schools of Administration (D, I, R)
School of Architecture and Urban Planning (LA)
Graduate School of Business Administration (B)
Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)

Preparation for teaching credentials is available as follows:
Elementary Teaching (B, D, I, LA, R, SB, SC, SD)
Bilingual (Cantonese) Emphasis—Elementary (B, LA)
Bilingual (Spanish) Emphasis—Elementary (B, D, I, R, SB, SC, SD)
Secondary Teaching (B, D, I, LA, R, SB, SC)
Bilingual (Cantonese) Emphasis—Secondary (LA)
Bilingual (Spanish) Emphasis—Secondary (I, LA)
Special Education (I, R, SB)
Pupil Personnel Services: Basic (Counseling) (B, I, LA, R, SB)
Agricultural Specialist (D)
Bilingual (Spanish) Specialist (D, I, LA, SB)
Reading Specialist (B, D, LA, R, SB)
School Librarianship (B, LA)
School Psychology (D, I, LA, SB)
Clinical-Rehabilitative Services (SB)
Administrative (B, I, LA, R, SB)
Health Services (SF)
Early Childhood Specialist (I, SB)
Administration (B, LA)
Graduate School of Journalism (B)
Schools of Law (B, D, LA)
Hastings College of the Law (SF)
School of Librarianship (B)
School of Library and Information Science (LA)
Graduate School of Management (LA)
Graduate School of Public Policy (B)
Schools of Public Health (LA, B)
Schools of Social Welfare (B, LA)
Scripps Institution of Oceanography (SD)

PREPROFESSIONAL TRAINING

Preprofessional programs do not — in and of themselves — lead to a bachelor’s degree. Since professional schools cannot accommodate all qualified applicants, students should prepare themselves for alternate careers and are expected to pursue a major program while completing their preprofessional requirements.

With careful planning it is possible for students to undertake any one of a variety of majors. While most students interested in the health sciences will elect a major within the biological sciences, majors as varied as psychology, engineering, and art can be equally acceptable. Law schools, in particular, do not prescribe any specific major program. They give equal consideration to all qualified applicants completing a course of study which gives them a broad cultural background and includes intensive work for a substantial period of time in a selected field of study.

REFERRAL INFORMATION

Although the Davis campus offers course work in preparation for admission to most of the schools listed above, the referral information which follows relates to the types of preprofessional training in greatest demand at Davis.

Students are strongly urged to read this catalog and the appropriate professional school announcement carefully before consulting faculty and staff about admission requirements. Communicate directly with personnel at the professional school to which you expect to apply if you need more detailed information. A list of general reference books which may be of interest is presented at the conclusion of this section.
ADMINISTRATION
The UC Davis Graduate School of Administration, which enrolls its third class in the fall of 1983, offers a two-year program of study in management and policy analysis leading to the Master of Administration degree. (See page 107 for details.)

BUSINESS ADMINISTRATION AND PUBLIC POLICY
Preparation for study: See published announcements of schools of business administration and public policy. For advice and counsel, see the departmental advisers in the Department of Economics (380 Kerr Hall, 752-0741) or Agricultural Economics (118 Voorhies Hall, 752-1517); or see the Pre-Business School (Peer) Adviser located in 359 Kerr Hall, 752-6512.

FORESTRY
Preparation for Study: Consult this catalog (pages 69, 184, 302) and the announcement of the Department of Forestry and Conservation, UC Berkeley.

Preforestry advisers: C.C. Delwiche (Land, Air and Water Resources, 273 Hoagland Hall, 752-1511 or 752-1409).

LAW

Advising: Students interested in law school preparation should consult the Pre-Law Adviser, Pre-Law Advising Office, 109 South Hall, 752-3008. Information is available about law school admission procedures, academic program planning (see also page 26), and professional possibilities.

School of Law, UC Davis: Consult this catalog (page 109), the Announcement of the School of Law, or the Law School Admissions Office, 115 King Hall, 752-6477.

HEALTH SCIENCES
At the Davis campus only preparatory work is offered. Professional training for all fields except medicine and veterinary medicine must be completed elsewhere. Degree work is offered at Davis for dietetics, but students must apply elsewhere for the required postgraduate internship. Information regarding careers in dietetics or nutrition can be obtained from the Nutrition Department or the Work-Learn and Career Planning and Placement Office on campus. Contact the Health Sciences Advising Office, South Hall (phone 752-2672) regarding curricula and schools for all health science fields.

Suggested Curricula. Since specific school requirements vary, students should either contact the schools directly, or contact the Health Sciences Advising Office for more detailed information. Students transferring into a professional program offered at the undergraduate level must complete that school's general education requirements.

Students are advised that in California most professional programs are unable to accommodate all applicants. Students may wish to consider applying also to out-of-state programs. Professional school admissions committees evaluate applicants on the basis of their course work and grades, test scores, work experience in health care, community activities, and letters of recommendation.

Courses listed under each of the following health fields of study are general requirements only.

Clinical Laboratory Technology
To qualify for the required twelve-month medical technology traineeship in California, students need to complete a baccalaureate degree, which includes the following minimum coursework requirements as specified by the State Department of Health.

Biological sciences: 27 units, including instruction in hematology (Clinical Pathology 101), immunology (Veterinary Microbiology 126 or Medical Microbiology 107), and medical microbiology (Veterinary Microbiology 127).

Chemistry: 24 units, including Chemistry 1A, 1B, 1C, 5 and Biochemistry 101A-101B or Physiological Sciences 101A-101B.

Physics 2A, 2B, 2C.

Mathematics or calculus, at least one term.

Strongly recommended courses include: hematology (Clinical Pathology 101L); immunology (Veterinary Microbiology 126L); parasitology (Veterinary Microbiology 132, Medical Microbiology 215, or Entomology 156-156L); and a laboratory in clinical chemistry (e.g., Clinical Pathology 102 or Biochemistry 101L).

Recommended courses include: organic chemistry (Chemistry 8A-8B); physics (Physics 3A-3B-3C); Physiology 110-110L; virology (Veterinary Microbiology 128 or Biological Sciences 162); histology (Zoology 122).

Suggested electives:

Genetics (Genetics 100A-100B or 120); Human Anatomy 101; advanced immunology (Veterinary Microbiology 270); computer programming (Engineering 5, Mathematics 19, or 29A); business management (Agricultural Economics 112).

Requirements vary among training programs. Students should check the individual program for additional required courses.

Dentistry
Students complete three to four years of preprofessional course work prior to admission to the three- or four-year dental curriculum. The Dental Admission Test should be taken in April or October— one year prior to the projected date of admission, but preferably in April. Check individual catalogs for exact prerequisites.

Biological sciences (at least one year with laboratory). Recommended: Biological Sciences 1; Zoology 2-2L; Physiology 110-110L; Zoology 100-100L; Biochemistry 101A-101B.
Chemistry 1A-1B-1C, and at least 8 units of organic chemistry with laboratory (e.g., either courses 8A-8B, 128A-129A, or courses 128A-128B-128C and 129A-129B-129C). Check individual catalogs for specific requirements.

English: one year, preferably to include two composition courses (e.g., English 1, 3, 103). Rhetoric courses are not acceptable.

Physics 2A-2B-2C and 3A-3B-3C.

Psychology: one lower- and one upper-division course. Recommended: Psychology 1, 16, 112, 145, or 168.

Suggested electives: Statistics 13 or Human Anatomy 101, 101L; Mathematics 16A-16B-16C; Genetics 100A-100B or 116; sculpture course, art practice.

Health Care Administration

A public administration or business management orientation is recommended for the baccalaureate and master’s degree work. Schools of public health and graduate school programs in administration offer professional training. Entrance requirements vary greatly from program to program. Contact the school of your choice for particular requirements. Elective courses may be selected from the following:

Agricultural Economics (e.g., courses 1B, 112, 117, 171A, 171B).

Applied Behavioral Sciences (e.g., courses 151, 152, 153, 154, 155, 160A, 160B, 162, 163, 164).

Biological Sciences 1.

Community Health 101, 121, 204.

Economics (courses 1A, 1B, 11A, 11B, 131, 134, 150A, 151A).

Engineering 5.

Epidemiology and Preventive Medicine 401, 402, 403, 404.

Food Service Management 123.

History (e.g., courses 174A, 174B, 174C, 174D, 185B).

Statistics 13 or Agricultural Science and Management 150; Mathematics 19.

Political Science (e.g., courses 100, 101, 102, 156, 180, 181, 182, 183, 187, 188).

Psychology 1, 112, 145, 168.

Rhetoric 1, 3.

Sociology (e.g., courses 154, 180).

Medicine

Students complete three to four years of preprofessional course work prior to admission to medical school. The Medical College Admission Test must be taken at least one year prior to expected date of admission. Check individual medical college catalogs or contact the Health Sciences Advising Office, South Hall, for specific requirements for each school. Any major is appropriate for admission; the following courses are required by most schools.

Biological sciences: six quarters, with laboratory. (Biological Sciences 1, Zoology 2-2L, Physiology 110, 110L, Bacteriology 2 or 102, and 3 recommended).

Chemistry 1A-1B-1C; one year organic, with laboratory (e.g., Chemistry 8A-8B-8C-129A-129B or preferably 128A-128B-128C and 129A-129B-129C).

Physics: one year, with laboratory (e.g., 2A-2B-2C, 3A-3B-3C).

English: one year (e.g., English 1, 3, 103).

Mathematics: one year of calculus (e.g., Mathematics 16A-16B-16C or 21A-21B-21C).
Nursing
Two years are usually required to complete prerequisites prior to transferring into two- or three-year baccalaureate nursing programs. General requirements include:
- Bacteriology 2 or 102, and 3.
- Chemistry 1A, 1B, 8A, 8B.
- English 1.
- Human Anatomy 101, 101L.
- Physiology. Recommended: Physiology 2-2L or 110-110L.
- Psychology 1.
- Sociology 1.
- Recommended courses include: Nutrition 10 or 110;
  Human Development 100A or Psychology 112;
  Anthropology 2; Rhetoric 1 or 2; Physics 3A, 10;
  Zoology 2, 2L; Family Practice 92A-H, 192K;
  Community Health 101; Psychiatry 255; Biological
  Sciences 19, Psychology 15 or 108.
Specific requirements vary from school to school and are subject to change; students are advised to contact specific schools regarding requirements. An R.N. license may also be earned through Associate degree programs (A.D.N.) offered by community colleges or through hospital diploma programs.

Occupational Therapy
Basic preprofessional training may be taken either at the undergraduate or graduate level. Students must transfer to another school to obtain professional training. Applicants are expected to be proficient in some arts and crafts activities and preferably knowledgeable in some industrial arts and recreational skills. Experience in the field is strongly recommended.
- Biological Sciences 1.
- Chemistry 1A, 1B.
- English 1 or 3.
- Human Anatomy 101, 101L.
- Human Development 100A-100B or Psychology 112.
- Physiology 2-2L or 110-110L (110-110L recommended).
- Psychology 1, 168.
- Sociology: one course or Anthropology 2.
- Suggested electives: Human Development 100C, 102, 130, 131, 141; additional psychology; Physics 2A-2B-2C, 3A-3B-3C, 10; Physiology 111A-
  111B, 112-113, Community Health 101; Genetics 10;
  Nutrition 10; art and design courses; Physical Education
  103, 105, 113, 125, 131; Behavioral Biology 451, 468;
  Family Practice 92A-H, 192K; Rhetoric 1, 3; Bacteriology 2, 3. CSU San Jose requires a "skills" course.

Optometry
Two years minimum preparation is required prior to transfer into a four-year Doctor of Optometry degree curriculum. Students must take the Optometry College Admission Test, one year prior to projected date of admission. Inquire at the Health Sciences Advising Office for test dates. Check individual catalogs for exact prerequisites.

Biological sciences (one year with laboratory). Recommended: Biological Sciences 1; Bacteriology 2 or 102 and 3; Zoology 2-2L; Human Anatomy 101-101L; Physiology 110-110L.
Chemistry: one year of general (Chemistry 1A, 1B, 1C) and one year of organic with laboratory, (8A, 8B and 128A-129A or 128A-128B-128C and 129A-129B-129C). Required by a few schools: 9 units of organic chemistry.
English: one year (e.g. English 1, 3, 103). Rhetoric courses may fulfill this requirement.
Mathematics 16A-16B. Required by some schools: Mathematics 16C; Statistics 13 or Agricultural Science and Management 150.
Physics 2A-2B-2C, 3A-3B-3C.
Psychology: two courses, Psychology 1 and one upper division course (e.g., Psychology 112, 168).
Suggested electives: economics, sociology, biochemical, additional biological sciences.

Pharmacy
One to two years minimum preprofessional course work is required prior to transfer to professional training. Students may be required to take the Pharmacy College Admission Test one year prior to projected date of admission. Each school has its own requirements; experience in the field is highly recommended. Check individual catalogs.

Biological sciences (one year with laboratory). Recommended: Zoology 2-2L, 100; Bacteriology 2 or 102, 3; Biological Sciences 1.
Chemistry: one year of inorganic chemistry with laboratory (Chemistry 1A-1B-1C); one year of organic with laboratory (Chemistry 128A-128B-128C-129A-129B-129C). UCSF requires Chemistry 5, but no organic chemistry. UOP B.S. degree program does not require organic chemistry.
Economics. USC requires one macroeconomics course (Economics 1B). A few schools require Economics 1A-1B.
English, one year: one each of composition, literature and one other.
Mathematics 16A-16B (-16C required by out-of-state schools) and Statistics 13.
Psychology: one course, such as Psychology 1.
Rhetoric 1 or 10.
Suggested electives: courses in behavioral psychology, speech, communication, sociology, anthropology, history, and political science.

Physical Therapy
Basic preprofessional training is available for both the undergraduate and graduate levels; students must obtain professional training from another school. Each physical therapy program has its own specific requirements; therefore, students should contact the school of their choice. Experience in the field is strongly recommended. General requirements include:
- Biological Sciences 1.
- Chemistry: 1A, 1B. Recommended: 1C, 8A, 8B.
- English 1.
Human Anatomy 101, 101L. Physics 2A, 3A. Many schools require also Physics 2B, 2C, 3B, 3C. Physiology 110-110L (required by majority of schools). Psychology 1 and 168. Statistics 13. Suggested electives: Human Development 100A-100B or Psychology 112; Human Development 100C, 131, 141; Bacteriology 2 and 3; Sociology 1, 3; Zoology 2-2L, 106, 143; Anatomy 215; Physical Education 101, 102, 103, 105, 113, 125, 131; Rhetoric 1, 3; Behavioral Biology 451; Community Health 101; Family Practice 192K; additional psychology.

Physician Assisting

Physician Assistant programs often require courses in English composition, sociology, psychology, chemistry, anatomy, physiology, bacteriology, and mathematics. Additionally, one to two years of direct patient care (i.e., nurse, nurse's aide, EMT, orderly, corpsman) are usually required. The majority of the programs are for training people who are interested in assisting the primary care physician in underserved areas; however, specialty training is available. Physician's assistants work in a wide variety of settings.

Speech Therapy

Students must transfer to another school for preprofessional and professional training through a master's degree or special teaching credential program.

Speech therapy and audiology programs are highly specific in their entrance requirements at both the undergraduate and graduate levels. UC Davis offers courses that satisfy a few of the requirements; however, it has no preprofessional major for these fields. For information on courses at Davis which are acceptable toward specific programs in speech therapy and audiology, you may contact either the Health Sciences Advising Office or the professional program in which you are interested.

School of Medicine, UC Davis: Consult page 113 of this catalog, the School of Medicine Bulletin, or the Office of Student Affairs, School of Medicine, 752-3170.

School of Veterinary Medicine, UC Davis: Consult this catalog page 117, the Announcement of the School of Veterinary Medicine, or the Office of Student Services, School of Veterinary Medicine, 752-1383.

REFERENCE BOOKS

School catalogs and reference texts are available in the Periodicals Room of the Shields Library, the Health Sciences Library, or the Health Sciences Advising Office.

Some recommended publications are as follows:

American Universities and Colleges, edited by the American Council on Education.

Graduate Programs and Admissions Manual, published by the Graduate Record Examination Board and the Council of Graduate Schools in the United States.

"Internships, work experience, and special projects have been some of the most enjoyable parts of my years at Davis."

Admission Requirements of American Dental Schools, published by the American Association of Dental Schools.

Medical School Admission Requirements U.S. and Canada, published annually by the Association of American Medical Colleges.

Pharmacy School Admission Requirements, published annually by the American Association of Colleges of Pharmacy.
School of Administration
PREPARATION FOR THE STUDY OF ADMINISTRATION

A bachelor's degree and a strong interest in professional management are prerequisites for admission to the Graduate School of Administration. The school seeks students from diverse professional and academic backgrounds, and does not limit its consideration to applicants from any particular category of majors. Although the program has no specific subject prerequisites, it is strongly recommended that students complete the following coursework prior to enrollment in the program:

Economics — the introductory courses in micro and macroeconomics, and one upper-division course in microeconomics (Economics 1A, 1B, 100).

Mathematics — an introductory course in calculus (Mathematics 16A).

Statistics — one course in elementary statistics (Statistics 13).

Well-developed English reading and writing skills are essential for success in the program.

ADMISSION

Admission is for the Fall Quarter only. Application materials may be obtained from the Graduate School of Administration and must be completed and returned, along with a nonrefundable application fee of $30 and all supporting documents, by April 1. Completed applications for fellowship and graduate scholarships must be filed by January 15.

Applications are reviewed by the Admissions Committee which seeks students of clear promise and ability as evidenced by undergraduate grade-point average, GMAT scores, letters of recommendation and a personal statement. Professional management experience is not required for admission, but is favorably considered.

The Graduate School of Administration of the University of California, Davis, prepares men and women for management careers in business, government, and nonprofit enterprises. The School combines the principal components of leading graduate programs of business management and public policy analysis into an intensive two-year course of study leading to the Master of Administration degree. The Graduate School of Administration admitted its charter class in the fall of 1981, and the planned enrollment at maturity is 300.

The two-year program provides both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made. Successful comple-
The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. The fall of 1983 will see the School enroll its eighteenth class. The program of the School is designed to combine the best features of traditional legal education with the development of new interests and approaches necessary for training lawyers to meet the demands of the future. In addition to the traditional professional curriculum, the School offers opportunities for practical experience through clinical programs and for in-depth study of an area of law in an individualized program of classroom work, research, writing, and experience in the community. It also seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

The School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools, and has a chapter of the Order of the Coif.

Preparation for the Study of Law

No specific college major is required for admission to the School of Law, and there is no prescribed pre-legal program. Your college record and Law School Admission Test (LSAT) score must, of course, demonstrate that you are highly qualified for the study of law.

As a pre-law student, you should plan a course of study that will give you a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Pre-law students should develop the ability to communicate easily, persuasively, and accurately; to understand people and institutions; to gather and weigh facts; and to solve problems and think creatively. You should be able to read rapidly with comprehension, express yourself clearly, completely, and concisely, both orally and in writing — in short, it is most important that you obtain mastery of the English language.

Assistance in program planning may be obtained from the Pre-Law Advising Office, South Hall, 752-3009 (see pages 26 and 102).

For additional information, see the official Pre-Law Handbook, published annually and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law school, and the study of law, together with individualized information on most American law schools. It may be found at college bookstores or ordered from Law School Admissions Services, Box 2000, Newtown, PA 18940.

**ADMISSION**

**Requirements for Admission**

Your application for admission to the School of Law's professional curriculum must show a record of sufficiently high caliber to demonstrate qualification for the study of law. A bachelor's degree or an equivalent degree from an approved college or university must be earned prior to the time you begin work in the School.

Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by LSAT scores and the undergraduate grade-point average (GPA). (Refer to the School of Law Announcement for LSAT score minimum requirements.) The Committee seeks students of diverse backgrounds. In this regard, the Committee considers ethnic and economic factors, advanced degrees or other advanced studies, significant work experience, and extracurricular and community activities during and after the college years. An applicant's growth, maturity, and commitment to the study of law are major concerns.

Students are admitted only on a full-time basis and only in August.

**Law School Admission Test (LSAT)**

All applicants are required to take the Law School Admission Test administered by the Law School Admission Services. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, October, and December. If at all possible, you should take the test by October, and in any event not later than December, for admission the following fall. The completed test application blank, accompanied by the fee, must be postmarked at least 30 days before the date of the test to ensure the applicant's being registered.

To obtain application forms, information about the test, specific test dates, and the location of testing centers, write to: Law School Admission Test, Law School Admission Services, Box 2000, Newtown, PA 18940.

**Admission Procedures**

Complete details of admission procedures are included in the School's bulletin, School of Law Announcement.

1. Application for admission to the School of Law and to the Graduate Division of the University for the program leading to the degree of Juris Doctor should be made on forms supplied by the School. Application forms and the School bulletin may be requested from the Office of Admissions, School of Law, University of California, Davis, CA 95616. The completed application must be returned to that same office, accompanied by a $30 nonrefundable application fee in the form of a check or money order made payable to The Regents of the University of California.

The last date for filing completed application forms, together with all supporting documents, including LSAT scores, Law School Data Assembly Service (LSDAS) reports, and letters of recommendation, is February 1 of the year in which admission is sought. Early filing of all application materials is strongly recommended and will materially assist the School of Law Admissions Committee in its considerations. No app-
Application will be considered if postmarked after February 1 of the year in which admission is sought.

2. You must take the Law School Admission Test and submit the Law School Application Matching Form with your application so that the score will be reported to the School. You are urged to take the test as early as possible, and in no event later than December preceding the year in which admission is sought.

3. You should register with the LSDAS no later than December 1 by completing and mailing the registration form supplied with each LSAT information packet. A transcript from each college or university attended should then be sent directly to the Law School Data Assembly Service, Law School Admission Services, Box 2000, Newtown, PA 18940.

4. An official transcript of college work completed during the first semester or quarter of your senior year must be submitted directly to the School of Law as soon as it is available. Failure to do so may delay consideration of your application materials. Successful applicants are required to submit directly to the School of Law a final transcript showing the award of a bachelor's degree.

5. Two letters of recommendation from objective and responsible persons to whom you are well known must be provided. At least one of these letters should come from a faculty member under whom you studied while in college. These letters of recommendation should come directly from the writer or from a college placement center, career center, or college pre-law office. The Admissions Committee cannot seriously consider your application before two letters have been received.

6. When accepted by the School of Law, you are simultaneously admitted to the Graduate Division on the Davis campus of the University for the program leading to the degree of Juris Doctor. If you intend to pursue studies leading to other graduate degrees, or wish to become a candidate for a Combined Degree Program (see page 111), you must make separate application to the Graduate Division prior to commencing such studies.

Admission to Advanced Standing

If you have completed at least one year of work in another approved law school, you may be considered for admission into advanced standing with credit for not more than one year of such work. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

Application procedures for advanced standing are the same as described above with the addition of (1) a letter of good standing including class rank from the dean of any law school previously attended; (2) at least one letter of recommendation from a law professor; (3) transcripts of all law school work; (4) LSAT score (no need to register with LSDAS — a copy of the report previously submitted to the school you are presently attending will suffice); and (5) an official transcript from the school where you earned your undergraduate degree, stating the date the degree was conferred. The deadline for transfer applications is June 30 of the year for which transfer is sought. Committee decisions on advanced standing are normally made in late July or early August of the year in which admission is sought.

Students who have been disqualified at another law school will not be admitted to this school.

Minority Recruitment

The students and faculty of the UCD School of Law recognize the desperate need for minority lawyers. The School, therefore, actively solicits applications from Asian, Black, Chicano, Native American, Pilipino, and other minority students. Although a legal career is neither the only nor, in many instances, the most desirable way to deal with racism, poverty, and the myriad social, political, and economic problems which besiege this country — it is one way to approach their solutions.

The School of Law, in cooperation with the Association of American Law Schools (AALS) and the Council on Legal Education Opportunity (CLEO), participates in programs designed to increase the number of minority law students. CLEO applications may be obtained by writing to: Council on Legal Education Opportunity, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Applications for the special summer program for Native American students may be obtained from the Special Scholarship Program in Law, American Indians, P.O. Box 4456, Station A, Albuquerque, NM 87119.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Chicano students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 28 Geary Street, 8th Floor, San Francisco, CA 94108.

PROFESSIONAL CURRICULUM AND DEGREE

The course of study in the professional curriculum requires six semesters for completion and extends over a period of three years. It is designed for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the Fall Semester.

When you satisfactorily complete the professional curriculum of 84 semester units, and the required period of residence study, you will be recommended for the degree of Juris Doctor.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, a prerequisite to second- and third-year courses. The work of the second and third years is elective. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.
The courses of the professional curriculum are listed beginning on page 245.

Combined Degree Programs

Students with interests in areas such as anti-trust, business, labor law, criminal law, or ecology, may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. In order to encourage this kind of study, the School, in conjunction with other schools and University departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. In some instances it may be possible to work on a Ph.D. degree as well.

Normally, a Combined Degree Program will take at least 3½ to 4 years. You will usually be able to earn up to 10 semester-hours of law school credit for work in the related discipline and normally can complete the combined degree program in less time than it would take to earn the two degrees separately. The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the law school and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with the UC Berkeley School of Business for the M.B.A. degree, and with UCD departments for the M.A. degree in economics and sociology. The law school will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time prior to the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should indicate this on the School of Law admission form.

SEMESTER SYSTEM

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

Academic Calendar 1983-84

<table>
<thead>
<tr>
<th></th>
<th>Fall 1983</th>
<th>Spring 1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Introductory Program begins</td>
<td>Sun, Aug 14</td>
<td>Mon, Feb 20</td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 22</td>
<td>Mon, Jan 9</td>
</tr>
<tr>
<td>Labor Day holiday*</td>
<td>Mon, Sept 5</td>
<td></td>
</tr>
<tr>
<td>Thanksgiving holiday period*</td>
<td>Thurs-Fri, Nov 24-25</td>
<td></td>
</tr>
<tr>
<td>President's holiday*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring vacation period</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, Dec 2</td>
<td>Fri, Apr 27</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Wed, Dec 3-7</td>
<td>Sat-Wed, Apr 26-May 2</td>
</tr>
<tr>
<td>Law school examination period</td>
<td>Thurs-Fri, Dec 8-23</td>
<td>Thurs-Fri, May 3-16</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Fri, Dec 23</td>
<td>Fri, May 16</td>
</tr>
</tbody>
</table>

*Academic and administrative holiday.

APPLICATION MATERIALS

The Announcement of the School of Law and application materials may be obtained by writing to the Office of Admissions, School of Law, 115 King Hall, University of California, Davis, CA 95616.
The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study comprised of 15 consecutive quarters. Course work is conducted on the Davis campus, at the University of California Davis Medical Center, Sacramento, and in nearby affiliated hospitals.

With the start of the academic term in June 1977, the Medical Sciences-I (MS-I) Complex opened. The new MS-1 Complex provides two lecture halls (each with a capacity of 170), smaller conference rooms, the Health Sciences Library, the Health Sciences Bookstore, and student lounges. A four-story, 200,000-square-foot structure is primarily devoted to multidisciplinary laboratories and faculty offices.

ADMISSION POLICIES

The class entering in the fall of 1983 will be limited to 93 students selected on the basis of academic achievement and promise, as well as personal characteristics that lead the Admissions Committee to feel the candidates will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to intellectual capacity, motivation, emotional stability, and personal dedication.

The vast majority of openings in the entering class will be awarded to students who are legal residents of the State of California. However, a few out-of-state students may be accepted. The School of Medicine also participates in the program of the Western Interstate Commission for Higher Education (WICHE). In this program are several states which do not offer professional graduate medical education. Applicants from such states 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 at Post Office Drawer P, Boulder, CO 80302.

Applicant Selection. The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession, and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School's commitment to expand opportunities in medical education for individuals from groups underrepresented in medicine as the result of societal discrimination and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of cultural backgrounds and which is representative of a broad spectrum of medical sciences, evaluates applicants in terms of all relevant factors. These include academic credentials, with due regard to how they may have been affected by disadvantages experienced by the applicant, such personal traits as character and motivation, experience in the health sciences and/or the community, career objectives, and the ability of the individual to make a positive contribution to society, the profession, and the School.

Application Procedures

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). Application request forms are available from the School's Admissions Office after March 15 of each year. You may also secure this form from other AMCAS-participating medical schools or from your premedical adviser. You need to submit only one application and one set of official transcripts to AMCAS, regardless of the number of member schools to which you are applying.

Upon receipt of the application request form, AMCAS will send you an application for admission, together with descriptive material and instructions. The completed application and other required credentials should be submitted directly to AMCAS for verification, reproduction, and immediate distribution to the medical schools you have indicated.

After your AMCAS application has been received by the School of Medicine, the Admissions Office will notify you and may request two letters of recommendation along with a nonrefundable application fee of $30. These items should be sent directly to the Chairperson of the Admissions Committee, School of Medicine, University of California, Davis, CA 95616, and not to AMCAS. Recommendations can be in the form of a report by a premedical advisory committee at the college or university where you are enrolled or letters from two faculty members who are familiar enough with you and your abilities to make a meaningful evaluation. It is required that one letter be from a science instructor and the other from a non-science instructor.

Applications will be accepted by the Admissions Committee between June 15 and November 1. It is strongly recommended that you make an early request for application materials from AMCAS and see that the necessary supporting items reach the Committee as soon as possible after the School of Medicine notifies you of receipt of your completed application from AMCAS. The Committee reviews only complete application files and schedules interviews for highly qualified applicants throughout the application period and beyond.

A personal interview is required before a place in the first-year class can be offered. However, because of the large number of applicants, it is not possible to interview each one, and for this reason interviews are held only at the invitation of the Admissions Committee. It is highly desirable that interviews take place at the medical school in order to provide you with first-hand knowledge of programs and facilities and give you the opportunity to meet some of the students. Where circumstances warrant, interviews may be arranged by the Admissions Committee at other locations.
You will be notified of your status as soon as possible after a decision has been reached. As decisions are made, letters of acceptance are sent; this can be as early as mid-October and as late as September of the following year.

Transfer with Advanced Standing

Students may be admitted by action of the Admissions Committee at levels more advanced than the regular entering level but not beyond the beginning of the third year. Such applicants must meet the entrance requirements for regular status in the School of Medicine, must satisfactorily complete courses elsewhere that are substantially equivalent to those offered in the School of Medicine, and must meet the necessary requirements for the advanced status requested. Applicants may also be required to pass examinations to establish their qualifications for admission. An advanced standing applicant must be a student in good standing at an approved medical school. At UCD the second-year classes begin work in early August and third-year classes begin work in early July. Applications for admission to advanced standing will be accepted until January 1 of the year in which admission is sought.

Premedical Requirements

Arrangements for taking the New Medical College Admission Test should be made at the institution at which you are presently enrolled, and the Examining Board should be requested to forward the results to the Chairperson of the Admissions Committee, UC Davis School of Medicine. Information about the test can be obtained at your undergraduate college or directly from MCAT Registration, Box 414, Iowa City, IA 52240. It is desirable that the results of the test be available at the time your qualifications are reviewed. The Admissions Committee recommends that, if feasible, tests be taken in the spring prior to application.

Applicants for admission to the professional curriculum must have satisfactorily completed a minimum of three years (60 semester units; 135 quarter units) of college-level work in an accredited school in the United States or Canada. In most instances, however, completion of a four-year course of study leading to a bachelor's degree is recommended.

Although a specific major in science is not necessary, the following course content at college level is required:

- a. English, one year or the equivalent
- b. Biological science, one year (including laboratory) or the equivalent
- c. General chemistry, one year (including laboratory) or the equivalent
- d. Organic chemistry, one year or the equivalent (If two or more undergraduate organic courses are offered, it is recommended that you elect the more rigorous option.)
- e. Physics, one year or the equivalent
- f. Mathematics, course work to satisfy prerequisites for integral calculus

Upon matriculation, each applicant must have both an overall grade-point average and science grade-point average of at least 3.0 (on a scale where one credit hour of A = 4 points). Grades of D in any of the required courses cannot be accepted. Required courses may not be taken on a Passed/Not Passed basis unless all courses at your undergraduate institution are graded this way.

While the minimal overall and science GPA requirements at the UCD School of Medicine have been established at 3.0, in exceptional cases a special waiver may be granted by the Faculty of the School of Medicine through the action of the Executive Committee and at the recommendation of the Chairperson of the Admissions Committee.

Applications may be submitted on the basis of work completed plus work in progress. However, all academic requirements must be completed by June 30 of the year for which admission is sought.

Although the minimum scholastic requirements are stated in some detail, it should not be inferred that admission is assured each applicant who meets these requirements. In addition to a high level of academic competence, many other factors which determine success in pursuing a career in medicine are given full weight by the Admissions Committee before it reaches a final decision.

For additional information, contact the School of Medicine Admissions Office or request the School of Medicine Bulletin from the medical school Admissions Office.
### Academic Calendar 1983-84

The School of Medicine operates on a different schedule from the remainder of the campus.

<table>
<thead>
<tr>
<th>SUMMER QUARTER 1983</th>
<th>WINTER QUARTER 1984</th>
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<tbody>
<tr>
<td>Medical School Instruction begins for 3rd- and 4th-year students</td>
<td>Medical School Instruction begins for 2nd-, 3rd-, and 4th-year students</td>
</tr>
<tr>
<td>Mon, Aug 1</td>
<td>Tues, Jan 3</td>
</tr>
<tr>
<td>Medical School Instruction begins for 2nd-year students</td>
<td>Medical School Instruction begins for 1st-year students</td>
</tr>
<tr>
<td>Mon, Sept 5</td>
<td>Thurs, Jan 5</td>
</tr>
<tr>
<td>Labor Day (academic and administrative holiday)</td>
<td>Presidents' holiday (academic and administrative)</td>
</tr>
<tr>
<td>Tues-Wed, Sept 5-7</td>
<td>Mon, Feb 20</td>
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<tr>
<td>National Board Examination: Part I</td>
<td>Mon, Mar 12</td>
</tr>
<tr>
<td>Mon, Sept 12</td>
<td>Tues-Mon, Mar 19-19</td>
</tr>
<tr>
<td>Medical School Instruction ends for 2nd-year students</td>
<td>Final Examination period for 2nd-year students</td>
</tr>
<tr>
<td>Tues-Fri, Sept 13-16</td>
<td>Wed, Mar 14</td>
</tr>
<tr>
<td>Final Examination period for 2nd-year students</td>
<td>Medical School Instruction ends for 1st-year students</td>
</tr>
<tr>
<td>Fri, Sept 23</td>
<td>Fri-Thurs, Mar 16-22</td>
</tr>
<tr>
<td>Medical School Instruction ends for 3rd- and 4th-year students</td>
<td>Medical School Instruction ends for 3rd- and 4th-year students</td>
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<tr>
<th>FALL QUARTER 1983</th>
<th>SPRING QUARTER 1984</th>
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<tr>
<td>Medical School Instruction begins for 3rd- and 4th-year students</td>
<td>Spring holiday (academic and administrative)</td>
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<tr>
<td>Mon, Sept 26</td>
<td>Mon, Mar 26</td>
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<tr>
<td>Orientation period for Class of 1987</td>
<td>Tues, Mar 27</td>
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<tr>
<td>Mon-Wed, Sept 26-28</td>
<td>Mon, Apr 2</td>
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<tr>
<td>National Board Examination: Part II</td>
<td>Tues-Wed, Apr 3-4</td>
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<tr>
<td>Tues-Wed, Sept 27-28</td>
<td>Fri, May 25</td>
</tr>
<tr>
<td>Medical School Instruction begins for 1st- and 2nd-year students</td>
<td>Memorial Day holiday (academic and administrative)</td>
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<tr>
<td>Thurs, Sept 29</td>
<td>Mon, May 28</td>
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<tr>
<td>Thanksgiving holidays (academic and administrative)</td>
<td>Tues-Fri, May 29-June 1</td>
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<tr>
<td>Thurs-Fri, Nov 24-25</td>
<td>Fri, June 1</td>
</tr>
<tr>
<td>Medical School Instruction ends for 1st-year students</td>
<td>Fri, June 8</td>
</tr>
<tr>
<td>Fri, Dec 9</td>
<td>Mon-Fri, June 11-15</td>
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<tr>
<td>Final Examination period for 1st- and 2nd-year students</td>
<td>National Board Examination: Part I</td>
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<tr>
<td>Mon-Fri, Dec 12-16</td>
<td>Tues-Wed, June 12-13</td>
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<tr>
<td>Medical School Instruction ends for 3rd- and 4th-year students</td>
<td>Medical School Instruction ends for 1st-year students</td>
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<tr>
<td>Fri, Dec 16</td>
<td>Commencement</td>
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<td></td>
<td>Final Examination period for 1st-year students</td>
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<td></td>
<td>Mon-Fri, June 11-15</td>
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<td></td>
<td>National Board Examination: Part I</td>
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<td></td>
<td>Tues-Wed, June 12-13</td>
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<tr>
<td></td>
<td>Medical School Instruction ends for 3rd-year students</td>
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<tr>
<td></td>
<td>Fri, June 15</td>
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</table>

"Students need to be more flexible. I've seen a lot of students around here who decide that they are going to Med School and that's it."
The Doctor of Veterinary Medicine (D.V.M.) degree is granted upon completion of a course of study that usually requires eight years. The final four years must be spent in the professional veterinary medical curriculum. Most students planning a career in veterinary medicine broaden their educational experience by completing the baccalaureate degree before applying to the professional school.

PREPROFESSIONAL TRAINING AND REQUIREMENTS

Applicants must complete the equivalent of at least three full academic years in an accredited college or university before entering the School of Veterinary Medicine. At the time of application, at least three-fourths of the required science courses must be completed, i.e., 45 of the 58 quarter units listed below. Courses taken at other institutions may vary in units. In such cases, the unit value of the corresponding UCD courses will be used when calculating the minimum 45 units of science courses necessary in order for the applicant to qualify for review.

You should plan your preveterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. The undergraduate program should include plans for obtaining a baccalaureate degree. An undergraduate major should be selected on the basis of individual interest and aptitude; there is no advantage gained toward admission by selecting one major over another. Many students planning to enter veterinary school have definite areas of interest within the general field of veterinary medicine. These individuals are encouraged to take courses (for example, computer science, agricultural economics, molecular and biochemical genetics) which will broaden their background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal practice, and biomedical research. Veterinary and animal experience is considered an important part of your preprofessional training. This requirement can be fulfilled with twenty-week equivalents (800 hours) of relevant animal experience with types of activities that give an applicant an appreciation and understanding of the profession of veterinary medicine.

<table>
<thead>
<tr>
<th>Subject Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Science courses</td>
<td>58</td>
</tr>
<tr>
<td>Chemistry (general, qualitative, organic, and biochemistry)</td>
<td>24</td>
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<tr>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Physics (general)</td>
<td>9</td>
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<tr>
<td>Physiology (systemic)</td>
<td>5</td>
</tr>
<tr>
<td>Biology, zoology, embryology (including laboratories)</td>
<td>17</td>
</tr>
<tr>
<td>English composition and additional English or rhetoric</td>
<td>8</td>
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<tr>
<td>Statistics</td>
<td>4</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>70</strong></td>
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Following is a list of courses taught on the UC Davis campus which fulfill the preceding subject requirements.

<table>
<thead>
<tr>
<th>Subject Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Biological Sciences 1</td>
<td>(5)</td>
</tr>
<tr>
<td>Physiological Sciences 101A or Biochemistry 101A</td>
<td>(4,3)</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C, 8A, 8B</td>
<td>(5,5,5,3,3,3)</td>
</tr>
<tr>
<td>English 1 and additional English or rhetoric</td>
<td>(4,4)</td>
</tr>
<tr>
<td>Genetics 100A or 120</td>
<td>(3,4)</td>
</tr>
<tr>
<td>Statistics 13 or Agricultural Science and Management 150</td>
<td>(4,4)</td>
</tr>
<tr>
<td>Physics 2A, 2B, 2C</td>
<td>(3,3,3)</td>
</tr>
<tr>
<td>Physiology 110</td>
<td>(5)</td>
</tr>
<tr>
<td>Zoology 2-2L, 100-100L</td>
<td>(4-2, 4-2)</td>
</tr>
</tbody>
</table>

**Total 70**

If you complete the requirements in an institution other than the University of California, Davis, you are urged to check carefully the catalog of your college to be sure you are taking courses comparable in content.

Application Procedures

Students are admitted to the School of Veterinary Medicine only in the fall. Application forms may be obtained any time after August 15 by writing to the Office of the Associate Dean — Student Services, School of Veterinary Medicine, University of California, Davis, CA 95616 or by calling (916) 752-1383. Applications, accompanied by a nonrefundable application fee of $30, and Graduate Record Examination (GRE) scores for both the General Aptitude Test and the Advanced Test in Biology must be received by this office no later than November 1. Therefore, GRE scores received from the October administration or later administrations of the year the application is filed will not be accepted for consideration. The GRE must be taken within the five-year period prior to the time the application is submitted. At least three-fourths of the required science units must also be completed.

Students interested in admission to the School of Veterinary Medicine are urged to request an Announcement of the School of Veterinary Medicine at an early date so that all minimum academic requirements and deadlines are met.

Admission to the School of Veterinary Medicine

Evaluation is based on academic and nonacademic records. The academic record is divided into the required science grade-point average, cumulative grade-point average, and grade-point average for the last year of undergraduate studies. The scores from the Graduate Record Examination are included in the evaluation of your academic record. The principal nonacademic criteria are animal experience, your narrative statement, and letters of evaluation. Other criteria considered helpful by the Faculty Committee and Dean of the School of Veterinary Medicine may be used in the selection process. The minimum acceptable grade-point average for an applicant to be considered for admission to the School is 2.5.
must be certified by their home state. For the address of state certifying officers, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302.

Men and women are considered on an equal basis. Socially and economically disadvantaged students are encouraged to apply.

DEGREES

Requirements for the Bachelor of Science Degree in Veterinary Science

Any student in the School of Veterinary Medicine who does not hold a baccalaureate degree, but has satisfactorily completed the first two years of the professional curriculum and has satisfied the general University requirements (see page 61), is eligible to receive a Bachelor of Science degree in Veterinary Science.

Requirements for the Doctor of Veterinary Medicine Degree

A candidate for the Doctor of Veterinary Medicine degree must comply with the following requirements:

- Fulfill the academic standards set forth by the Faculty of the School of Veterinary Medicine
- Possess good moral character
- Study veterinary medicine for the equivalent of 12 quarters of 12 weeks each (the last six quarters must have been spent in the School of Veterinary Medicine, University of California, Davis)
- Maintain a grade-point average of 2.0 (C), computed on all courses taken in the School
- Satisfactorily complete all required work as determined by the Faculty of the School

The Master of Preventive Veterinary Medicine Degree

Applicants for candidacy to the Master of Preventive Veterinary Medicine (MPVM) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent, and must have their applications approved by both the Program Director and the Dean of the School. An option should be selected from the four listed below at the time of application. Completed application materials must be submitted no later than ninety days prior to the quarter of planned enrollment. Application forms can be requested from the MPVM Program Director, School of Veterinary Medicine, University of California, Davis, CA 95616.

Candidates for the MPVM degree must satisfactorily complete in residence a minimum of 28 quarter units of required course work and additional units of approved electives to total 40 quarter units. In addition, a research project must be completed for which a written report and an oral presentation are required. A three-member review committee reviews each paper, with an oral examination by the student optional. No more than 12 units in any quarter can be earned for research.

The degree program extends over a minimum of twelve months to a maximum of two years. Students who in-
tend to complete the program in one calendar year must enroll in August unless they have recently completed and performed satisfactorily in a statistics course that has been approved by the MPVM Program Director at the time of the student's acceptance into the program. Students meeting this requirement may enroll at the beginning of the Fall Quarter in late September. Students who intend to remain in the program for more than one year may enroll in the optimal course sequencing, but arrival in August is recommended.

Four options offered under the MPVM Program permit students to select an area of study that best identifies their individual interests and needs. The options are as follows:

1. **Epidemiology and Herd Health Management**
   (statistics, epidemiology, animal health economics, and disease control)

2. **Veterinary Public Health**
   (veterinary medicine applied to food safety and zoonoses)

3. **Laboratory Services**
   (roles of diagnostic laboratories in animal disease surveillance and disease control)

4. **Veterinary Programs Administration**
   (administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service)

Inquiries regarding the program should be directed to the Office of the Dean, School of Veterinary Medicine, University of California, Davis, CA 95616.

**The Master of Science and Doctor of Philosophy Degrees**

General information regarding these degrees will be found in the *Announcement of the Graduate Division*, which may be obtained from the Graduate Division on the Davis campus. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.
Programs and Courses
ACADEMIC CREDIT

Academic work at the University is measured by "units of credit." In conjunction with the letter grade you receive from the course instructor, units of credit give a fairly accurate evaluation of the amount of time you have devoted to a given subject. Units of credit also make it possible to anticipate the amount of work involved in a particular course, as well as enabling you to transfer from one campus or university to another without undue difficulty.

The way units of credit are assigned to courses is based on the "Carnegie unit" which assigns one unit of credit for three hours of work by the student per week. Usually this means one hour of lecture or discussion led by the instructor and two hours of outside preparation by the student. In laboratory courses, two or three hours of work in the laboratory are normally assigned for one unit of credit.

In most courses at Davis the standard procedure prevails, so that a three-unit course meets for three hours a week, a four-unit course for four hours, and so on. Courses that are an exception to this pattern may require additional class time or give more demanding assignments. If you have questions about the number of units assigned to a course you should check the "Expanded Course Descriptions" (If your college or department provides them) or inquire from the instructor about what the course will require in the way of outside reading, term papers, problem sets, field trips, and the like. These are not always spelled out completely in the General Catalog. By knowing the amount of work which will be required, you can plan your course load more systematically and realistically.

COURSE DESIGNATIONS

The Class Schedule and Room Directory, available several weeks before the beginning of each quarter, gives class hours and room numbers, as well as the most up-to-date information on registration and enrollment procedures. A supplement with changes to the General Catalog and Class Schedule and Room Directory is available near the time for enrollment each quarter.

The quarter in which a course is intended to be given is shown as follows:*

I. Fall Quarter (September to December)
II. Winter Quarter (January to March)
III. Spring Quarter (April to June)
IV. Summer Quarter (July to September) for students in the School of Medicine only

When a course is listed to be offered in even-numbered years or odd-numbered years only, the year involved would be that in which the quarter occurs: e.g., Fall Quarter 1983 would be an odd-numbered year and Winter and Spring Quarters 1984 would be even-numbered years.

A series of course numbers followed by two or three letters (for example, Spanish 101A-101B-101C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is generally prerequisite to the second, and the second to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 102A and 102B), the A course is not a prerequisite to B, unless it is specifically mentioned in the listing of prerequisites.

Here is a sample of how a course is listed in this Catalog.

<table>
<thead>
<tr>
<th>Course number:</th>
<th>1. Physical Education for Men and Women (1/2) I, II, III.</th>
<th>Staff (Chairperson in charge):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Laboratory—2 hours. Prerequisite: at least freshman standing. Section in: a) sports skills, rules and strategy; b) physical fitness and personal health; c) recreation; d) dance; and e) intercollegiate athletics. May be repeated for a total of 6 units. (P/NP grading only.)</td>
<td></td>
</tr>
</tbody>
</table>

PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests mainly on the student. Certain classes are restricted to a limited number of students, and therefore it is especially important that you fulfill the prerequisites by the time the class begins. Otherwise, you may be displaced by a student who does have the necessary prerequisites. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you.

UNDERGRADUATE COURSES

Lower-Division Courses

These courses, numbered 1-99, are open to all students for lower-division credit, but are designed primarily for freshmen and sophomores.

Variable-Unit Courses (See below for enrollment procedures) are primarily student-designed and the amount of credit given varies:

- 92 (Internship) courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities.
- 97T (Tutoring) and 97TC (Tutoring in the Community) are courses for students desiring to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.
- 98 (Directed Group Study) courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.

*Courses in the School of Law:
I. refers to Fall Semester (August - December)
II. refers to Spring Semester (January - May)
**Programs and Courses**

- **59 (Special Study for Undergraduates)** is a course arranged for an individual student who shares an instructor’s academic interest which cannot be accommodated within the formal course structure.

**Autotutorial Courses** are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 1ATA-1ATB-1ATC, 31ATA, 31ATB.

**Upper-Division Courses**

These courses, numbered 100-199, are open to all students who have met the necessary prerequisites as indicated in the Catalog course description. Preparation should generally include completion of one lower-division course in the given subject or completion of two years of college work.

**Variable-Unit Courses** (see below for enrollment procedures) for upper-division credit include:

- **192 (Internship)** courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units prior to enrollment.

- **194H (Special Study for Honors Students)** courses are for individual students with honor status, as determined by the department offering the course, and who have completed 84 units.

- **197T (Tutoring) and 197TC (Tutoring in the Community)** are the upper-division counterparts of 97T and 97TC.

- **198 (Directed Group Study)** courses are the upper-division counterparts of course 98, and are for students judged to have adequate background in the subject proposed for study.

- **199 (Special Study for Advanced Undergraduates)** courses are the upper-division counterparts of course 99, and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

**Autotutorial Courses** are courses in which students instruct themselves at their own pace. These courses can be identified by a suffix of the letters AT on their course numbers.

**Research Conference Courses** are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

**Registration for Variable-Unit Courses**

Registration in the above variable-unit courses (numbered 92, 97T, 97TC, 98, 99, 192, 194H, 197T, 197TC, 198, 199) must be approved by the chairperson of the department concerned in a proposal submitted by the instructor in charge. The subject matter in these courses must fall within the instructor’s professional competence. These courses, unless otherwise noted, are graded on a Passed/Not Passed basis only. Under special circumstances, an instructor may request from the appropriate college or school Committee on Courses of Instruction approval to award letter grades (except 92, 192 courses). The request must be submitted by the instructor within the first ten days of instruction of the quarter in which the course is offered. Such requests, however, are not automatically approved.

In **Special Study Courses** (numbered 99, 194H, 199), credit is limited to a total of five units per term.

A maximum of 12 units of **Internship Courses** (92, 192, or a combination) can be counted toward the 180-unit bachelor’s degree requirement.

**GRADUATE COURSES**

Courses numbered 200-299 are open to students who have completed 18 units of upper-division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in 290C courses and variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory.

**PROFESSIONAL COURSES FOR TEACHERS**

Courses numbered 300-399 are teacher-training courses in the Department of Education and in other departments and are especially intended for teachers or prospective teachers. Included are courses designed to provide instruction to teaching assistants. All courses numbered 300-399 are approved for graduate student credit.

**OTHER PROFESSIONAL COURSES**

Courses numbered 400-499 are in departments and schools other than the Department of Education. Graduate students should consult their faculty adviser or contact the Graduate Division before enrolling in 400 series courses to determine if graduate credit may be awarded for the course in question (also note † footnote in prerequisites).

**Note:** Undergraduates should refer to their college’s section regarding any restrictions on degree credit for courses in the 200, 300, or 400 series.

**INDEPENDENT STUDY PROGRAM**

The Independent Study Program is intended to provide an opportunity for upper-division students to design and pursue a full quarter (12-15 units) of individual study in an area of their special interest.

Under the current system of numbering courses, a program qualifying as Independent Study will consist of one or more courses in the 190-199 series, adding up to a quarter’s work. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you under-
INDIVIDUAL MAJOR PROGRAMS

Opportunities for interdisciplinary programs tailored to your own educational objectives are offered by the "Individual Major" in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science (see page 239).

INTERNSHIP PROGRAM

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

Students may undertake an internship by enrolling in a course numbered 92 or 192 under departmental listings. Course 192 requires a minimum of 84 units prior to enrollment. These courses are initiated by the student well in advance of enrollment by first obtaining a "Request for Approval of Internship for Academic Credit" form from the office handling the desired 92 or 192 course, and then making arrangements with a faculty sponsor who subsequently obtains the signature of the department chairperson. The student presents a copy of the approved request form to the Work-Learn and Career Planning and Placement Office on campus and enrolls for the course by Add card through the department involved. The deadline each quarter is the last day for adding courses to the study list.

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

EXTRA-SESSION COURSES

Regularly approved courses (laboratory, field, or other individual work) done outside of a regular session but under the direction of a department of instruction may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree. Enrollment is with the consent of the instructor only.

SUMMER SESSION COURSES

If you are a regularly enrolled student or are planning to enroll for the Fall Quarter, you can receive credit toward the degree in Summer Sessions courses.

It is also possible for students to gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. Assurance that such credit will be accepted, however, can be given only after the courses have been completed. You should arrange to have the transcripts of your summer session grades sent to the Registrar for evaluation. On your transcript UCD Summer Sessions courses are identified by the letter S preceding course numbers.

UCD Summer Sessions courses may be audited for a fee of $70 per session with the following constraints: no laboratory (including language laboratories) courses
may be audited; consent of the instructor is required; and in courses with restricted enrollment regularly enrolled summer session students have priority over auditors. See page 18 and the Summer Sessions bulletin for detailed information.

CONCURRENT COURSES
Where classroom space permits and the instructor gives permission, enrollment may be granted to members of the community in regular courses offered on the Davis campus. Such work may be used for admission consideration and for degree recognition. See page 45 for more information.

UNIVERSITY EXTENSION COURSES
Simultaneous enrollment in resident courses and in Extension courses is permitted only with the approval of the dean of your college or school. Credits may also be earned, but previous authorization is necessary.

University Extension courses are identified by the letter X preceding course numbers: XD (equivalent) courses are the same as regular UCD courses in title and topic; XDC (concurrent) courses are regular UCD courses in which Extension students may enroll.

Extension courses are not accepted as part of the University residence requirement, and cannot be used to effect a transfer from one campus of the University to another. Grades earned in University Extension courses are not used in calculating individual grade-point averages (see page 56).

KEY TO FOOTNOTE SYMBOLS
The following symbols are used throughout the Majors and Courses section to indicate:
- * Not to be given 1983-84
- † Approved for graduate degree credit
  1 Absent on leave, 1983-84
  2 Absent on leave, Fall Quarter 1983 (Semester, for Law School)
  3 Absent on leave, Winter Quarter 1984
  4 Absent on leave, Spring Quarter 1984 (Semester, for Law School)
  5 In residence at President's Office (Systemwide Administration)
  6 In residence at another campus

The course offerings listed in this catalog are subject to change without notice. For more current quarter offerings, refer to the Class Schedule and Room Directory available in the UCD Bookstore. A Supplement to the Class Schedule and Room Directory and General Catalog is published quarterly and is available at the beginning of preenrollment periods.
Administration, School of

Gary M. Walton, Ph.D., Dean
School Office, 308 Voorhees Hall
(752-7282/7363)

Faculty
Nicole W. Biggart, Ph.D., Assistant Professor
(Administration, Sociology)
Richard Castanias, Ph.D., Assistant Professor
Richard C. Dow, Ph.D., Professor
(Agriculture Economics)
George W. Downs, Jr., Ph.D., Associate Professor
(Political Science)
Peter H. Farquhar, Ph.D., Associate Professor
(Agricultural Economics)
Paul A. Griffin, Ph.D., Associate Professor
Chester G. McCorkle, Jr., Ph.D., Professor
(Agricultural Economics)
Seyw Neumann, Ph.D., Visiting Professor
David M. Rocke, Ph.D., Acting Associate Professor
Thomas Russell, Ph.D., Visiting Associate Professor
Paul A. Sahlster, Ph.D., Associate Professor
(Entrepreneurship)
Sevier I. Schwartz, Ph.D., Professor
(Environmenal Studies)
David F. Shanno, Ph.D., Professor
Arthur M. Sullivan, Ph.D., Assistant Professor
(Administration, Economics)
Jerome J. Suran, B.S., Ph.D. (Hon.), Senior Lecturer
(Administration, Electrical and Computer Engineering)
Gary M. Walton, Ph.D., Professor
(Administration, Economics)
William Wecker, Ph.D., Associate Professor

Courses in Administration

Graduate Courses
201-2018. Accounting, Budgeting and Control (3-3) H. Griffin
Lecture 3 hours. Prerequisite: graduate standing. Introduction to basic principles of accounting, budgeting and control, basic accounting, financial reporting, cost accounting, planning and budget formulation, management control techniques, operational control and auditing, strategies in financial reporting, and management information.

202. Organizational Decisionmaking (3-3) A. Abott
Lecture 3 hours. Prerequisite: graduate standing. Applicability of organizational theories and models to decisionmaking in complex organization, public and private. Organizational control structures and patterns of development and change are considered as are organizational responses in environments and market structures and role of the executive. Case Studies.

203. Comparing Public and Private Management (3-3) H. Biggart
Lecture 3 hours. Prerequisite: graduate standing. Comparison of public and private management in terms of organizational environments, interaction and external controls. Attention given to similarities and differences between different types of organizations and the interaction among them. Regulated industries.

204-2048. Economic Analysis for Management (4-4) H. The Staff (Saxon in charge)
Lecture 3 hours. Prerequisite: introductory knowledge of microeconomics strongly recommended. Economic reasoning applied to public, private and international public and private sectors. Classic optimization and the price system. Market models, demand and supply, price determination, market structure, supply and demand, equilibrium, and elasticity. Cost and revenue analysis, concept of welfare economics, externality, and special problems of collective choice. Economic effects of government taxation and regulation.

205A. Quantitative Analysis (4) I. Rocke
Lecture 5 hours. Prerequisite: introductory knowledge of statistics strongly recommended. Designed to give understanding of role of quantitative analysis in decision making and develop skills sufficient to allow application of these tools to problems encountered in both public and private sectors. Decision analysis, linear programming, and simulation.

205B. Quantitative Analysis (4) I. Shanno
Lecture 5 hours. Prerequisite: course 205A. Designed to give understanding of role of quantitative analysis in decision making and develop skills sufficient to allow application of these tools to problems encountered in both public and private sectors. Decision analysis, linear programming, and simulation.

205C. Quantitative Analysis (4) III. Rocke, Dow
Lecture 5 hours. Prerequisite: course 205B. Designed to give understanding of role of quantitative analysis in decision making and develop skills sufficient to allow application of these tools to problems encountered in both public and private sectors. Decision analysis, linear programming, and simulation.

206. Policy Analysis (3) III. The Staff
Lecture 3 hours. Prerequisite: graduate standing. Comparison of techniques for planning, implementation, and evaluation in public and private sectors. Includes cost-benefit analysis, dynamic economics, social-political-approvals for project analysis. Product development issues include market planning, demand analysis, and production planning Case studies.

207. Finance: Public and Private (3) III. The Staff
Lecture 3 hours. Prerequisite: graduate standing. Comprehensive overview of financial issues in public and private management, sources and means of acquiring funds, implications of taxation for productivity, investment and income distribution, interactions in capital and securities markets, impact on interest rate and capital availability.

208. Marketing Management (3) III. B. Beech
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Analysis of marketing decisions from the viewpoints of managers with emphasis on both business and nonbusiness applications, includes consumer behavior, competitive structure of markets, legal environment, marketing research, pricing strategies, product development, channels of distribution, advertising, promotion, planning.

209. Program Evaluation (3) III. The Staff
Lecture 3 hours. Prerequisite: graduate standing. Focuses on planning, designing, conducting and analyzing effectiveness of policies and programs. Statistical topics include experimental design, randomization, time-series, regression analysis, cost-benefit analysis, advantages and limitations of various kinds of evaluation designs explored in depth.

210. Law and Legal Process (3) III. The Staff
Lecture 3 hours. Prerequisite: graduate standing. Introduction to law and legal process in the United States. Sources of law, legislation and administrative courts, federal state relationships, fundamentals of administrative law, fundamentals of business law.

217. Organizations, Environments, and Policy (3) III. Abott
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

220. Public Budgeting and Planning (3) II. Sullivan
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Fiscal role of government in a mixed economy and democratic society; policies and politics of taxation and resource allocation; intergovernmental financial relations; budgeting activities of local governments.

244. Human Resource Management (3) II. Biggart
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

245. Analysis of Economic Impact on Agriculture (3) III. The Staff
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

246. Management Policy (3) III. Suran
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

247. Regulation and Policy in Agriculture (3) II. The Staff
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

248. Agricultural Policy Behavior (3) III. Farquhar
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

250. Policy Analysis (3) III. The Staff
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

251. Urban Administation (3) III. The Staff
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.

252. Urban Administration and Policy (3) III. The Staff
Lecture 3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the relationships between organizations and their environments and how the environment constrains organizations. Includes techniques for the analysis of interaction between markets, organizations, and agencies; influence on business and government policy.
244. New and Small Businesses (3) III. Dorf

Leacture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Emphasizes starting a new business venture or managing a small business during its initial development stage. Business plan, long-range financial considerations, management team. The entrepreneur. Students develop a detailed business plan.

248. Marketing Strategies (3) II. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor, which organization develops strategic marketing plans. Includes definition of activities and products marketing audits, appraising market opportunities, new activities and products, and organizing marketing planning function, Applications to problems in public and private sector marketing.

249. Marketing Research (3) III. Bechtel

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public sector marketing decisions that affect the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.

250. Technology Management (3) I. Dorf

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the principles of engineering and technology activity, functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Resource management activity. Project planning and organization. Manufacturing issues. Case studies.

251. Planning for the Technological Enterprise (3) II. Suran


252. Production and Operations Management (3) II. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Explores methods of increasing operational efficiency in production and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queuing, and network models.

253. Financial Management (3) I. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on financial planning, acquiring, and managing a company. Includes discussions of the role of capital in various aspects of mergers and other forms of reorganization. Annuity determination. Financial, investment and dividend policy. Theories of optimal capital structure.

261. Investment Analysis (3) II. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Explores the pricing theory and the implications of that theory for the analysis and management of stocks, bonds, and other financial securities. Factors influencing bond market, corporate bonds, options, warrants, and other securities are discussed from the perspective of a portfolio fund manager.

262. Money and Security Markets (3) I. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Examines the role of money, securities markets are organized. Money created, money agencies, businesses, others compete for funds in those markets. Relationship between interest rates, monetary policy, government's role in promoting capital market's approach to assessing changes in regulation in specific markets.

263. Options and Futures Markets (3) III. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Studies the behavior of options and futures markets: how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, commodity, financial futures contracts. Price determination in options and futures markets is also examined.

264. Business Taxation (3) III. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Analysis of taxation of business firms on income, capital gain, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.

270. Corporate Financial Reporting (3) I. Griffin

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Analyzes and evaluates contemporary issues in financial reporting, including implications of those issues for business decision makers, investment managers, and accounting policy makers.

271. Accounting and Budgeting for Management Control (3) I. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Examines concepts and techniques of accounting, budgeting for management decision making in the public sector. Topics include cost control, capital budgeting, per unit pricing, and the effects of uncertainty in achieving management objectives.

272. Evaluation of Financial Information (3) III. Griffin

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Concentrate on role of the independent public accountant as auditing from the perspective of an enterprise manager. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also given to current issues confronting the accounting profession.

280. Information Systems and Management (3) I. Shanno

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Covers the role of information systems in management and organizational issues in implementation and usage of management information systems; computer technology for management information systems; systems, information systems analysis and design, and management of information systems.

281. Decision Support Systems (3) III. Shanno

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Concentrate on role of computer systems in assisting management in their decisions making for unstructured tasks. Examines general purpose time-sharing systems, graphics, telecommunication, database management, application development, personnel management decisions, and case studies.

282. Simulation and Systems Analysis (3) II. The Staff

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Introduces applied optimization theory. Examines linear, nonlinear, discrete, and dynamic programming, optimality conditions; transportation, networks, and large-scale systems; and computer implementation. Applications are made to problems in public and private management.

284. Applied Linear Models for Management (3) II. Bechtel

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Covers regression, analysis of variance, and multivariate analysis. Applications are made on to applications to management and policy problems.

285. Time Series Analysis and Forecasting (3) II. Rocke

Lecture 1-3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Considerations apply time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARMA models. Applications of ARIMA models will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control.
Agrarian Studies

(College of Agricultural and Environmental Sciences)

The Major Program

Agrarian Studies is a multidisciplinary program designed for students who seek the "broad-view" and are challenged by the scientific, philosophical, and cultural concepts important to an understanding of agriculture and its relationship to man. Through a purposeful/integration of science and the humanities the major provides a sound general education important for effective leadership in agriculture and in many agriculturally or environmentally related aspects of business, government, international services, or teaching. Depth of understanding in your field of agricultural interest is achieved by the selection of specialized courses and in work experience that can be gained in programs offered by Bixby Work-Learn or the campus Work-Learn Center. With appropriate selections of a field of emphasis and electives, you may also prepare for admission to graduate study or a professional school.

Agrarian Studies

B.S. Major Requirements:

For convenience in program planning the usual core courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.

UNITS

Social Sciences and Humanities ........................................ 40

Writen and oral expression (see College requirement, page 71) ............................. 8

Cultural anthropol. or geography (Anthropology 2 or Geography 2) .................... 4

Philosophy of biological sciences (Philosophy 10G or 10H) ................................ 4

Introduction to economics (Economics 1A) .................................. 5

Restricted Electives ............................................................. 19

Additional courses selected in consultation with adviser from a list of restricted electives in 3 or more of the following fields: agricultural economics, American studies, anthropology, classics, economics, geography, history, languages, political science, rhetoric, sociology.

Examples of typical programs in Agrarian Studies with suggested courses in these area may be obtained from the major adviser through the College Office.

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Examples of typical programs in Agrarian Studies with suggested courses in these areas may be obtained from the major adviser through the College Office.
Agricultural and Environmental Chemistry (A Graduate Group)

Albert T. Bottini, Ph.D., Chairperson of the Group
Group Office, 198 Chemistry Building
(752-0948/0503)

Faculty. Includes members from various departments in the Colleges of Agricultural and Environmental Sciences and Letters and Science.

Graduate Study. The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. Detailed information regarding graduate study may be obtained by writing the Group Chairperson.

Graduate Advisers. See Class Schedule and Room Directory.

Related Courses. See Biochemistry 205; Environmental Toxicology 203, 220, 220L; Food Science and Technology 211, 250, 251; Soil Science 215; Virology and Ecology 219.

Courses in Agricultural Chemistry

Graduate Courses

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Selected topics in Agricultural Chemistry. Prerequisite: consent of instructor. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Arrangements should be made in advance with a member of the Group in Agricultural and Environmental Chemistry. (SU grading only.)

Teaching Credential Subject Representative. Secondary Teaching Credential—J. G. Leising, 137 AO8-4 (Agriculture); B. G. Goldman, 149 AO8-4 (Home Economics); Community College Credential—J. G. Leising, 137 AO8-4 (Agriculture).

Courses in Agricultural and Home Economics Education

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, 106 AO8-4.

Lower Division Course

82. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Field placement—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

Upper Division Courses

100. Concepts in Education (2) I, II. Goldman, Leising Lecture—2 hours; field observations. Prerequisite: upper division students; examination of educational institutions. Implications for those preparing careers in teaching. (Sec. 1: Agriculture; Sec. 2: Home Economics.)

106. Vocational Education (3) I. Leising Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics and industry.


171. Audio Visual Communications (2) I, II. Pershing Discussion—1 hour; laboratory—3 hours. Concepts and principles of audio-visual communications related to education. (P/NP grading only.)

172. Multi-Media Productions (3) I, II. Pershing Lecture—2 hours; laboratory—3 hours. Prerequisite: completion of course 171 or consent of instructor. Theory and application of producing multi-media educational programs.

180. Consumer Education (3) I, II. The Staff (Goldman in charge) Lecture—3 hours. Prerequisite: Consumer Economics 141 or 142 or Consumer Science 100. Examination of values, decision-making processes, lifestyle needs of individuals and communities, at a basis for teaching of consumer education in various subject areas at all age levels. Offered in odd-numbered years.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Field placement—3-36 hours. Prerequisite: upper division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

196. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Professional Courses

300. Directed Field Experience in Teaching (2) I, II. Goldman, Leising Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated for credit. (Sec. 1: Agriculture; Sec. 2: Home Economics.) (P/NP grading only.)

301. Planning for Instructional Programs (3) I, II. Goldman, Leising Lecture—3 hours. Prerequisite: courses 100, 300 (may be taken concurrently). Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and resources. (Sec. 1: Agriculture; Sec. 2: Home Economics.)

302. Teaching Methods in Education (2-3) I. Goldman, Leising Lecture (1 hour minimum)-laboratory—4-7 hours. Prerequisite: courses 100, 300 and 301. Development of teaching strategies, with special emphasis on the designing of learning experiences, instructional execution, teaching skills. (Sec. 1: Agriculture—2 units, Sec. 2: Home Economics—2-3 units.)

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (1-2) I, II, III. Leising Lecture-discussion—2 hours, field work—6 hours. Prerequisite: acceptance into the Teacher Education Program; course 306A (concurrently), courses 100, 300, 301, 302. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges.

307. Teaching in Secondary Schools (1-2) I, II. Goldman Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. (Deferred grading only, pending completion of course.)


381. Family Life Education (3) I, II. The Staff (Goldman in charge) Lecture—3 hours. Prerequisite: upper division standing; courses on the family, sex education and teaching methods recommended. Current topics in family life education. Review of selected research, resources, curriculum, teaching strategies and interdisciplinary approaches to family life education at all age levels. Offered in even-numbered years.

390. Seminar: Issues in Agricultural and Home Economics Education (2) I, II. Goldman, III. Leising Seminar—2 hours. Prerequisite: acceptance into the Teacher Education Program; courses 306A, 306B, 307. Discussion of and evaluation of current issues, theories and research in home economics and agricultural education. (Sec. 1: Agriculture; Sec. 2: Home Economics.) (SU grading only.)

Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

Agricultural and Managerial Economics focuses on the student’s understanding of the total economic and social environment through study of the agricultural, biological, physical, and social sciences. The major offers an option of two areas of specialization: (a) Agricultural Economics and (b) Managerial Economics.

The Agricultural Economics option is preprofessional, essentially preparation for continued study at the graduate level. The emphasis is on the theoretical aspects which lie behind decisions concerning production, marketing, use of resources, prices, and policy. Supplemental courses are offered in statistics, effects of governmental policy, rural appraisal, and related topics.
Agricultural Economics

(College of Agricultural and Environmental Sciences)

Warren E. Johnstone, Ph.D., Chairperson of the Department Department Office, 116 Voorhis Hall (752-1517)

Faculty

John M. Antla, Ph.D., Assistant Professor
Frances A. Antovoy, Ph.D., Assistant Professor
Bayard D. Butler, Ph.D., Visiting Lecturer
Hoy F. Carmar, Ph.D., Professor
Herald C. Carter, Ph.D., Professor
Robert E. Collins, Ph.D., Assistant Professor
James H. Cotten, Ph.D., Adjunct Lecturer
D. Barton DeLoach, Ph.D., Professor Emeritus
Peter H. Freker, Ph.D., Associate Professor
S. Delworth Gardner, Ph.D., Professor
Leon Garvey, Ph.D., Adjunct Lecturer
Richard D. Green, Ph.D., Associate Professor
David E. Hansen, Ph.D., Associate Professor
Arthur Haxenner, Ph.D., Associate Professor
Dale M. Heilen, Ph.D., Associate Professor
Gerald L. Horne, Ph.D., Adjunct Lecturer
Richard E. Howitt, Ph.D., Associate Professor
Warren E. Johnstone, Ph.D., Adjunct Lecturer
D. Jolly, Ph.D., Adjunct Lecturer
John S. Kushman, Ph.D., Associate Professor
Larry Lane, Ph.D., Associate Professor
Emir W. Lear, Ph.D., Professor
Samuel H. Logan, Ph.D., Professor
Marc S. Mangell, Ph.D., Associate Adjunct Professor
(Administrative Economics, Mathematic)

Philip L. Martin, Ph.D., Associate Professor
Douglas J. Matheson, J.D., Visiting Lecturer
Alexander F. McCaskill, Ph.D., Professor
Chester O. McCormick, Jr., Ph.D., Professor
Chaffee V. Moore, Ph.D., Adjunct Lecturer
Ray D. Nelson, Ph.D., Assistant Professor
Kent D. Olson, Ph.D., Adjunct Lecturer
Quirino Paris, Ph.D., Professor
A. Doyle Reed, Ph.D., Visiting Lecturer
Roger I. Rochin, Ph.D., Adjunct Professor
Lawrence E. Shepherd, Ph.D., Associate Professor
J. Herbitz Snyder, Ph.D., Professor
Stephen H. Sonnich, Ph.D., Professor
Joe J. Stasul, Ph.D., Adjunct Lecturer
James E. Wilt, Ph.D., Associate Professor
(Agricultural Economics, Environmental Studies)

Upper Division Courses

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B, Mathematics 16A-
16B Theory of individual consumer and market demand; theory of production and suppl-
of agricultural products, with particular reference to the individual firm, pricing, output determination, and employ-
ment of resources under pure competition. Students having had Economics 100 are not eligible.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1008. Pricing, output determination, and emplo-
yme of resources under conditions of monopoly, oligopoly, and monopolistic competition.
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 102. Statistical methods for analyzing quantitative agric-
ultural economics data: linear and multiple correlation and regression analysis.
1026. Regional Analysis: Location and Trade (3) III, French
Lecture—3 hours. Prerequisite: course 1006. Theory of region-
ization: specialization, location, and trade for agricultural products; general economic equilibrium.
1032. Fundamentals of Business Organization (4) I, Logan, III, McCormick
Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing or consent of instructor. Role of organi-
zational and behavior in business and public agencies, decision making; individual business generation, informal groups, conflict and change in the organization.
113. Fundamentals of Marketing Management (3). II. Butler Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm; product relationships; pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; merchandising; wholesaling, retailing, Government regulation and restraint. Students having had course 136 may not receive credit for this course.

114. Production Management (4) III. Logan Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1B. For non-majors only. Principles and procedures for efficient use of resources, in processing and handling of agricultural and other products, including: Inventory control; coordination; production and sales. Students having had course 157 may not receive credit for this course.

115. Managerial Accounting (4) II, III. Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 118; 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.


120. Agricultural Policy (3) II, McCalla Lecture—3 hours. An examination of recent and current economic problems and governmental policies and programs affecting American agriculture.

125. Comparative Agriculture (4) II. Lecture—3 hours. An in-depth study of all the major agricultural regions in the world and their economy and problems.

130. Agricultural Marketing (4) I. Cothren, II, Antovetz. Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or the equivalent. The nature, function, organization, and development of agricultural marketing procedures; price policies; and marketing management.

135. Agricultural Marketing (4) I. Butler, II. Sheppard Lecture—3 hours. Principles of marketing and management of agricultural commodities: pricing, costs, and margins; market information, regulation, and controls; cooperative marketing.

136. Managerial Marketing (4) I. Nelson Lecture—3 hours; laboratory—3 hours. Introduction to and laboratory in the process of marketing an agricultural product.

140. Farm Management (5) III. Reed Lecture—5 hours; field trip. Farm organization and resource use; economic and technological principles in decision making; marketing and management problems in organizing and managing the farm business.

142. Personnel Finance (3) III. Butler, III, Shepard Lecture—3 hours. Prerequisite: Economics 19. Management of the farm household by the head of the household. The study of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning. (Same course as Consumer Economics 145.)

143. Investments (3) III. Shepard Lecture—3 hours. Prerequisite: Agricultural Economics/Consumer Economics 142 or consent of instructor. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock and real estate markets to the perspective of the investor.

145. Farm and Rural Resources Appraisal (4) III. Reed Lecture—3 hours; laboratory—3 hours; field trip. Principles of farm and rural appraisal and utilization of real estate in property taxation, real estate insurance, and mortgage finance.

147. Natural Resource Economics (4) I, Hansen Lecture—3 hours; discussion—1 hour. Natural resource use; public and private policies; and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public policy issues. Students who have had or are taking course 100A, Economics 100, or the equivalent may receive credit for this course.

147W. Natural Resource Economics (2) I, Hansen Lecture—3 hours; discussion—1 hour. Natural resource use; public and private policies; and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public policy issues. Students who have had or are taking course 100A, Economics 100, or the equivalent may receive credit for this course.

148. Economic Planning for Regional and Resource Development (3) II. Scottson Lecture—3 hours. Prerequisite: Economics 1A and 1B; Mathematics 16A recommended. Relation of resources to economic growth, including regional planning, problems, economic development, and the need for emphasis on resource use in agriculture and regional and national planning by both centralized and decentralized governments.

150. Agricultural Labor (3) I, III, Mays Lecture—2 hours; field trip; problems, attitudes, and characteristics of agricultural employees, employers, and labor contracts. Interaction of mechanization, determinants of agricultural labor supply and structures, evolution and efficiency of the labor market; placement and supervision; off-season and in-season unemployment; organization and conflict; relevant legislation.

151. Economics of Poverty (3) III. Rocklin Lecture—3 hours. Prerequisite: Economics 1A-1B or consent of instructor. Economic theories of mean distribution; causes of poverty; economic analysis of policy and political implications of policies to minimize economic insecurity, maximize equality of opportunity, and establish minimum income levels.

155. Quantitative Analysis for Business Decisions (4) II, III, Colman. Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A, Statistics 102. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, optimization, and simulation.

157. Analysis for Production Management (4) III. Catman Lecture—4 hours. Prerequisite: course 100A; Statistics 102. Application of economic theory and quantitative methods to the analysis of problems in industry, inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.

160. Economics of Energy (3) II. Willow Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100B (or Economics 100) or consent of instructor. Course designed to familiarize students with economic concepts necessary to study energy issues. Topics covered include: petroleum, coal, and natural gas;_U.S._$U.S._ battle for energy, cement production, and development; economic fundamentals: supply, demand, and market equilibrium; the prices of energy resources; the role of energy in the economy; the role of government in pricing; and the role of international trade in the energy sector.

171A. Financial Management of the Firm (3). II. Collins Lecture—3 hours. Prerequisite: Economics 11A, 11B, and course 106. Financial analysis at the firm level: methods of depreciation, influence of the tax structure; inventory, cash, and accounts receivable management; sources of short- and long-term funds; risk and return; who has the power and how it is used. Economics 134 may not receive credit for this course.

171B. Financial Management of the Firm (3) III. Collins Lecture—3 hours. Prerequisite: course 171A. Economics 11A, 11B. Financial analysis at the firm level: methods of capital budgeting, capital structure: dividend policy; mergers and acquisitions; and special current topics in finance.

176. Economic Analysis in Resource Use (3) III. Gardner Lecture—3 hours. Prerequisite: Economics 1A, 1B, course 100B or the equivalent recommended. 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.

190A. Senior Research Project (2) I, Snyder, II, Gardner Lecture—1 hour. Prerequisite: course 100A and Statistics 102, or consent of instructor. Senior standing, individual student-determined research project conducted under the guidance of a faculty advisor. Subject matter project, study objectives, procedure, method of analysis, writing outline, and preliminary elements of a report of what has to be completed in the first quarter. (Degree granted only, pending completion of sequence.)

190B. Senior Research Project (2) II, Snyder, III. Gardner Lecture—1 hour; discussion—1 hour. Prerequisite: course 190A or the equivalent, or consent of instructor. The senior student's research report begun in course 190A will be completed and, after evaluation by the instructor, reviewed and submitted by the student prior to the end of the semester. (Degree granted only, pending completion of sequence.)

192. Internship (1-6) II, III, summer. The Staff (Chairperson in charge). Laboratory—6 to 18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural Economics. Internships are supervised by the staff of the Stahlhut Internship (1-6) II, III, summer. The Staff (Chairperson in charge).

196. Tutoring in Agricultural Economics (1-3) I, II, III. The Staff (Chairperson in charge).

197. Agronomy (1) III. The Staff (Chairperson in charge).

198. Special Project for Advanced Undergraduate (1-5) I, II, III. The Staff (Chairperson in charge).

Graduate Courses

200A. Microeconomic Theory (5) II. Kushman Lecture—4 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A. Mathematics 16A-16B. Theories of behavior of individual economic agents. Characteristics of market equilibrium including perfect competition, monopoly, and monopolistic competition. (Same course as Economics 200A.)

200B. Microeconomic Theory (5) III. The Staff (Chairperson in charge).

200C. Microeconomic Theory (5). The Staff (Chairperson in charge).

Graduate Courses

200A. Microeconomic Theory (5) II. Kushman Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A or consent of instructor. Introduction to the theory of welfare economics in a general-equilibrium, linear economic model, externality, instability, and welfare functions. (Same course as Economics 200B.)

200C. Microeconomic Theory (5). The Staff (Chairperson in charge).

200E. Applied Welfare Economics (3) II, III. Lecture—3 hours. Prerequisite: one graduate course in microeconomic theory; one course in econometrics (or equivalent); one intermediate course in welfare economics (Economics 130). Application of welfare economics to topics chosen from areas of microeconomics, natural resource, general welfare issues, and market performance. Focus on the techniques of welfare theory by illustrating analytical methodology through specific empirical applications.

215A. Economic Development (4) I, Keneda (Economics) Discussion—1 hour; seminar—3 hours. Prerequisite: Economics 1.00 or 100A, 100B and Economics 19A-19B. Open to advanced undergraduates with consent of instructor. Theories of economic development as they relate to developing nations: demographic problems; development issues in economic development. (Same course as Economics 215A.)

215B. Macroeconomic Development (4) I. Keneda (Economics) Discussion—1 hour; seminar—3 hours. Prerequisite: Economics 215A. The macroeconomics of economic development: monetary policy problems; fiscal policy problems; international issues in economic development. (Same course as Economics 215B.)

215C. Economic Development in Agriculture: Policy and Planning (4) III. Hansen Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A or the equivalent. Agriculture in the structure of developing nations: role in economic development; agricultural and natural planning; second: policies relating to prices, inputs, productivity, and marketing; international aspects of trade, aid, and technical assistance; country case studies. (Same course as Economics 215C.)
Agricultural Education

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

Biology (including genetics) 21
Chemistry (including organic) 15
Physics (molecules from Physics 1A or 1B) 6

Depth Subject Matter

Agricultural Economics 9
Agricultural and Home Economics Education 7
Agricultural engineering 11
Animal sciences 16
Environmental sciences (includes offerings in environmental horticulture, environmental studies, environmental toxicology, renewable natural resources, and wildlife and fisheries biology) 6
Plant and soil sciences 16

Breadth Subject Matter

English (college requirement, plus 4 additional units of English or rhetoric) 71
Economics 1A or 1B 12

Restricted Electives

Supplement or expand any of the above areas 14
From the following: Enology 10 (total 10 units) 11
Environmental Planning 110; Nutrition 103; Food Science 110; 1108

Total Units for the Major 180

Major Adviser: J. G. Leising (Applied Behavioral Sciences)

Advising Center for the major is located in 119 Academic Office Building 4 (752-2244).

Teaching Credential Subject Representative

You may make an appointment with a credential counselor and obtain a statement of the completion requirements for the credential at the Applied Behavioral Sciences department office, 106 AOB-4. Since many majors in the College do not offer a minimum preparation necessary for entering the Agriculture Credential program, you are encouraged to seek counseling as early as possible. See also page 99 for the Teacher Education Program.

Graduate Study

The Department of Applied Behavioral Sciences offers a program of study leading to the M.Ed. degree. See also page 95. Further information may be obtained from the department and the Annunciation of the Graduate Division.

Graduate Adviser: M. C. Regan

Courses

See course listings under Agricultural and Home Economics Education (page 128) and Applied Behavioral Sciences (page 144).

Agricultural Education

See Agricultural Education (below); and Agricultural and Home Economics Education!

Agricultural Education

(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Education major serves those interested in teaching agricultural sciences in high schools or community colleges as well as those preparing for a service-type career in agriculture. It prepares graduates whose function will be to supervise youth and adult groups and to direct programs requiring preparation in both agricultural and educational fields. Federal requirements for instructors participating in federally funded vocational programs are also met. The need for scientists, technicians, and creative educators in both domestic and international agricultural programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation which is appropriate for work in banking, sales and service, rural recreation, and related agricultural industries. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility which this program provides.

NOTE: For key to footnote symbols, see page 124.
Agricultural Education (A Graduate Group)

Mary C. Regan, Ph.D., Chairperson of the Group
Group Office, 124 Academic Office Building 4
(752-2244)

Faculty. This interdisciplinary graduate group consists of a wide array of faculty from departments such as Applied Behavioral Sciences, Nutrition, Textiles and Clothing, Agricultural Economics, Agronomy and Range Science, Environmental Design, Community Health, Plant and Animal Sciences, Agricultural Engineering, Environmental Horticulture, and Pharmacology.

Graduate Study. The Agricultural Education Graduate Group is housed in the Department of Applied Behavioral Sciences. The program of study involves three areas of specialization: (a) agricultural sciences, (b) consumer studies, and (c) family and social organizations studies. Individual students focus on a specialty area gaining expertise in various subdisciplines of their interest. Generalist students are preparing themselves for leadership and professional roles in research, planning, implementation, and evaluation of educational or other institutional programs.

Requirements. Students should submit a Program Plan in the area of intended specialization by the end of the first quarter of graduate study. To complete the Master of Education degree, 36 units (minimum) of upper division and graduate courses must be successfully completed. A minimum of 18 of these units must be graduate-level courses (200 series). Three core courses are required for graduation as well as completion of at least 8 units related to research and/or statistics. A field project and comprehensive oral examination is the final phase for completion of this degree.


Agricultural Engineering

(College of Agricultural and Environmental Sciences)

Roger E. Garrett, Ph.D., Chairperson of the Department
Department Office, 3030 Bailer Hall (752-0102)

Faculty

Norman B. Akesson, M.S., Professor
Ray Bainer, M.S., LL.D., Professor Emeritus
William J. Chancellor, Ph.D., Professor
Pietz (Pau1) Chen, Ph.D., Professor
Roger E. Garrett, Ph.D., Professor
John R. Goss, M.S., Professor
George F. Hanna, M.Ed., Lecturer
S. Alan Henderon, M.S., Sc.D., Professor Emeritus
D avid J. Hills, Ph.D., Associate Professor
Bryan M. Jenkins, Ph.D., Assistant Professor
M. Stephen Kaminaka, Ph.D., Assistant Professor

Robert A. Kepner, B.S., Professor Emeritus
Coby Lozenetz, Jr., M.S., Professor Emeritus
James J. Mehlichau, B.S., Senior Adjunct Lecturer
John A. Miles, Ph.D., Associate Professor
Stanton R. Morrison, Ph.D., Professor
Loren W. Neubauer, Ph.D., Professor Emeritus
Michael O'Brien, Ph.D., Professor
Hugo Patino, Ph.D., Assistant Professor
Thomas R. Rumssey, Ph.D., Assistant Professor
R. Paul Singh, Ph.D., Professor
Henry E. Stutz, M.S., Professor
Shrinivas K. Upadhyaya, Ph.D., Assistant Professor
Wesley E. Yates, M.S., Professor

Courses. See course listings under Agricultural Engineering Technology (this page), Consumer Technology (page 191), and Engineering Agriculture (page 191).

102. Farm Tractors (1) II. Yates Lecture—1 hour. Prerequisite: Physics 2A or high school physics recommended. Types of farm tractors; operating principles, including power transmission components, power-take-off drives, implement hitchs and controls; tractor and drawbar power; operator safety, comfort, and convenience. (Engines are studied in Consumer Technology 101.)

103. Hydraulic Power and Controls (1)(II) Student Lecture-laboratory—2 hours. Prerequisite: upper division standing; Physics 2A. Principles of operation and construction of hydraulic systems. Application of pumps, motors, and valves for controlling machines.

104. Field Machinery (2) III. Lecture—1 hour, laboratory—3 hours. Prerequisite: upper division standing; Physics 2A and some general knowledge of field crop production recommended. Principles, performance, and operating characteristics of machines for tillage, planting, cultivating, and harvesting field and vegetable crops. Laboratory may include one or more field trips, field studies, laboratory studies of specific machines, and laboratory discussions.

105. Machinery Management (1) III. Chancellor Lecture—1 hour. Prerequisite: course 101 or 102 or 104, or consent of instructor. Factors in machinery management decision processes of sources of equipment information; methods of analyzing and selecting machinery systems; management of machinery maintenance; the role of machinery management with respect to worker safety.

113. Animal Environment and Shelter (1)(I) I. Morrison Lecture—2 hours (lecture); 2-3 lab hours during first four weeks of quarter. Prerequisite: Animal Science 2 or consent of instructor. Animal energetics; heat and vapor transmission in buildings; psychrometrics; ventilation; and thermal protection. Environmental considerations affecting the choice of animal shelter.

114. Plant Shelters, Environment and Related Equipment (1)(I) M. Morrison Lecture—2 hours (lecture); 2-3 lab hours during first five weeks of quarter. Prerequisite: Plant Science 2 or consent of instructor. A study of shelters and equipment for providing a suitable environment for plant growth; temperature and humidity regulation; irrigation and equipment for use in plant shelters.


132L. Laboratory Studies in Management of Agricultural Waste (1) III. Hills Laboratory—3 hours. Prerequisite: course 132 (concurrent). Directed laboratory exercises, field trips and special projects to augment the study of course 132. (FNP grading only.)

134. Pesticide Application Techniques (1) III. Yates Lecture—1 hour. Prerequisite: upper division standing. Chemistry 1B, introductory course in environmental toxicology, and Physics 1A or 2A. Introductory course in entomology, botany, plant pathology or nematology recommended. Emphasis will be on safe application of pesticides. Requirements of closed mixing and handling systems to protect workers. Disposal of pesticide materials. Selection and operation of aerial and ground spray application systems. Techniques to minimize spray drift hazards.

141. Technology for Agriculture in Developing Regions (3) I, II, III Chancellor Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture, man, animal, and engineering powered devices. Energy requirements, size, scale, costs, support infrastructure development, and productivity potentials. (Some course as International Agricultural Development 141.)

141AT. Equipment Technology for Developing Agriculture (1) I, Chancellor Autotutorial—3 hours. Prerequisite: course 141 or International Agricultural Development 41 (may be taken concurrently). Autotutorial (slide-tape) presentation of machinery, irrigation, and machine equipment technology applications, operation, and maintenance (FNP grading only).

151. Energy Relations in Agricultural Production (1) II. Chancellor Lecture—1 hour. Prerequisite: Physics 2B. Quantitative relationships among energy flows in various forms through agricultural production and processing as practiced in California today: the sun, plants, animals, fertilizers, irrigation, seed and machinery, pesticides, swttransportation, tool preservation, distribution.

132
Agricultural Practices; Agricultural Science and Management

Agricultural Science and Management

(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Science and Management major is designed to prepare students for career opportunities on farms and ranches, in land management, and in agricultural service industries. The program provides a core of science and technology necessary for the understanding of how agricultural and food systems work, along with basic elements of economics, business, and management. Students may select from among several options allowing concentration of their agricultural science and technology courses in a chosen field. Experience in computing sciences serves as an appropriate complement to this major.

Agricultural Science and Management

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equal courses are acceptable, and a more comprehensive course treatment (e.g., Physics 1A, and 1B rather than 1A only) will be useful for some. Students should consult with their advisor to coordinate the courses they will take to go beyond the Minimum requirements shown for the Preparatory and Depth Subject Matter areas.

Preparatory Subject Matter 53-59

Mathematics 16A and 16B 5

Breadth Subject Matter 20

Physical sciences (Chemistry 1A and 1B, Biology 2, Physics 1A and 1B, or Physics 2A and 2B) 10-16

Breadth electives 5

Total 123

Total Units 129

General biological sciences (Botany 2) 5

Economics 1A and 1B 5

English, oral, Rhetoric 3, or Philosophy 5 4

Social sciences and humanities 10

Restrictive electives 14

Additional courses chosen with advisor's approval from agriculture, engineering, technology, agriculture, business, and management courses chosen with advisor's approval.

Plant Science option

Botany 111A, 111B, or 112 9

Botany 111A or 112 9

Genetics 120 or 120L 4

Plant Pathology 120 4

Plant Science 2 8

Soil Science 100, 109 8

Water Science 110A 2

Total Units 129

Total Units for the Major 129

Major Adviser. H.M. Reisener (Land, Air and Water Resources). Upon entering the major, students should see the Major Adviser for assignment of a faculty adviser with expertise in the selected option.

Advising Center. For the major is located in 177 Animal Science Building (752-6118); and peer advising is in 161 Animal Science Building.

Graduate Study. See page 95.

Notes:

1 Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

Agricultural Practises; Agricultural Science and Management

Courses in Agricultural Practises

Questions pertaining to the following courses should be directed to the instructor or to the Office of the Department of Agricultural Engineering, 2030 Balser Hall.

Lower Division Courses

49A. Field Equipment Operation (1) I, II, III. Hanna (Agricultural Engineering) Laboratory, 3 hours. Prerequisite: consent of instructor. Theory and operation of the major types of field equipment.

NOTE: For key to footnote symbols, see page 124.
Agronomy

Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the instructor or to the Agricultural Science and Management Advising Center.

Lower Division Course

21. Computer Programming: FORTRAN (3) (II, III). The Staff Lecture—3 hours, laboratory—1 hour. Prerequisite: Statistics 13 or Mathematics 16A or the equivalent. Introduction to computer programming stressing the development of modular algorithms written in FORTRAN to solve quantitative agricultural problems. Not open to students who have received credit for Engineering 5 or Electrical and Computer Engineering 8.

Upper Division Courses

190. Applied Statistics in Agricultural Sciences (4) (I, II). Geng (Agronomy and Range Science) Lecture—3 hours, laboratory—3 hours, prerequisite: at least two years high school algebra and junior standing. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover concepts and basic statistical theory, specialized laboratory sections cover procedures, data processing and interpretation.

190. Professional Seminar in Agronomy and Management (1) (I, II, III). The Staff Seminar—1 hour, prerequisite: upper division majors or consent of instructor. Reports and discussions of current development in the agricultural industry. (P/NP grading only.)

Agronomy

(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Agronomy and Range Science.

Major Program and Graduate Study. See majors in Plant Science (page 296) and Range and Wildlands Science (page 306), and page 95 for graduate study.

Related Courses. See Plant Science and Range Science.

Courses in Agronomy

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 258 Hunt Hall.

Lower Division Courses

21. Agricultural Science and the Food Crisis (3) (II, III). Raines Lecture—2 hours. An interdisciplinary approach to the food issue. Lectures will be drawn from several departments to discuss such areas as agronomy, nutrition, economics, water science, agricultural engineering, political science, and anthropology. Both agricultural and nonagricultural majors are encouraged to enroll. Offered in even-numbered years.

92. Agronomy Internship (1-12) (I, II, III). summer. The Staff (Department Chairperson in charge) Laboratory—36-38 hours. Prerequisite: completion of 84 units and consent of instructor. Work-study experience on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

197. Tutoring in Agronomy (1-3) (I, II, III). The Staff (Chairperson in charge) Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student will assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/NP grading only.)

198. Directed Group Study (1-5) (I, II, III). The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) (I, II, III). The Staff (Chairperson in charge) Prerequisite: 6 upper division units of agronomy. (P/NP grading only.)

Graduate Courses

206A-206B. Design, Analysis and Interpretation of Experiments (3-3) (I, II). Geng, Williams Lecture—2 hours, discussion—1-2 hours. Prerequisite: graduate standing in Plant Science, Agronomy Science and Management 150; knowledge of elementary FORTRAN or ALGOL recommended. The planning and analysis of field and laboratory experiments with emphasis on the biological interpretation of results.

221. Advanced Plant Breeding (4) (III). Teuber Lecture—3 hours, laboratory—3 hours. Prerequisite: Plant Science 113; Genetics 120 or 1006; course 205A. Pheno- typy, methods and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, gama- plasm conservation, and breeding for pest and stress resistance. Discussions focus on population improvement methods and strategies.

222. Quantitative Genetics and Plant Improvement (4) (II). Allard Lecture—4 hours. Prerequisite: Plant Science 113; Genetics 125; or consent of instructor. Genetic factors affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

223. Selection Theory in Plant Breeding (4) (II). Jain, Qualset Lecture—2 hours, discussion—2 hours. Prerequisite: course 222 or consent of instructor. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis of quantitative character expression and methods for obtaining maximum efficiency in plant breeding schemes. Offered in odd-numbered years.

224. Chromosome Evolution (4) (I). Dvorak Lecture—3 hours, laboratory—3 hours. Prerequisite: Genetics 101 or consent of instructor. Structure and function of chromosomes. Dynamics of these evolution at the molecular and structural levels. Offered in odd-numbered years.


230. Advanced Population Biology (3) (II). Jain Lecture—3 hours, discussion—1 hour. Prerequisite: Genetics 103; recommended, a basic course in ecology (Botany 117, Zoology 126, etc.). The dynamics of growth and evolution of populations. Genetic and ecological aspects of population regulation and integration. Natural selection within and among populations, intra- and interspecific competition. Community structure and diversity. Offered in even-numbered years.

231. Advanced Topics in the Ecology of Crop and Range Plant Communities (3) (I, II). The Staff Lecture—2 hours. Prerequisite: Plant Science 101, Analysis and quantitative description of the structure and dynamics of field crop and range communities in relation to interplant competition, population functions, environmental stresses and adaptation.

232. Advanced Topics in the Physiology of Crop and Range Plants (3) (I). Hufnagel Lecture—3 hours. Prerequisite: Botany 111B or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crop and range plants in relation to nitrogen utilization and photosynthesis.

233. Biological Nitrogen Fixation (3) (II). Valentine Lecture—2 hours; seminar—1 hour. Current concepts of the physiology, microbiology, biochemistry, genetics, and regulation of free living and symbiotic Nitrogen fixing organisms. Integration and translation of basic research to develop strategies for improving N productivity of agronomic crops. Offered in odd-numbered years.


237. Tutoring in Agronomy (1-3) (I, II, III). The Staff (Chairperson in charge) Prerequisite: graduate standing; consent of instructor; course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated for a total of 5 units. Same course may not be tutored more than one time. (S/U grading only.)

238. Group Study (1-5) (I, II, III). The Staff (Chairperson in charge) Prerequisite: independent study in the areas of plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

239. Research (1-2) (I, II, III). The Staff (Chairperson in charge) Original research involving plant physiology, plant genetics, plant biochemistry, agricultural chemistry, or soil-plant relationships of field crops. (S/U grading only.)
Agronomy and Range Science

(College of Agricultural and Environmental Sciences)

D. William Rains, Ph.D., Chairperson of the Department
Department Office, 133 Hunt Hall (752-1703)

Faculty
Robert W. Ailand, Ph.D., Professor (Agronomy and Range Science, Genetics)
R. William Breidenbach, Ph.D., Lecturer
Ivan W. Buddenhagen, Ph.D., Visiting Professor
John P. Conrad, Ph.D., Professor Emeritus
Beverly Crampton, M.S., Senior Lecturer
Monique W. Denning, Ph.D., Assistant Professor
Jan Dvorak, Ph.D., Associate Professor
Ken W. Funder, Ph.D., Assistant Professor
Shu Geng, Ph.D., Associate Professor
Melvin H. George, Ph.D., Adjunct Lecturer
James E. Hill, Ph.D., Adjunct Lecturer
F. Jack Hiles, Ph.D., Adjunct Lecturer
Ray C. Huffaker, Ph.D., Professor
Leland F. Jackson, Ph.D., Adjunct Lecturer
Subodh K. Jain, Ph.D., Professor
C.C. Jan, Ph.D., Assistant Adjunct Professor
Milton B. Jones, Ph.D., Lecturer
Burgess L. Kay, B.S., Lecturer
Thomas A. Kirby, Ph.D., Adjunct Lecturer
Paulen F. Knowles, Ph.D., Professor Emeritus
Horton M. Laude, Ph.D., Professor Emeritus
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Loomis, Ph.D., Professor
R. Marion Lowe, Ph.D., Professor Emeritus
John W. Menke, Ph.D., Associate Professor
Duane S. Mikelsen, Ph.D., Professor
Maurice L. Peterson, Ph.D., Professor Emeritus
Donald A. Phillips, Ph.D., Professor
Calvin O. Quade, Ph.D., Professor
Charles A. Rausge, Ph.D., Professor
D. William Rains, Ph.D., Professor
J. Neil Rutger, Ph.D., Adjunct Professor
Charles W. Schaller, Ph.D., Professor
Donald E. Seaman, Ph.D., Adjunct Lecturer
Ernest H. Stanford, Ph.D., Professor Emeritus
Larry R. Tepler, Ph.D., Assistant Professor
Robert L. Travis, Ph.D., Associate Professor
Carl L. Tucker, M.S., Adjunct Lecturer
Raymond C. Valentine, Ph.D., Professor
Barbara D. Webster, Ph.D., Professor
William A. Williams, Ph.D., Professor
Frederick P. Zacherle, Jr., Ph.D., Professor Emeritus

American Studies

(College of Letters and Science)
Jay Mechling, Ph.D., Program Director
Program Office, 816 Sprout Hall (752-3377)

Committee in Charge
*David A. Robertson, Ph.D. (English), Committee Chairperson
Daniel H. Calhoun, Ph.D. (History)
Dennis J. Dingemans, Ph.D. (Geography)
Bruce Hackett, Ph.D. (Sociology)
Harvey Himelfarb, M.A. (Art Studies)
Jay Mechling, Ph.D. (American Studies)
Gerald P. Mohrman, Ph.D. (Rhetoric)
Robert K. Sarlos, Ph.D. (Dramatic Art)
Robert Sonrwer, Ph.D. (Psychology)
David Scottfield Wilson, Ph.D. (American Studies)

Faculty
Jay Mechling, Ph.D., Assistant Professor
David Scottfield Wilson, Ph.D., Associate Professor

The Major Program
Students who choose the major in American Studies are usually those who feel too limited by a departmental approach to American experience. American Studies lower division courses are an introduction to interdisciplinary study through attention to significant cultural themes, such as science and technology, gender issues, or nature. American Studies features close contact between students and instructors, special attention to student writing, and the combination of classroom and field work.

The major program offers the advanced student of American civilization some strategies for combining disciplines with the aim of describing and interpreting American cultural systems. The American Studies Core courses provide the student the opportunity to conduct original research in the company of interdisciplinary teachers and students. The Interpreting Skills Core equips students with the methods and techniques they will need in order to get the most out of their other upper-division coursework for the major and to be able to undertake the senior research project that culminates the student's program of study. These skills include field-work techniques in natural cultural settings; principles and practice of criticism of visual materials, and principles and practice of the criticism of visual materials. The student also plans an upper-division emphasis in close consultation with an American Studies adviser, and undertakes a senior research project.

Career Alternatives. As an interdisciplinary program, American Studies provides a good liberal arts and sciences undergraduate education. American Studies maximizes the student's contact with a variety of subject matter and approaches. This flexibility has meant that graduates have been able to move into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, environmental planning, teaching, library science, museum curatorship, and business. Some students discover new career possibilities through their internships in American institutions.

American Studies

A.B. Major Requirements:

Preparatory Subject Matter
One course from American Studies 1 series .......................... 4
American Studies 30 ................................................................ 2
American Studies 45 ................................................................ 4
Two courses chosen from History 17A, 17B ................................ 8

Depth Subject Matter
American Studies core courses .............................................. 20
American Studies 120, 140A, 140B, 190A-190B ..................... 16

Interpreting Skills courses ....................................................... 12
(a) Field work, American Studies 111 (Sacramento Valley Studies)
(b) Criticism: Verbal, choose one course from Comparative Literature
    141 (Literary theory and criticism),
    English 110A (Introduction to principles of criticism),
    Rhetoric 120 (metaphorical criticism)
(c) Criticism: Visual, choose one course from Art 147 (Theory and
criticism of photography),
    Art 148 (theory and criticism of painting and sculpture),
    Art 149 (theory and criticism of architecture),
    Rhetoric 143 (media criticism: broadcast)

Emphasis .............................................................................. 16
In consultation with an American Studies advisor, the student designs
a program of 16 units of upper division coursework around a unifying theme or
subject matter in American civilization. The coursework should come from at
least two disciplines.

Total Units for the Major ....................................................... 66

Minor Program Requirements:

American Studies, upper division courses ............................... 20
No more than 5 units of courses numbered 100-129 may be counted toward this total.

Faculty Advisers. J. Mechling, D. S. Wilson.
Teaching Credential Subject Representative. J. Mechling. See page 99 for the Teacher Education Program.
Anatomy

Courses in American Studies

Lower Division Courses

1A. Technology, Science and American Culture (4) III. Mach- ling Lecture—2 hours; discussion—2 hours. Critical examination of American science and technology as cultural systems which define the natural world and man's relation to it; mutual influence and interaction of those systems with other cultural systems (arts, politics, social thought, religion, etc.).

1E. Nature and Culture in America (4) III. Wilson Lecture—3 hours; discussion—1 hour; tutorial confer- ences, short projects, field exercises. Uses and abuses of nature in America; Native and non-Native approaches to nature contrasted; attention to different species and individuals (animals, scientists, naturalists, farmers, etc.); survival theory and practice; classwork, field study, directed independent projects, individual or group.

1F. The Popular Image of Women in America (4) III. The Staff Lecture—2 hours; discussion—1 hour, directed analysis of popular media, literature, media exposure, special projects. Examines the images of women as presented in popular media. Emphasis on the politics of gender roles and the connection between the popular feminine image and the demands of the larger popular culture.

2. Forms of American Wisdom (2) II, III. Wilson Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America—e.g., folklore, proverbs, language, public religion, science—with attention to coming to terms today with its content. (P/N grading only)


30. Fieldwork in American Civilization (2), III. The Staff Lecture—1 hour; discussion—1 hour. A practical introduction to the multidisciplinary techniques of gathering, organizing, and interpreting the data of American experience: exercises in field experience, observation, interviewing, logging, group fieldwork, oral archaeology, photogrammetry, and ethnography, and in the application of these techniques to the study of a literate post-industrial civilization.

45. Introduction to American Studies (4) I, II, III. Machling, Wilson Lecture—2 hours; discussion—2 hours; evaulation of written reports and conferences with individual authors. Prerequisite: at least one course from course sequence; Anthropology 2 and Sociology 1, or the equivalent. The elements of American Studies, including the background and general nature of American Society, and the methods and philosophies of the academic disciplines which deal with United States.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily for lower division students. (P/N grading only)

99. Individual Study for Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only)

Upper Division Courses

101A-H. Special Topics (4) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours, intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. Content will vary according to the instructor and in accord with the following titles: (A) Popular Culture Studies; (B) Women's Studies; (C) Material Aspects of American Culture; (D) American National Character; (E) American Lives Through Autobiography; (F) The Interrelationship Between Arts and Ideas; (G) New Directions in American Cul- ture Studies; (H) Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area.

111. Sacramento Valley Studies (4) II. Wilson Lecture—2 hours; discussion—1 hour; fieldwork. Prerequisite: 101I or 45 or Anthropology 2 recommended, or consent of instructor. A comparative study of the American cultures in the Sacramento Valley, including their relation to a varied biological, physical, social environment, their intercultural relations, and their relationship to the dominant American culture.

120. American Folklore and Folklife (4) II. Machling Lecture—3 hours, fieldwork—1 hour. The theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture (arts, crafts, architecture, costume, food). Emphasis upon the collection, classification, and analysis of California and urban folk traditions.

140A. American Studies and the Social Sciences (4) III. Mach- ling Lecture-discussion—3 hours; term paper. Prerequisite: courses 1 and 45. Exploration of convergent ways American Studies scholars use languages of the social sciences to explore American events, institutions, values, and meanings.

146B. American Studies and the Humanities (4) III. Wilson Lecture-discussion—3 hours; term paper. Prerequisite: courses 1 and 40. Exposition of convergent ways American Studies scholars use languages of the humanities to explore American events, institutions, values, and meanings.

199A-99B. Senior Prospective (4-4) II, III. Wilson, Machling Seminar—2 hours; project—2 hours. Prerequisite: senior standing in American Studies major: individual conferences and written reports. Individual research on American Studies topes. (Deferred grading only, pending completion of sequence).

192. Internship in American Institutions (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of intern positions, with priority to American Studies majors and those completing course 30. Supervised internship and study within and about key organizations in American civilization: archives, museums, schools, institutional societies, governmental and social agencies, etc., with attention to the techniques of participant observation and the collection of ethnographic data. May be repeated for credit for a total of 12 units. (P/N grading only).

197. Tutoring in American Studies (1-5) I, II, III. The Staff (Chairperson in charge) Tutorial—1-5 hours. Prerequisite: consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge, reports and readings. May be repeated for credit as the tutoring is for a different course. (P/N grading only).

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only).

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only).

Graduate Courses

258. Group Study (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only).

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only).

Anatomy

See Anatomy (this page); and Human Anatomy (under Medicine, School of).

Anatomy

(=School of Veterinary Medicine)

George H. Cardinet III, D.V.M., Ph.D., Chairperson of the Department

Department Office, 1321 Haring Hall (752-1174)

Faculty

George H. Cardinet III, D.V.M., Ph.D., Professor
Leslie J. Faukin, Jr., Ph.D., Associate Professor
Dallas M. Hyett, Ph.D., Associate Professor
Logan M. Julian, D.V.M., Ph.D., Professor
Ralph L. Kitchell, D.V.M., Ph.D., Professor
Carleton L. Lohse, D.V.M., Ph.D., Associate Professor
Charles G. Plapper, Ph.D., Associate Professor
Walter S. Tyler, D.V.M., Ph.D., Professor

Courses in Anatomy

Upper Division Courses

210. Systematic Anatomy (4) I, Julian Lecture—2 hours; laboratory—6 hours. Prerequisite: Zoology 2, 2L. Lectures, dissections, and demonstrations emphasizing the typical structure of the anatomical systems of the dog, chicken, and subhuman primates. (P/N grading only)

216. Directed Group Study (1-5) II, III, The Staff (Chair- person in charge) Prerequisite: consent of instructor. (P/N grading only).

236. Special Study for Advanced Undergraduates (1-5) II, III, The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only).

Graduate Courses

210. Advanced Systematic Anatomy (5) I, Julian Lecture—2 hours; laboratory—9 hours. Prerequisite: course 100 or consent of instructor. Detailed dissections comparing the anatomy of the dog, sheep, chicken and primate. Emphasis placed on the unique aspects of each species and their use in research.

212. Organography (2) II. The Staff (Juran in charge) Lecture—2 hours. Prerequisite: course 100 or the equiv- alent and consent of instructor. Comparative development, growth patterns, and composition of selected organs: liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in even-numbered years.

215. Ultrasoundic Anatomy (3) I. The Staff (Tyler in charge) Lecture—3 hours. Prerequisite: histology: the electron micro- scopic appearance of tissues, and organ systems. (P/N grading only)

216. Morphology of Body Surfaces (2) III. The Staff (Tyler in charge) Lecture—1 hour; discussion—1 hour. Information concern- ing the three-dimensional morphology of internal and exter- nal body surfaces, both normal and abnormal, as revealed by scanning electron microscopy of cells, tissues, organs, and replicas will be compared and correlated with observations derived from other techniques. Offered in even-numbered years.

2120. Principles of Histochernistry (3) I. The Staff (Tyler in charge) Lecture—2 hours; laboratory—3 hours. Prerequisite: Zool- ogy 121, Biometrics 101A. Principles of enzyme histo- chemistry of animal tissues applicable to light and electron microscopy. Offered in odd-numbered years. (SU grading only)

2151. Veterinary Histology (5) II. The Staff (Tyler in charge) Lecture—3 hours; laboratory—6 hours. Prerequisite: Zool- ogy 2-2L. The microscopic anatomy of tissues and organs of mammalian and avian species of veterinary significance.

143
Animal Behavior (A Graduate Group)

Donald H. Owings, Chairperson of the Group

Group Office, 148 Young Hall (Psychology) (752-1880/1673)

Faculty

The Group includes faculty from eight departments in three schools and colleges.

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program which trains students for teaching and research in a variety of areas including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students choose one of the three areas of specialization: (1) ethology and the evolutionary basis of animal behavior, (2) physiological basis of animal behavior, and (3) behavior of domestic animals. All three specializations will emphasize the adaptive and evolutionary basis of animal behavior. Resources available to students, in addition to various departmental facilities, include those of the California Primate Research Center and the Agricultural Field Stations.

There is an early application deadline of February 15 for Fall Quarter.

Preparation. Appropriate preparation is a bachelor's or master's degree in one of the several disciplines relevant to behavior such as psychology, zoology, anthropology, physiology, wildlife biology, ecology, animal science, veterinary science, genetics, or animal behavior. In addition, at least one course from each of the following four areas must be taken before admission into the program or before the end of the first year in the program.

General Genetics: Genetics 100A-100B or 120, or the equivalent

Statistics: Statistics 102 or Psychology 103, or the equivalent

Evolution: Genetics 105 or Zoology 148, or the equivalent

Animal behavior: Psychology 150, Wildlife and Fisheries Biology 140, or Zoology 155, or the equivalent

Students are encouraged to engage in some form of research as early as possible during the first year. This dissertation research may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.

Breadth Requirement. The following core courses or the equivalent (22 to 24 units) are required of all students.

Systemic physiology: Psychology 110 or Zoology 142

Statistical analysis: Psychology 206 or Statistics 106

Scientific approaches to animal behavior research: Animal Behavior 201

Seminar in animal behavior: Animal Behavior 200

Ecology: Entomology 104, Environmental Studies 100, or Zoology 125

College teaching: Biological Sciences 210 or Psychology 290

Comparative psychology: Psychology 260

Specialization. In addition to the requirements listed above, students must also take several courses in one of the three areas of specialization with substitution as approved by the advisor.

Graduate Advisor. R. G. Coss (Psychology).

Anatomy (A Graduate Group)

Douglas S. Gross, Ph.D., Chairperson of the Group

Group Office, 3301 Medical Science 1A (Human Anatomy) (752-2102/2100)

Faculty. Includes faculty members from the Schools of Medicine and Veterinary Medicine as well as from various departments such as Avian Sciences, Environmental Toxicology, Nutrition, Physical Education, and Zoology.

Graduate Study. The Graduate Group in Anatomy offers graduate study leading to the M.S. and Ph.D. degrees. It is designed to provide fundamental training in those basic subject areas required of a teacher as well as specialized training in one of the areas of anatomy which would be pursued by a research scientist. The interrelationship between structure and function is stressed. Areas of specialization include cell structure and function, neurophysiology, reproduction and developmental anatomy and individualized areas of specialization. Application to the study programs are considered only twice a year, January 15 and June 1.

Preparation. Applicants for graduate work must have courses in general biology and chemistry, systemic physiology, morphology, biochemistry or cell biology and statistics. At least 22 units are required of all students.

Systemic anatomy: Anatomy 100

Statistical analysis: Psychology 206 or Statistics 106

Comparative anatomy: Anatomy 120

Preparation for a dissertation research project may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.

Breadth Requirement. The following core courses or the equivalent (22 to 24 units) are required of all students.

Systemic anatomy: Anatomy 100

Statistical analysis: Psychology 206 or Statistics 106

Comparative anatomy: Anatomy 120

Specialization. In addition to the requirements listed above, students must also take several courses in one of the three areas of specialization with substitution as approved by the advisor.

Graduate Advisor. D. M. Hendrick (Human Anatomy), C. L. Loth (Anatomy).

Anesthesiology

See Medicine, School of

Animal Genetics

Courses in Animal Behavior

Graduate Courses

201. Scientific Approaches to Animal Behavior Research (3)
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Includes seminar in animal behavior and sensoric experience. Offered in odd-numbered years.

202. Behavioral Aspects of Animal Domestication (3)
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Offered in even-numbered years.

Animal Genetics

Courses in Animal Genetics

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 177 Animal Science Building.

Upper Division Courses

107. Genetics and Animal Breeding (3)
Lecture—5 hours. Prerequisite: Genetics 120 or 100A-100B. Principles of quantitative genetics applied to improvement and creation of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices. Foundation provided for further study in animal breeding.

108. Methods in Quantitative Animal Breeding (3)
Lecture—3 hours. Prerequisite: course 107. Methods and procedures in quantitative animal breeding: repeatability, heritability and genetic correlation estimation; single and multiple trait selection methods.
Animal Physiology: Animal Science

198. Directed Group Study (1-5) I, II, III. The Staff (Bradford in charge).
Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Bradford in charge).
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

204. Theory of Quantitative Genetics (3) I, Gall Lecture—3 hours; discussion—1 hour. Prerequisite: course 107 or the equivalent. Introduces the theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. The course will develop the concepts used to estimate quantitative genetic differences and bases for partitioning the phenotypic variance.

206. Advanced Domestic Animal Breeding (3) I. Farniua Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; course 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and composite traits. Methods of estimating genetic trends. Offered in odd-numbered years.

207. Quantitative Genetics and Animal Breeding Theory (3) II. Aplin (Animal Sciences) Lecture—2 hours; laboratory—2 hours. Prerequisites: Math 105A-105B or 130A-130B. Quantitative genetic theory, relating to inbreeding and crossbreeding systems, selection for performance, major quantitative genetic control populations, and applied and theoretical breeding programs. Offered in even-numbered years.

208. Estimation of Genetic Parameters (3) II, III. Thompson Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability; repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection. Offered in even-numbered years.

209. Animal Improvement in an International Context (4) II, III. Bradford Lecture—3 hours; seminar—1 hour. Prerequisite: completion of at least one year of graduate study, including upper division or graduate courses in livestock production and animal breeding. Evaluation, utilization, conservation and husbandry of livestock populations; the presence of central data processing; population structure and rate of improvement; roles of governments; group breeding schemes; research needs. (SU grading only.) Offered in odd-numbered years.

210. Group Study (1-5) I, II, III. The Staff (Bradford in charge).
Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (SU grading only.)

211. Research in Animal Genetics (1-12) I, II, III. The Staff (Bradford in charge).
(SU grading only.)

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Animal Nutrition

See Nutrition

Animal Physiology

(College of Agricultural and Environmental Sciences)

John M. Horowitz, Ph.D., Chairperson of the Department
Department Office, 186 Briggs Hall (752-2023)

Faculty

R. Leland Baldwin, Ph.D., Professor (Animal Science)
Marylyn S. Barkley, Ph.D., Assistant Professor
James J. Boda, Ph.D., Professor Emeritus
Ray E. Burger, Ph.D., Professor
Earl E. Carstens, Ph.D., Assistant Professor
Harry W. Colvin, Jr., Ph.D., Professor
Perry T. Cupps, Ph.D., Professor Emeritus
Jack M. Goldberg, Ph.D., Associate Professor
John M. Horowitz, Jr., Ph.D., Professor
Barbara A. Horowitz, Ph.D., Professor
Frederick W. Lorenz, Prof., Emeritus
Verne E. Mandel, Ph.D., Professor (Animal Physiology, Animal Science)
Gary F. Mobbert, Ph.D., Professor (Animal Science)
Frank X. Osawara, Ph.D., Professor Emeritus
Edward A. Rhode, Ph.D., Professor
Robert P. Scooby, Ph.D., Associate Professor (Neurology)
Arnold J. Stillman, Ph.D., Associate Professor
Arthur H. Smith, Ph.D., Associate Professor
W. Jeffrey Weidner, Ph.D., Associate Professor
Barry W. Wilson, Ph.D., Professor (Avian Sciences)
Charles M. Wolf, Ph.D., Visiting Lecturer
Dorothy E. Wooley, Ph.D., Professor

Courses.
See course listing under Physiology (Animal), page 293.

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Animal Science

(College of Agricultural and Environmental Sciences)

Robert W. Touchberry, Ph.D., Chairperson of the Department
Department Office, 130 Animal Science (752-1250)

Faculty

Thomas E. Adkins, Ph.D., Assistant Professor
Donald F. Amund, Ph.D., Associate Professor
Gary B. Anderson, Ph.D., Associate Professor
Robert A. Ashmore, Ph.D., Professor
R. Leland Bailey, Ph.D., Professor
Donald L. Baw, Ph.D., Adjunct Lecturer
G. Eric Bradford, Ph.D., Professor
Anthony C. Bywater, Ph.D., Assistant Professor
Christopher Calvert, Ph.D., Assistant Professor
Floyd D. Carroll, Ph.D., Professor Emeritus
Ernest S. Chang, Ph.D., Assistant Professor
Wallis H. Clark, Ph.D., Assistant Professor
Douglas E. Conklin, Ph.D., Lecturer
Perry T. Cupps, Ph.D., Professor Emeritus
Edward J. DePeters, Ph.D., Assistant Professor
Serge Doroshov, Ph.D., Associate Professor
J. Warren Evans, Ph.D., Professor
Thomas R. Fumula, Ph.D., Assistant Professor
Graham A. E. Gall, Ph.D., Professor
William M. Garrett, Ph.D., Professor
Paul W. Gregory, Ph.D., Professor Emeritus
Dennis Hedgecock, Ph.D., Adjunct Lecturer
Ronald P. Hedrick, Ph.D., Assistant Professor
Hubert Helmsley, Ph.D., Professor
J. L. Hill, M.S., Adjunct Lecturer
Siaj S.O. Hung, Ph.D., Assistant Professor
Robert C. Lachen, Ph.D., Professor
Oskar Lang, Dipl., Vet. Med Vienna, Adjunct Lecturer
Yu-Bang Lee, Ph.D., Associate Professor
Glen P. Loggins, Ph.D., Professor Emeritus
Joan M. Macdy, Ph.D., Assistant Professor
Verne E. Mandel, Ph.D., Professor (Animal Science, Animal Physiology)
James H. Meyer, Ph.D., Professor
Gary P. Mobbert, Ph.D., Professor
James G. Morris, Ph.D., Professor
Edward O. Price, Ph.D., Professor
David W. Robinson, Ph.D., Professor
Wade C. Rollins, Ph.D., Professor Emeritus
John R. Thompson, Ph.D., Assistant Professor
Robert W. Touchberry, Ph.D., Professor (Society Chairperson in Animal Science)
Dana B. Van Liew, B.S., Adjunct Lecturer
William C. Weis, Ph.D., Professor (Animal Science, Nutrition)
Richard A. Zinn, Ph.D., Assistant Professor

The Major Program

The objective of the Animal Science major is to develop an understanding of the proper care of animals and their utilization by man for food, fiber, work, research, companionship, and recreation. The study of animals is achieved through biologic, physical and social sciences such as chemistry, biochemistry, genetics, physiology, nutrition, economics, mathematics and their integration in the various animal science courses.

Career opportunities for graduates cover a wide range from farming and ranching through all of the industries, institutions and professions that serve domestic animal agriculture and aquaculture directly or indirectly. These include positions in management, sales, financial services, agricultural extension, consulting services, teaching, journalism, laboratory technology and research. Preparation for veterinary medicine or other professional schools or graduate study may be achieved by careful planning in the major.

Both aquaculture and domestic animal agriculture are included in Animal Science. Students specializing in aquaculture are advised by faculty members from this area of study.

Animal Science

B.S. Major Requirements:

For convenience in program planning the usual courses taken to fulfill major requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.

Preparatory Subject Matter ................................................. 51-53
General biological sciences: Biology 101A-101B or 104A-104B
General sciences: Zoology 2-2L, and either
Bacteriology 2 or Botany 2 .............................. 15-16
Physical sciences: Chemistry 1A, 1B, 2A, 2B, and 10 units of mathematics, including
and 10 units of statistics, including
.......................... 26
Animal science: Animal Science 1, 2, and 41; or
or 1, 2, and 24 (for Aquaculture specialty) ............ 10-11
Depth Subject Matter .................................................. 63-64
Physiological Sciences 101A-101B (Biochemistry 101A-101B may be substituted with consent of adviser) .......................... 6-7
Genetics: Genetics 100 or 100B ................................. 9
Nutrition (N110 and 121, or 105 and
either 122 or 123) .............................................. 7
Pharmacology 110, 110L ......................................... 7
Agricultural Engineering Technology 161A-161B (for Aquaculture
7 specialty only) ................................................. 6

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138
Courses in Animal Science

Lower Division Courses

1. Domestic Animals and Man (4) I. Bradford
   Lecture—3 hours; laboratory—3 hours. Animal domestication and its effects affecting their characteristics. Introduction to animal feed, use for fiber, work, drugs, research, and recreation. Present and future roles in society. Laboratory exercises with swine, poultry, sheep, horses, and laboratory animals. (P/N grading only.)

2. Introductory Animal Science (3) III. Touchberry
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1. Course 1 covers the basic principles of animal husbandry and its applications. Topics include nutrition, reproduction, lactation, infection, nutrition, and disease control in domesticated animals. The application of scientific knowledge to animal production.

3. Introductory Horse Husbandry (3) II. Evans
   Lecture—3 hours. Prerequisite: Course 2 recommended. An introduction to the care and use of light horses emphasizing the basic principles of selecting, handling, and caring for horses. Topics include nutrition, feed, grooming, and behavior. Students receive credit for Animal Science 155 for credit only.

4. Livestock and Dairy Cattle Judging (2) II, III. Van Liew
   Laboratory—6 hours. Prerequisite: courses 1 or 2 recommended. Practical experience in judging beef and dairy cattle. Topics include nutrition, reproduction, lactation, infection, nutrition, and disease control in domesticated animals. The emphasis placed on the behavioral development and social behavior. External (agonistic) and physiological mechanisms influencing behavior will be discussed. Students who have received credit for Animal Science 155 may receive only 2 units for this course.

5. Behavioral Adaptations of Domestic Animals (2) II. Price
   Lecture—2 hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management.

6. Behavioral Adaptations of Domestic Animals (2) II. Price
   Laboratory—3 hours. Prerequisite: courses 1-104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management.

114. Dairy Cattle Production (4) III.
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics for Dairy Cattle. Recombined 153 or 210, or the equivalent. Scientific principles from genetics, nutrition, and related fields applied to the conversion of animal feed to human food through dairy animals. Genetic, environmental, and managerial influences on milk composition and yield, economic and energetic efficiency of milk production.

115. Advanced Horse Production (4) I. Evans
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management. Students who wish to become professionally involved in the horse industry.

   Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110. Application of the principles of animal husbandry to the evolution of the animal feedlot. Topics include nutrition, feeding, and management of horses; application of the principles of animal husbandry to the evolution of the animal feedlot. Students who wish to become professionally involved in the horse industry.

118. Intensive Livestock Production (3) III. Hiltan, Link
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Nutrition 103 or 110; courses 1-2. Genetics 102 or Animal Genetics 107 recommended. Principles and practices involved in feeding, dairy, swine, and swine operations. Growth and fattening; lactation, feeding practices; methods of evaluating body composition of meat animals; housing and equipment; waste disposal.

119. Experimental Aquaculture (15) L-Chang
   Lecture—3 hours; discussion—2 hours; laboratory—30 hours. Prerequisite: Biochemistry 101B or the equivalent. An introduction to the basic concepts and principles of animal husbandry. Topics include nutrition, reproduction, and disease control in domesticated animals. The emphasis placed on the behavioral development and social behavior. External (agonistic) and physiological mechanisms influencing behavior will be discussed. Students who have received credit for Animal Science 155 may receive only 2 units for this course.

120. Principles of Meat Science (3) III. Banden (Food Science and Technology). Lee
   Lecture—3 hours. Prerequisite: Biochemistry 101B or the equivalent. An introduction to the basic concepts and principles of animal husbandry. Topics include nutrition, reproduction, and disease control in domesticated animals. The emphasis placed on the behavioral development and social behavior. External (agonistic) and physiological mechanisms influencing behavior will be discussed. Students who have received credit for Animal Science 155 may receive only 2 units for this course.

121. Animal Growth (4) I. Garnett, Asmore, Bradford
   Lecture—4 hours. Prerequisite: upper division course in genetics, physiology, and quantitative methods. Evaluation of growth and feed efficiency of practical aspects of prenatal, postnatal, and adult growth of animals focusing on nutritional, physiological, and genetic factors. Topics include nutrition, reproduction, and disease control in domesticated animals. The emphasis placed on the behavioral development and social behavior. External (agonistic) and physiological mechanisms influencing behavior will be discussed. Students who have received credit for Animal Science 155 may receive only 2 units for this course.

122. Lactation (4) I. Baldwin, Lehen
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Physiology 110 and Nutrition 110 or the equivalent. An introduction to the basic concepts and principles of animal husbandry. Topics include nutrition, reproduction, and disease control in domesticated animals. The emphasis placed on the behavioral development and social behavior. External (agonistic) and physiological mechanisms influencing behavior will be discussed. Students who have received credit for Animal Science 155 may receive only 2 units for this course.

123. Linear Programming in Animal Agriculture (2) III. Bywater
   Lecture—1 hour; discussion—1 hour. Prerequisite: courses 1-2 recommended. An introduction to the basic concepts and principles of animal husbandry. Topics include nutrition, reproduction, and disease control in domesticated animals. The emphasis placed on the behavioral development and social behavior. External (agonistic) and physiological mechanisms influencing behavior will be discussed. Students who have received credit for Animal Science 155 may receive only 2 units for this course.

124. Reproduction and Early Development in Aquatic Animals (4) II. Drosen
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 101; Wildlife and Fisheries Biology 120; or consent of instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of aquatic animals used in aquaculture.

125. Meat and Meat Animal Evaluation (3) III. Lee
   Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2 or 21 recommended. Correlation of live animal conformation and degree of finish with carcass traits, transformation
of five animal to carcass, criteria for evaluation and grading of carcasses as related to meat quality, write- and post-mortem processes related to meat quality.

135. Experimental Biochemistry Laboratory (4) I. Adams Lecture—2 hours, laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology, consent of instructor. Development of concepts to introduce principles to concepts of research. Experience in research animal care, tissue sampling and handling techniques, variety of common laboratory assistants, cost analysis, literature review and publication writing are provided. Not open to students who have received credit to Biochemistry 101.

140. Management of Laboratory Animals (4) I. Adams Lecture—3 hours, laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110; Physiology 110. Administration of care, feeding, and maintenance of experimental animals. Management procedures will be examined in view of experimental and regulatory regulations, and animal health.

141. Management of Nonhuman Primates (3) I. Moberg Lecture—2 hours, laboratory—3 hours. Prerequisite: Physiology 110 and consent of instructor. Examination of currently used husbandry practices used to maintain primates in zoo, breeding colonies, and laboratories. The application of concepts of basic sciences to problems in reproduction, behavior, and health will be discussed. Enrollment priority to Animal Science majors. Offered in odd-numbered years.

150. Range Livestock Production (4) I. M. Ragsdale Lecture—3 hours, discussion—1 hour. Prerequisite: Nutrition 103 or 110 or 122; Range Science 100 or 133 or 134; upper division status. Application of principles of animal and range science to the extensive production of livestock and related products from range. Emphasis on beef and sheep production systems from perennial and annual range vegetation. (Same course as Range Science 160.)

152. Proseminar in Animal Science (1) I. Heimann Seminar—1 hour. Prerequisite: senior standing in Animal Science or consent of instructor. Reports and discussions of recent advances in animal science.

190C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.)

192. Internship in Animal Science (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—1-3 hours. Prerequisite: completion of 64 units and consent of instructor. Work experience off and on campus in agriculture, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Application Request Form must be met. (P/NP grading only.)

270. Tutoring in Animal Science (1-2) I, II, III. The Staff (Chairperson in charge) Prerequisite: Animal Science or related major; advanced standing. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated one time for credit. (P/NP grading only.)

295. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Selected topics related to the animal sciences. (P/NP grading only.)

296. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Problems in animal biology related to nutrition, breeding and physiology of large domestic livestock. (P/NP grading only.)

Graduate Courses

250. Computer Analysis of Biological Data (3) I. Fannin Lecture—2 hours, discussion—1 hour, laboratory—3 sessions. Prerequisite: undergraduate- and graduate- level courses in mathematics and Management 150. The use of matrix algebra, regression and least square programs to manipulate and analyze biological and laboratory data. Lectures are concerned with the analytical procedures used in the programs as well as interpretation of computer output.

280. Advanced Meat Science and Technology (3) I. Lee Lecture—2 hours, discussion—1 hour, laboratory—3 sessions. Prerequisite: courses 120 or the equivalent; courses 135 and 133 recommended. Integration of muscle biochemistry and meat quality; basic of meat tenderness; physicochemical properties of meat emulsion; new concepts in fresh and cured products and processing technology; energy efficiency in processing and marketing of meat products. Offered in even-numbered years.

211. Hereditary Disorders of Muscle, Bone and Connective Tissues in Large Animals: Models for Human Disease (3) II. Ashworth Lecture—3 hours. Prerequisite: Biochemistry 101A-101B and Physiology 100A-100B or the equivalent. May be taken concurrently. Hereditary disorders of muscle, bone, and connective tissues in large animals and their usefulness in research as models for analogous diseases in humans.

280. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Reports and discussion of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (SA grading only.)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (SU grading only.)

337.Supervised Teaching in Animal Science (2) I, II, III. The Staff (Chairperson in charge) Supervised teaching—6 hours. Prerequisite: consent of instructor. Practical experience in teaching Animal Science at the University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. Arranged. (SU grading only.)

339. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Lectures and discussions of advanced topics in the animal sciences. (Sec. 1, 2—3-credit grading; from Sec. 3 on—SU grading only.)

390. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Anthropology

Anthropology (College of Letters and Science)

William G. Davis, Ph.D., Chairperson of the Department
Department Office, 328 Young Hall (752-3745/0746)

Faculty

Edwin B. Almquist, Ph.D., Assistant Professor
Robert L. Beals, Associate Professor
David J. Boyd, Ph.D., Assistant Professor
Jay B. Crain, Ph.D., Assistant Professor in Residence (Psychiatry)
Daniel J. Crowley, Ph.D., Professor (Anthropology, Art History)
Richard T. Curley, Ph.D., Associate Professor
William G. Davis, Ph.D., Associate Professor
Jack D. Forbes, Ph.D., Professor (Anthropology, Applied Behavioral Sciences)
Suad Joseph, Ph.D., Associate Professor
Henry McHenry, Ph.D., Professor
David L. Omsted, Ph.D., Professor
Benjamin S. Orlove, Ph.D., Associate Professor
Petersen (Environmental Studies)
Janet S. Shiibumoto, Ph.D., Assistant Professor
David G. Smith, Ph.D., Associate Professor
Lenora Timm, Ph.D., Associate Professor
(Anthropology, Linguistics)
David L. Tripp, Ph.D., Associate Professor
Carolyn F. Wall, Ph.D., Associate Professor
Miriam J. Wells, Ph.D., Associate Professor
(Anthropology, Applied Behavioral Sciences)

The Major Program

Anthropology is a broad and diverse field with many subfields, subdivided within Davis into four categories — physical, social/cultural, linguistics, and archaeology. The goals for the Anthropology major are to train students for graduate study leading toward professional careers in anthropology and to provide background resources for teaching in primary and secondary education. Students interested in the scientific study of human origins, prehistoric studies and the fundamentals of biology as these relate to Homo sapiens should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas, linguistics (language in culture and society with an emphasis on linguistic field methods), and archaeology (prehistory and the techniques and methods of archaeology) should enroll in the Bachelor of Arts degree program.

Anthropology

A.B. Major Requirements:

Preparatory Subject Matter .................................................................................. 20-38
Anthropology 1, 3, 12 ......................................................................................... 12
Statistics 13 ........................................................................................................ 4
Geography 1 or Environmental Studies 10 ........................................................ 4
Foreign language (19 units or the equivalent) ...................................................... 0-38

Depth Subject Matter ........................................................................................ 44
Anthropology 102, 103A, 195, 110, 128 ........................................................... 20
Anthropology, one course from 111, 112, 120 .................................................. 5
Physical anthropology, one course .................................................................... 4
Ethnography, one course ................................................................................... 4
Archaeology, one additional course ................................................................... 4
An additional 8 units selected from the following: any upper division anthropology course, Art 150, 151, Genetics 100A, 100B, 116 .................................................. 8

Total Units for the Major .................................................................................. 64-82

Anthropology

B.S. Major Requirements:

Preparatory Subject Matter .................................................................................. 46-59
Anthropology 1, 2, 3 ......................................................................................... 16
Biological Sciences 1 ....................................................................................... 3
Chemistry 1A, 1B ............................................................................................... 5
Statistics 13, 32, or 102 .................................................................................... 10
Zoology 2, 16 .................................................................................................... 3
Chemistry 9A-9B or Mathematics 16A-16B ......................................................... 6
Foreign language (12 units or the equivalent) ...................................................... 0-12

Depth Subject Matter ........................................................................................ 45
Six courses in anthropology totaling at least 3 in physical anthropology, and the remaining 3 chosen in consultation with major adviser ........................................................................................................................................................................ 23-24
Genetics 102 and 100A-100B or 116 ............................................................... 16

Total additional units from the list below to achieve a minimum of 45 upper division units. Include at least one laboratory course in human or vertebrate anatomy. ............................................................................................................................... 7-9

Total units for the Major .................................................................................. 91-104

Recommended

Geology 1, 2, 3, 3L, Physics 2A, 2B, 2C, Psychology 1, 15

Bachelor of Science List of Courses

Physical anthropology: 150, 151, 152, 153, 154A, 154B, 155, 156, 157, 158
Upper division courses outside the Department: Anatomy 100; Biochemistry 101A, 101B, Botany 140; Environmental Studies 100, 125; Epidemiology and Preventive Medicine 401, 503, 504; Genetics 102A, 1008, 102, 103, 104, 105, 116, 120; Geography 117; Geology 106, 107; Human Anatomy 101; Physical Education 120; Psychological Sciences 100, 101, 102; Psychology 101, 111; Anthropology 102, 112, 115, Statistics 130A, 130B, Zoology 100, 105, 106, 125, 136, 141, 147, 148, 155

Major Advisers .......................... A.B. degree: W.G. Davis, S. Joseph; B.S. degree: P.S. Rodman, D.G. Smith
Minor Program Requirements:

**Anthropology**

- **19-24 credits**
  - General emphasis
  - Anthropology 120
  - One course from Anthropology 103A, 103B, 103C, 103D
  - One course from Anthropology 102, 114, 116, 121, 122, 123, 124, 125, 126, 127, 128, 130, 141, 142, 143, 163, 193, 194
  - One additional course from any upper division Anthropology courses

**Biological emphasis**

- **19-24 credits**
  - Anthropology 152, 153, 154A
  - Two additional upper division Anthropology courses chosen in consultation with a B.S. degree undergraduate adviser

**Social-Cultural emphasis**

- **19-24 credits**
  - Anthropology 102
  - One course from Anthropology 103A, 105B, 106A, 106B, 106C, 125, 126A, 138A, 140, 143, 146, 147, 150, 191
  - Two courses from Anthropology 101, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 130, 141, 163
  - One additional upper division Anthropology course chosen from Anthropology 153, 154B, 156B, 158, 159, 160, 161

**Teaching Credential Subject Representative.**

- See page 99 for the Teacher Education Program.

Graduate Study. The department offers a program of graduate education leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the department office and at the Graduate Division.

Graduate Advisor, R.L. Bettinger.

Related Courses. See Native American Studies 20.

Courses in Anthropology

**Lower Division Courses**


3. **Introduction to Biological Anthropology** (4) III. Rodman Seminar—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment. Offered in odd-numbered years.

4. **Behavioral and Evolutionary Biology of the Human Life Cycle** (5) II. Rodman. Lecture—3 hours; discussion—1 hour. Diversity of cultural patterns as well as cross-cultural variation in humans by study of selected cases.

98. **Dietary Group Survey** (1-5) I, II, III. The Staff (Chairman in charge). Primarily intended for lower division students. (P/NP grading only.)

99. **Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairman in charge). Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

101. **Principles of Human Ecology** (4) II. Davis Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 or Sociology 1 or Anthropology 2 recommended. An examination of the critical variables in the processes that relate man to his environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Environmental Studies 121.)

102. **Theory in Social and Cultural Anthropology** (4) I. Boyles Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. An introduction to the varieties of explanation in anthropology; discussion of the controversy surrounding the designation of problem areas, choice of concepts, and selection of facts in the construction of anthropological theory.


103C. **New World Prehistory: The First Ancestral** (4) II. True Lecture—2 hours; discussion—1 hour. Prerequisite: course 3. Early man in the New World. Culture adaptation and development of early hunting and gathering peoples in North and South America.

103D. **New World Prehistory: Archael Adaption in New World Prehistory** (4) II. Bettinger Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The collectors: cultural channelization in prehistoric settings.

103E. **New World Prehistory: Formative Lifeways in North and South America** (4) III. Lecture—2 hours; discussion—1 hour. Prerequisite: course 2. The farmers: the transition from a hunting and gathering subsistence to sedentary farming in the American Southwest, Mississippian Valley, and Andean South America.

103F. **New World Prehistory: The High Cultures: Mesoamerica and Andean South America** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Urban developments and the rise of civilization in Mexico and Peru.

104. **Race and Sex: Race Mixture and Mixed Populations** (4) I, Forbes Lecture—2 hours; discussion—1 hour. A study of the phenomena of race mixture (miscegenation), intermarriage, and mixed (hybrid) human populations. Emphasis will be placed upon the social and cultural effects of race mixture and of the interaction of race and sexual behavior.

105. **Indians of North America** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians and the South American: origins, languages, civilizations, and history.

105B. **Indians of South America** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians and the South American: origins, languages, civilizations, and history.

106A. **Prehistory of California and the Great Basin** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Description and analysis of the native peoples of California and the Great Basin (and other remainders) from earliest times to Euro-American contact.

106B. **Ethnography of California and the Great Basin** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Description and analysis of the native peoples of California and the Great Basin (and other remainders) from earliest times to Euro-American contact.

106C. **Ethnography of California and the Great Basin** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Description and analysis of the native peoples of California and the Great Basin (and other remainders) from earliest times to Euro-American contact.

107A. **Old World Prehistory** (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The beginnings of agricultural cultures during the Pleistocene epoch. A critical and comprehensive survey of known cultural phenomena beginning some 2

1 million years ago and extending through the terminal stages of the last glacial period. Will include material from Africa, Asia, and Europe.

107B. **Old World Prehistory** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The first farmers. Development of a new way of life following the end of the Pleistocene. A survey of cultural developments during the period of time from the end of the Pleistocene through Neolithic times in Africa, Asia, and Europe.

107C. **Old World Prehistory** (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The development of civilization. Bronze and iron age cultures in Africa, Asia, and Europe. A survey of the archaeological evidence underlying currently accepted models relating to urban developments and the growth of civilization.

108. **Native Americans in Contemporary Society** (4) II. Forbes Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An introduction to the social and cultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present-day conditions.

109. **Phonetics** (4) I. Wall Lecture—2 hours; discussion—1 hour. Thorough grounding in articulatory phonetics with attention to the fundamentals of acoustic phonetics. (Same course as Linguistics 109.)

110. **Elementary Linguistic Analysis** (4) I. Omstred Lecture—2 hours; discussion—1 hour. Prerequisite: course 109. An introduction to phonemic theory, morphophonemics, and semantics. (Same course as Linguistics 110.)

112. **Comparative Linguistics** (4) I. Omstred Lecture—2 hours; discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and reconstruction. (Same course as Linguistics 112.)

118. **The Ethnography of Speaking** (4) I. Wall Lecture—2 hours; discussion—1 hour. Prerequisite: course 2. Course 4 or Linguistics 1. The social and linguistic aspects of verbal behavior. Participants, situations, and functions of communication. Speech communities, language and social stratification, bilingualism, and multi-linguism. (Same course as Linguistics 114.)

119. **Introduction to Ethnographic Research** (4) I. Lecture—2 hours; discussion—1 hour. Prerequisite: courses 1 and 109. Research methods for the collection of anthropological data; standards for evaluating ethnographic literature.

119. **Culture and Personality** (4) I. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 119. Personality of the Indian peoples, and their role in modern society. Cultural factors shaping personality.

120. **Language and Culture** (4) I. Wall Lecture—2 hours; discussion—1 hour. Prerequisite: course 2. Course 4 or Linguistics 1. Language and thought; systems of classification; linguistic aspects of culture and society.

121. **Politics** (4) I. Crowley Lecture—2 hours; discussion—1 hour. Prerequisite: course 2. Course 4 or Linguistics 1. Language and thought; systems of classification; linguistic aspects of culture and society.

122. **Economic Anthropology** (4) II. Davis Lecture—2 hours; discussion—1 hour. Prerequisite: course 2. Course 4 or Linguistics 1. Language and thought; systems of classification; linguistic aspects of culture and society.

123. **Political Anthropology** (4) I. Lecture—2 hours; discussion—1 hour. Prerequisite: course 2. Course 4 or Linguistics 1. Language and thought; systems of classification; linguistic aspects of culture and society.

NOTE: For key to footnote symbols, see page 124.
Anthropology

magic and witchcraft, rituals and symbols, and religious movements. Extensive discussion of ethnographic examples, analysis of the influence of religions institutions.

128. Anthropology of Development (4) I. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Survey of theories of social and economic change, their relationship with technological innovation. Application of anthropological theory to case studies of rural economy and society.

127. Urban Anthropology (4) III. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Survey of approaches to urban living: political structures, organization of labor, class relations, and race. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies.

128. Kinship and Social Organization (4) III. Davis
Lecture—3 hours; discussion—1 hour. Prerequisite course 2. Theoretical discussion of social organization with primary emphasis on typology and classification of family and kinship structures.

130. Sex Roles: An Anthropological Perspective (4) II. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 and consent of instructor. Study of cultural roles in primitive and complex societies. Impact of different political and economic systems on male and female activities and identities in evolution and present day issues from the contemporary women's movement around the world.

132. Festivals and Carnivals (4) III. Crowley
Lecture—3 hours; discussion—1 hour. Prerequisite course 2. Ethnographic and folkloric analysis of selected festivals based on ethnic, religious, regional, class, vocational, and other affiliations.

133. Peoples and Cultures of Southeast Asia (4) III. Davis
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or the equivalent, or consent of instructor. The development of major cultural traditions, the patterns of ecological relationship, and comparative social organization of ethnic and regional groups in Southeast Asia. Offered in even-numbered years.

134. Cultures and conflict in the Middle East (4) I. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or the equivalent, or consent of instructor. Survey of the peoples of the Middle East (including North Africa). Topics include class relations, kinship organization, sex roles, religious behavior, ethnic identities, systems of politics. Impact of European colonization, contemporary political movements, and social change.

136. Peoples of Africa (4) II. Curley
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.

141. Cultural Ecology (4) III. Ostrov
Lecture—3 hours; discussion—1 hour. A comparative survey of human societies. The interplay between diverse human cultures and the environment and the environment of the peoples that practice them. Primary emphasis is given to people living in rural and rural-urban environments as a basis for interpreting more complex environments. (Same course as Environmental Studies 141.)

143. Contemporary Societies of South America (4) II. Ostrov
Lecture—3 hours; discussion—1 hour. Prerequisite course 2. An introductory survey of the history and contemporary social and political environment. Social, economic, and political organization in the countryside and city. Patterns of national integration and conflict.

147. Peoples of the Pacific (4) I. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional practices of peoples of Hawaii, Micronesia, and Melanesia. Consideration of recent changes associated with colonialism and national independence.

151. Primate Evolution (4) III. McHenry
Lecture—3 hours; discussion—1 hour. Prerequisite course 1; Zoology 2 recommended. The origin and relationships of the primates, especially humans.

152. Human Evolution and Fossil Man (4) II. McHenry
Lecture—3 hours; discussion—1 hour. Prerequisite course 1. Nature and results of the evolutionary processes involved in the formation and differentiation of menkind.

153. Human Biological Variation (4) I. Smith
Lecture—2 hours; laboratory—1 hour. Prerequisite course 1. The origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention will be given to marital differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics.

154A. Ecology and Socioology of Primates (5) I. Rodman
Lecture—2 hours; laboratory—1 hour. Prerequisite course 1. Examines ecological diversity and evolution of social systems of primates, monkeys, and apes, placing them in the context of appropriate ecological and evolutionary theory.

154B. Ecology and Sociobiology of Primates (5) III. Rodman
Lecture—2 hours; laboratory—1 hour. Prerequisite course 154A, Statistics 13 (or the equivalent), and consent of instructor. Course for graduates of 154A for students interested in methods of studying, describing and analyzing the ecology and socioiology of primates. Laboratory consists of directed reading and primates and with quantitative analysis of observations. Offered in even-numbered years.

155. Comparative Primate Anatomy (4) III. McHenry
Lecture—2 hours; laboratory—4 hours. Prerequisite course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, and variations in race, sex, and age. Offered in odd-numbered years.

156. Human Osteology (4) III. McHenry
Lecture—2 hours; laboratory—4 hours. Prerequisite course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, and variations in race, sex, and age. Offered in even-numbered years.

157. Anthropological Genetics (3) II. Smith
Lecture—3 hours. Prerequisite course 1 or Biological Sciences 1, and Genetics 100B or 120. An introduction to human genetics. Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes. Hemagglutination and immunoelectrophoresis on starch, cellulose acetate and polycrylamide, immunodiffusion and immunoelectrophoresis on agarose. Offered in even-numbered years.

158. Peasant Society and Culture (4) III. Ostrov
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban-rural relations; problems of economic development and cultural change.

159. Anthropology of Complex Societies (4) II. Ostrov
Lecture—3 hours; discussion—1 hour. Prerequisite course 2. Examination of local level social organization in state-organized societies. Major topics include patron-client relations, political and economic relations, and the role of various classes in formal institutions and informal social relations. Examples are taken from urban areas and peasant groups.

160. Cultures of China and Korea (4) III. Wallacc (Oriental Languages and Civilizations)
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Ethnological and comparative treatments of two cultures with emphasis on the village level.

191. Culture of Japan (4) III. Shibano
Lecture—3 hours; discussion—1 hour. Prerequisite course 2 or consent of instructor. Development of Japanese cultural traditions. Social and economic trends.

194. Special Study for Honors Students (1-9) I, II, III. The Staff (true in charge)
Prerequisite: open only to majors of senior standing who qualify for honors. Independent study of an anthropological problem involving the writing of an honors thesis. (P/NP grading only.)

195. Field Course in Archaeological Method (3) II. True
Laboratory—8 hours. Prerequisite: course 3, Lectures, museum preparation, and weekend excavations. May be repeated for credit with consent of instructor. Limited enrollment.

196. Archaeological Method (3) I. Bettiger
Laboratory—6 hours. Prerequisite: course 195 and consent of instructor. Museum field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment.

197. Tutoring in Anthropology (1-5) I, II, III. The Staff
Lectures—1-5 hours. Prerequisite: upper division standing in major in anthropology and consent of Department Chairperson. Leading of small study discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson selected by student with prior consent of instructor)
Discussion—3 hours. Prerequisite: consent of instructor. Directed reading and group discussion of selected anthropological problems. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Discussion—3 hours. Prerequisite: consent of instructor. Directed reading and group discussion of selected anthropological problems. (P/NP grading only.)

Graduate Courses

201. History of Anthropological Theory (4) I. Curley
Lecture—2 hours; discussion—1 hour. The historical development of the various fields of anthropology with emphasis upon their interrelationships.

202. History and Theory of Physical Anthropology (4) II. The Staff
Seminar—3 hours. The history of thought in physical anthropology and an analysis of the major theoretical problems in the field. Suggested for all first year graduate students lacking intensive preparation in biological anthropology.

203. History and Theory of Archaeology (3) I. Seminar—3 hours. The history of thought in archaeology and analysis of research methods.

204. Contemporary Issues in Anthropological Theory (4) I. Boyd
Seminar—3 hours; one unit for paper required. Prerequisite: course 2, 102 or consent of instructor. Consideration of fundamental issues in anthropological theory. Emphasis on critical examination of major contemporary debates between proponents of competing theories.

205. Research Design and Method in Social Anthropology (5) I, Joseph
Seminar—4 hours; individual student-instructor session—1 hour (in-depth work on proposal writing). Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, pre-fieldwork preparations, field dynamics, field research, and problems of ethics; intensive work on proposal writing. May be repeated once for credit.

206. Objectives and Methods for College Teaching of Anthropology (2) I, II, III. The Staff
Seminar—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of good teaching, drawing upon the student's experience in the classroom situation.

207. Aspects of Culture Structure (4) I. Seminar—3 hours. Analysis of various phases of culture, such as religion, economics, law, and folklore.

211. Advanced Topics in Cultural Ecology (3) I. Ostrov
Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Studies 141 or the equivalent or consent of instructor. Discussion of theories which relate environment, culture and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in odd-numbered years. (Same course as Ecology 211.)

212. Problems in Archaeological Method (4) II. True
Seminar—3 hours. Techniques for analyzing archaeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

213. Advanced Prehistory: Theory and Method (4) II. Bettiger
Seminar—3 hours. Prerequisite: course 211 or consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-Ceramic and early farming peoples.

219. Topics in North American Prehistory (4) II. Bettiger
Seminar—3 hours; paper. Advanced study on current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of instructor.
Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)

Glen R. Hawkes, Ph.D., Chairperson of the Department
J. Howard Adams, Ph.D., Vice Chairperson of the Department
Louise M. Bachhold, Ed.D., Vice Chairperson of Human Development
Department Office, 126 Academic Office Building 4 (752-0770)

Faculty

J. Howard Adams, Ph.D., Associate Professor
Edwin B. Alnifri, Ph.D., Assistant Professor
Louise M. Bachhold, Ed.D., Professor
Keith Barton, Ph.D., Associate Professor
Edward J. Blakey, Ed.D., Professor
Brenda K. Bryant, Ph.D., Associate Professor
Glen Burch, Ed.D., Lecturer Emeritus
L. Clair Christensen, M.S., Adjunct Lecturer
Susan Crockenberg, Ph.D., Associate Professor
Noreen G. Ellett, Ph.D., Adjunct Lecturer
Jack D. Forbes, Ph.D., Professor (Applied Behavioral Sciences, Anthropology)

B.S. Major Requirements:

120 Units

Major: 60 Units

Depth Subject Matter: 60 Units

Individualized program, including senior project, to be determined by student and advisor committee

Applied behavioral sciences, upper division courses: 20

Behavioral and social sciences, upper division courses: 40

Breadth Subject Matter: 60 Units

A minimum of 12 units in each of the following areas of study:

(a) Inquiry: intellectual skills of inquiry and critical analysis
(b) Environmental studies: understanding the dynamics of interaction of people and their environment
(c) Personal and social behavior: understanding the dynamics of human relationships extending from the individual to the international level
(d) Creative expressions: exploration and development of the student's own creative powers, intellectual and aesthetic
(e) Basic communication: skill in oral and written communication

Unrestricted Electives: 40

Total Units for the Major: 180

Breadth Subject Matter: 90

A list of suggested courses in each of the study areas. (a) through (e), may be obtained from the Advising Center

Other Requirements

Admission: development in consultation with an adviser, a statement of academic and career objectives and a plan for attaining stated goals. Graduation, minimum of one year in residence in the major after completion of major proposal and satisfactory completion of supervised field experience, internship, thesis, or other creative activity

Major Adviser, B.G. Goldman

Advising Center for the major is located in Academic Office Building 4 (752-2244)

Minor Program Requirements:

The Department of Applied Behavioral Sciences offers the following minor programs:

Aging and Adult Development: 24-30

Applied Behavioral Sciences 177, 191: 6

Human Development 1000: 4

Psychology 115: 4

Support Systems, Human Development 110, Applied Behavioral Sciences 173: 8

Application, at least 2 units of practicum: 28

Minor Adviser, G.R. Hawkes

The Major Program

The Applied Behavioral Sciences major is an interdisciplinary program that is individually tailored by the student along with faculty advisers. The major emphasized the application of theory and practice in the study of social problems. It features a perspective on learning that stresses self-development and critical thinking.

Each student majoring in Applied Behavioral Sciences prepares a major proposal that combines: (1) expertise in a topical area of the student's choosing, with (2) an understanding of the social context within which this expertise will be applied.

Major proposals are evaluated to ensure that the proposed coursework prepares the student effectively in each of these two areas of emphasis, and that it facilitates in the realization of the student's stated educational/vocational goals.

Depth subject matter is intended to build competence in the student's area of specialization, while breadth subject matter is designed to provide foundations of knowledge in the natural sciences, social sciences, and humanities, and to develop skills of inquiry and creative endeavor. Examples of recently approved specializations include: Planning for Small Communities, Community Education, Health Care in the Asian Community, and Community and Organizational Development.

Applied Behavioral Sciences graduates have been employed as community developers, planners, social researchers, program evaluators, and organizational and educational consultants. The curriculum also prepares students for pursuit of further study in the social and behavioral sciences.

NOTE: For key to footnote symbols, see page 124.
Applied Behavioral Sciences

UNITs
Asian American Studies .................. 20
Asian American Studies 1, 100 or 110, and
101 or 155 ............................. 8
Two courses selected from the following in

Minor Adviser. G. Kagawa.

Community Development .................. 23
Applied Behavioral Sciences 19, 151, 152, 164 ............................. 15
Two courses selected from the 160 and/or
170 series .............................. 8
(a) Applied Behavioral Sciences 162, 163
(b) Applied Behavioral Sciences 171, 173, 174, 175, 176, 177, 178.

Minor Adviser. B.G. Goldman.

Graduate Study. See page 95 or the Announcement of the Graduate Division.

Related Courses. See Environmental Studies 10, 101, 141.

Courses in Applied Behavioral Sciences

Lower Division Courses
17. Population Problems: Issues in Human Ecology (2) (I) Fujimoto
Lecture—2 hours. An introduction to the concept of population growth and the problems this crisis bears upon the world community. Special emphasis placed on the interrelationships of the natural ecosystem, population growth, and the availability of resources for social development, and economic stability. (P/N grading only.)

18. Science and Society (3) (II) Dowling
Lecture—2 hours, discussion—1 hour. Assumptions and biases in different fields of knowledge; taboos, topics, and the nature of evidence in the public and academic communities; the influence of University education on issues of society.

19. The Community (3) (I) MacCannel
Lecture—2 hours, discussion—1 hour. Exploration of ways in which people come together, and the scope of the expression of community; examination of the dynamics of social change.

47. Orientation to Community Resource (2) (II) III. Thompson, Fox
Lecture—3 days; seminar—three 2-hour sessions. (Course given between quarters.) Prerequisite: consent of instructor. Field trip to educational, social, and welfare agencies in California. Observation and discussion with staff members of different agencies which serve the needs of children and families; advance reservations required. (P/N grading only.)

92. Internship (1-12) II, III, II. The Staff (Chairperson in charge)
Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/N grading only.)

93. Directed Group Study for Undergraduates (1-5) II, III, II. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Group study of selected topics. (P/N grading only.)

95. Special Study for Undergraduates (1-5) II, III, III. The Staff (Chairperson in charge)
(P/N grading only.)

Upper Division Courses
151. Community Research and Analysis (4) (I) Fujimoto
Lecture—4 hours. Prerequisite: consent of instructor. Theory of the emergence and structure of contemporary communities. Ethnographic, power structure and comparative approaches to community studies. Ways to incorporate research into programs for community change and development.

152. Community Development (4) (II) Fujimoto
Lecture—4 hours. Prerequisite: course 151 recommended. Introduction to principles and strategies of building institutions so community people can affect change. Examination of the role of the community organization and administration and the various roles of change agents in working with communities for their own self-development.

153. Community Organizations, Institutions and Resources (4) (III) The Staff
Lecture—4 hours. Prerequisite: course 151 or 152. Analysis of resources, organizations, agencies, and groups in the community, and how each affects the development process.

154. Theories in Community Change (4) (I) Adams
Lecture—4 hours. Prerequisite: course 151, plus other course in Applied Behavioral Sciences. Consideration of the concepts and techniques of the social change process pertinent to community development.

155. Communication Skills for Community Development (4) (III) Grishop
Lecture—4 hours. Prerequisite: course 151 or 152. Communication skills and techniques in community development programs, to include group process and human relations methods useful in community development.

159A. Field Experience in Community Development (12) (II) Fujimoto
Prerequisite: courses 151 and 152, or consent of instructor. Field assignment-internship with community and grass-roots groups, analysis of resources and alternatives for resolution of community development needs.

159B. Field Problems (3) (III) Fujimoto
Seminar—3 hours. Prerequisite: course 159A and consent of instructor. Developing, implementing and evaluating field research and analysis.

Lecture—4 hours. Prerequisite: upper division status; courses 162 and 163 highly recommended. Application of behavioral science research methodology to multidisciplinary problems confronting organizations. Students electing this course may not receive credit for Native American Studies 140.

1808. Research Design and Analysis of Institutions (4) (II) Regan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1806 and either course 1114, 1115, or 1116, 13, or consent of instructor. Applied behavioral science research design and analysis for organization. Methods of data analysis, tests of significance, and data processing.

182. People, Work and Technology (4) (I) Pilisuk
Lecture—4 hours. Prerequisite: coursework in the social sciences (e.g., Sociology 1, 3, Anthropology 100, Economics 1A, 1B) or labor history. Relationship between work, technology, and people's lives. Such topics as industrialization, bureaucratization, automation, the structure of work-related communities, education and the labor market, work and the economic system and the future of work.

183. Behavior of Community Organizations (4) (II) Regan
Lecture—4 hours. Prerequisite: course 162 or consent of instructor. How the organizations function and how members of organizations interact to each other, the organization, and those people who are clients of the organization. Effects of leadership, group dynamics, communication, and power are considered.

184. Theories in Organizational Change (4) (III) Regan
Lecture—2 hours; discussion—2 hours. Prerequisite: course 182. The open system concept of changes in response to the internal and external environment. Emphasis on structural, technological and humanistic approaches to change.

185. Family Management in Contemporary Society (4) (II) Smith
Lecture—4 hours. Prerequisite: Human Development 110 and Economics 1A; senior or graduate status recommended or consent of instructor. Influence of social, economic, political and technological environments on contemporary family roles and goals. Examination of management strategies used by families and types of social support systems needed.

186. Concepts and Problems in Family Management (3) (II) Smith
Lecture—3 hours. Prerequisite: course 185 or consent of instructor. Management problems encountered by families, emphasis on home, community, societal issues. Application of theory to problem definition and solution.

171. Housing (4) (II) Wells
Lecture—4 hours. Exploration of the shelter aspects of family environment. Study of technological, social, economic, and aesthetic factors affecting the nature and organization of family and community housing.

172. Social Inequality: Issues and Innovations (4) (III) Wells
Lecture—4 hours. Prerequisite: upper division standing; 8 credits of sociology or psychology or economics. Study of the phenomenon of inequality in the U.S. Various approaches to inequality will be examined, including structural and historical explanations, prejudices and discrimination, the "culture of poverty," and arguments concerning race, sex, and genetic potential.

173. The Continuing Learner (I) (II) Dowling
Lecture—4 hours. Prerequisite: Predivision standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Desirability of adult education programs.

Lecture—4 hours. Prerequisite: course 151 or 152 recommended; consent of instructor. Historical background, curriculum, governance and finance for the segments of post-secondary education in California. Role of post-secondary education in the community.

175. Education in the Community (4) (III) Grishop
Lecture—4 hours. Prerequisite: upper division standing. Philosophical consideration of the function of education in the community. Relationships of community and non-formal education to formal education, and schooling to individual, community and national development. Study of planning process and role of education in institutional and social settings.

176. Comparative Ethnicity (4) (III) Mitchell
Lecture—4 hours. Prerequisite: upper division standing, 8 units of sociology or anthropology or comparison. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies.

177. Social Aspects of Aging (4) (II) Hawkes
Lecture-discussion. Prerequisite: Human Development 100 or Psychology 115 recommended. Major characteristics, needs and interests of older people in contemporary America. Examination of social problems and community approaches to their solution.

190. Proseminar in Applied Behavioral Sciences (1, I, II, III)
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of selected critical issues in the applied behavioral sciences. Required of seniors in the Applied Behavioral Sciences major. May be repeated for credit. (P/N grading only.)

Seminar—2 hours. Prerequisite: consent of instructor. Discussion of selected critical issues in the field of aging.

192. Internship (1-12) II, III, III. The Staff (Chairperson in charge)
Field placement—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervising internship, off and on campus, in community and institutional settings. (P/N grading only.)

196. Senior Project in Applied Behavioral Sciences (1-5) II, III, III. The Staff (Chairperson in charge)
Prerequisite: major in Applied Behavioral Sciences and consent of instructor. Guided research leading to completion of thesis. May be repeated for credit. (P/N grading only.)

197T. Tutoring in Applied Behavioral Sciences (1-5) II, III, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (P/N grading only.)

197C Community Tutoring in Applied Behavioral Sciences (1-5) II, III, II. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Supervised tutoring in the community. (P/N grading only.)

198. Directed Group Study (1-5) II, III, II. The Staff (Chairperson in charge)
(P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) II, III, III. The Staff (Chairperson in charge)
(P/N grading only.)

Graduate Courses

201. Planning Processes in Applied Behavioral Sciences (4) (II, III)
Lecture—3 hours; supervised practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, methodology, theories, and methods for planning with application to educational institutions, agencies and the community at large.

202. Systems Approach for Organizational Change (4) (II, III)
Lecture—3 hours; supervised practice in an institution studying the process of change—3 hours. Prerequisite: course 201. Study of organizational resource, allocation, communication networks, program priorities and decision-making needs for change.

144
Art

College of Letters and Science
Harvey Himelfarb, M.A., Chairperson of the Department
Department Office, 101 Art Building (752-0015)

Art History

(See page 146.)

Art Studio

Faculty
L. Price Amrein, Jr., Ph.D. Lecturer (Director, Nelson Gallery)
Robert C. Amelson, M.F.A., Professor
Richard D. Cramer, M.F.A., Professor Emeritus
William Henderson, M.F.A., Associate Professor
Harvey Himelfarb, M.A., Professor
Pasha M. Johnson, M.A., Professor
Manuel J. Neri, Professor
Roland C. Petersen, M.A., Professor
Cornelia Schulz, M.F.A., Associate Professor
Wayne Thiebaud, M.A., Professor
Garner H. Tullie, M.A., Associate Professor

The Major Program

Studio Art offers courses leading to the Bachelor of Arts degree. The program is composed of courses which provide training and experience which are necessary to a broad understanding of the visual aspects of the humanities and provides a basis for further training, study and practice, leading to careers in the professions of artist, teacher and various other aspects of the field of art.

Portfolio. Enrolling freshmen who have studied art in high school should apply for advanced standing by submitting examples of their work for faculty review. Lower division students at Davis and transfer students will be required to keep a continuing portfolio of the work which is subject to faculty perusal at such times as when the student is declaring the major, enrolling in pre- and independent study courses, etc.

Transfer Students. Prior to enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

Art Studio

A.B. Major Requirements: 

Preparatory Subject Matter: 

Three courses from Art 2, 3, 4, 5, 16, 18; see prerequisites required for upper division courses .

Two courses from Art 1A, 1B, 1C, 1D...

Depth Subject Matter: 

Six courses, under three different artists, from Group A, Practice of Art, or Group B, Special Study courses, one course from Group B, Theory and Criticism

Two upper division courses in art History...

Total Units for the Major...

Recommended

(a) Students interested in drawing and painting should take Art 2, 3, 4 (course 5 is recommended); (b) students interested in sculpture should take Art 2, 3, 5 (course 4 is recommended); and (c) students preparing for graduate work in any of the environmental/design professions should take Art 2, 5, 16, 18.

Major Adviser: See the Class Schedule and Room Directory.

Minor Program Requirements:

Art Studio 

Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permitted)

Prerequisite courses may be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

Teaching Credential Subject Representative. 

Department Chairperson. See page 99 for the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. Detailed information regarding graduate study may be obtained from the announcement of the Graduate Division.

Courses in Art (Studio)

Lower Division Courses

2. Drawing I (4) I, II, III. The Staff
Laboratory—8 hours, to be arranged—4 hours. Form and composition in black and white.

3. Drawing II (4) I, II, III. The Staff
Laboratory—8 hours, to be arranged—4 hours. Prerequisite: course 2. Form and composition in color.

4. Life Drawing (4) I, II, III. The Staff
Laboratory—8 hours, to be arranged—4 hours. Prerequisite: course 2. Form and composition in color.

5. Sculpture I (4) I, II, III. The Staff
Laboratory—8 hours, to be arranged—4 hours. Form in space using plastic and other media.

105A. Introduction to Art Appreciation (4) I, II, III, Thiebaud, Tullie
Lecture—3 hours; term paper or gallery study and review. Understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. (P/NP grading only).

104. Descriptive Drawing (4) I, II, III. The Staff
Laboratory—8 hours, to be arranged—4 hours. Objective drawing and rendering; representations of space.

98. Directed Group Study (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses

Note: Upper division courses are listed under three groups: (A) Practice of Art; (B) Theory and Criticism; (C) Special Study Courses.

Group A: Practice of Art

101. Painting: Materials and Carriers (4) I, II, III. The Staff
Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 2. 3, 4, 5, or consent of instructor. Experimentation in media and their supports

102. Painting (4) I, II, III. The Staff
Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. 3, 4, 5, or consent of instructor. Advanced painting in various media including oil and polymers. May be repeated twice for credit.

103. Advanced Drawing (4) I, II, III. Schulz
Laboratory—8 hours; 4 hours to be arranged. Prerequisite: course 2. 3, 4, 5, or consent of instructor. Advanced drawing, composition and form in black and white and color.

104. Figure Painting (4) I, II, III. The Staff
Laboratory—8 hours; 4 hours to be arranged. Prerequisite: course 2. 3, 4, 5, or consent of instructor. Advanced figure drawing, painting the human figure as subject. May be repeated once for credit.

Applied Physics

See Physics

Aquaculture

See Animal Science

NOTE: For key to footnote symbols, see page 124.
10. Photography (4) I, II, III. Himelbloom. Laboratory—8 hours; to be arranged—1 hour. Prerequisites: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with the camera and light sensitive materials.

111. Photography II (4) II. Himelbloom. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 110 or consent of instructor. The art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated twice for credit.

112. Ceramics I (4) II. Ameson. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Ceramics forms and processes.

113. Ceramics II (4) II. Ameson. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 112 or consent of instructor. Ceramic color and glaze, kiln firing. May be repeated twice for credit.

115. Film-Making (4) I, II, III. Henderson. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 115 or consent of instructor. The art of film-making, editing and sound. Emphasis on the 16 mm camera. May be repeated twice for credit.

121A. Architectural Design (4) II. Cramer. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 2, 3, 4, or consent of instructor. Film-making as an art form; 8 and 16 mm. cameras and sound track.

121B. Architectural Design (4) II. Cramer. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Architectural drawings. Small buildings as expressions of climate, site, structure, function, and culture. Visualized in architectural drawings.

126. Architectural Design (4) III. Cramer. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 1, 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal plate relief and experimental uses of other materials. May be repeated twice for credit.

125. Printmaking: Intaglio (4) I, II. The Staff. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Etching, aquatint, hard- and soft-ground, burnishing and mordant intaglio. May be repeated twice for credit.

127. Printmaking: Lithography (4) I, II. The Staff. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 2, 3, 4, 5, or consent of instructor. Stone and metal plate lithography and other planographic methods. May be repeated twice for credit.

128. Printmaking: Serigraphy (4) III. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Silkscreen and related stencil methods. May be repeated once for credit.

129. Printmaking: Photographic Graphics (4) I. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Tradiional printmaking methods using photographically derived images: photolithography, photo-silk-screen, photo-etching, etc. May be repeated once for credit.

141. Sculpture, Non-Metal Materials (4) I, II, III. Johnson, Tullis. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in compliant materials, e.g., wood, plaster, plastics, etc. May be repeated twice for credit.

142. Sculpture, Metallic Materials (4) III. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Practice made from welded pieces or fabricated. May be repeated once for credit.

143. Sculpture, Metallic Materials (4) II. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Practice made from metal casting processes. May be repeated once for credit.

144. Figure Sculpture (4) II. Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit.

146. Ceramic Sculpture (4) III. Ameson Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 113 or with from courses 141, 142, 143, or 144. Clay sculpture in relief and round. May be repeated twice for credit.

Group B: Theory and Criticism

147. Theory and Criticism of Photography (4) III. Himelbloom. Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. The development of camera vision, ideas, and aesthetic and their relationship to the fine arts from 1839 to the present.

148. Theory and Criticism: Painting and Sculpture (4) I. Thiebaud. Lecture—3 hours; term paper required. Prerequisite: course 2 or 5, and one art lecture course. Aesthetic theories of design styles, historic and contemporary.

Group C: Special Study Courses

192. Internship in Museum (2-12) I, II, III. The Staff (Chairperson in charge). Prerequisites: 2, 3, 4, 5, 6, 7; and/or permission of Chairperson. For students in museum practice who have completed the minor. To be taken as part of the museum methods program, usually following course 401. May be repeated once for credit. (PR/NG grading only.)

196. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). (PR/NG grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (PR/NG grading only.)

Graduate Courses

201. Experiments in Art and Visual Communication (4) I. The Staff. Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

202. Seminar (4) I, II, III. The Staff. Seminar—3 hours. Original work produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

209. Seminar: Critical Evaluation (4) I, II, III. The Staff (Graduate Advisor in charge). Seminar—1 hour. May be repeated for credit. (SU/NG grading only.)

212. Seminar: Comprehensive Qualifying (1) I, II, III. The Staff (Graduate Advisor in charge). Seminar—1 hour. May be repeated for credit. (SU/NG grading only.)

216. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge). (SU/NG grading only.)

Professional Courses


Note: Various of the above courses are not offered each year; please check quarterly schedules.
writes an honors thesis (course 199). The Honors Program is distinct from the graduation honors awarded by the College of Letters and Science for which students must become eligible by meeting the grade-point requirements of the College; however, students participating in this Program are candidates for Departmental recommendation for graduation with Honors in Modern Art.

Teaching Credential Subject Representative, Department Chairperson. See page 99 for the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. Further information may be obtained by writing to the Graduate Adviser or consulting the Announcement of the Graduate Division.

Courses in Art (History)

Lower Division Courses

1A. Ancient Art (4.0). II. The Staff.
Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire.

1B. Medieval and Renaissance Art (4.0). II. Grigg.
Lecture—3 hours; discussion—1 hour. Chrzan, Barbarian, Mediaeval, and Classical traditions in European Art from the fourth through the sixteenth centuries.

1C. Baroque and Modern Art (4.0). III. MacLeod.
Lecture—4 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter-Reformation.

1D. Asian Art (4.0). I. Fong.
Lecture—3 hours; discussion—1 hour. An introduction to the arts of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in Mac's China.

Lecture—3 hours; term paper or gallery studies and review. Looking at art to understand how aesthetic experience relates to its cultural context, in a variety of historical situations from ancient to modern times. Intended for students not specializing in art. (P&P grading only.)

15. Women as Artist and Subject (4.0). III. MacLeod.
Lecture—3 hours; discussion—1 hour. Assessment of women's contribution to the visual arts. Examines the role of women in context of major artistic and social movements from Renaissance to present. Two midterms; final examination. Offered in even-numbered years.

20. Myths and Symbols in Chinese Art (4.0). II. Fong.
Lecture—3 hours; discussion—1 hour. Heritage of China as seen in the artistic expressions of its mythologies and symbols. Study of folk art, folk tales, ancestral worship, Taoist lore, Buddhist beliefs. Intended for non-majors.

29. Directed Group Study (1-10). I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. Restricted to lower division students. (P&P grading only.)

50. Special Study for Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. (P&P grading only.)

Upper Division Courses

150. Arts of Subsaharan Africa (4.0). III. Crowley.
Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of Subsaharan Africa; particular attention to the relationships between sculpture and culture in West and Central Africa.

Lecture—3 hours; term paper or gallery studies and review. Development of gallery studies in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile.

152. Arts of Oceania and Prehistoric Europe (4.0). II. Crowley.
Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East.

154A. Early Greek Art and Architecture (4.0). II. Howard.
Lecture—3 hours; gallery study and term paper. Prerequisite: upper division work in English and knowledge of major monuments in Greek art and architecture from the Homeric Age to the Golden Age and the death of Socrates.

154B. Later Greek Art and Architecture (4.0). II. Howard.
Lecture—3 hours; term paper or gallery studies and review. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Attic to Alexander to the end of the Hellenistic Age and the death of Cleopatra.

155. Roman Art (4.0). II. Howard.
Lecture—3 hours; term paper or gallery studies and review. The art of imperial Rome.

162. History of Printmaking (4.0). II. Ruda.
Lecture—3 hours; term paper or gallery studies and review. The development of graphic media in the Western world from the fifteenth to the eighteenth century.

183A. Chinese Art (4.0). I. Fong.
Lecture—3 hours; term paper or gallery studies and review. A survey from the beginning to the twelfth century focusing on the major arts forms that are traditionally known as "Newly discovered through archeology in China.

163B. Chinese Painting (3.0). III. Fong.
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers and birds, landscape—the favorite and enduring theme of the Chinese scholar-painter.

184. The Arts of Japan (3.0). I. Fong.
Lecture—3 hours; term paper or gallery studies and review. (Determined by instructor each quarter course offered). Study of the significant achievements in architecture, painting, sculpture, and decorative arts from prehistoric to nineteenth century.

186. The Design and Development of Great Cities (3.0).

175A. Art of the Middle Ages: Early Christian and Byzantine Art (4.0). II. Grigg.
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian era and Byzantine Empire through the later Roman Empire in the West and to the final capture of Constantinople in the East.

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of early medieval art from the rise of the barbarian kingdoms through the twelfth century.

176C. Art of the Middle Ages: Gothic (4.0). II. Grigg.
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries.

177A. Northern European Art (4.0). I. Grigg.
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel.

177B. Italian Renaissance Art (4.0). I. Ruda.
Lecture—3 hours; term paper or gallery studies and review. Goals and the origins of the Renaissance. Painting and sculpture in Italy from Masaccio to Lorenzo Monaco, with emphasis on Duccio, Giotto, and other leading artists of the early fourteenth century. Offered in even-numbered years.

177C. Italian Renaissance Art (4.0). II. The Staff.
Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence, fifteenth-century artists from Donatello to Michelangelo through Botticelli, in their artistic and cultural setting.

178C. Italian Renaissance Art (4.0). III. The Staff.
Lecture—3 hours; term paper or gallery studies and review. High Renaissance by Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice in the early sixteenth century.

179A. Baroque Art (4.0). III. Baird.
Lecture—3 hours; term paper or gallery studies and review. Western European architecture, sculpture, and the art of the garden from the late sixteenth through the early eighteenth centuries.

179B. Baroque Art (4.0). II. Ruda.
Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century art, including such as Caravaggio, Rubens, Rembrandt, and Velazquez. Offered in odd-numbered years.

183A. Art in the Age of Revolution (4.0). II. Howard.
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Examination of art and ideas in the history of European painting from 1750 to 1860. An artist study course: Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet.

183B. Impressionism and Post-impressionism (4.0). I. MacLeod.
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Social and cultural study of major European art movements between 1860 and 1900, including examination of the paintings of Manet, Monet, Renoir, Whistler, Gauguin, van Gogh, Cezanne, and Redon.

183C. Modern Art (4.0). I. Howard.
Lecture—3 hours; term paper or gallery studies and review. Sculpture Neo-Classicism to the present. Substyles of modern architecture, with emphasis on the development of organicism by Frank Lloyd Wright and of the international style by Le Corbusier and Mies van der Rohe, etc. Subsequent developments since 1960.

183D. History of Art Collecting (4.0). II. Baird.
Lecture—3 hours; gallery study and paper. Study of the major eras, personalities, objects, theories and practices in western art collecting. Care and presentation of works of art from antiquity to the present.

188A. Art of Latin America (4.0). I. Baird.
Lecture—3 hours; term paper or gallery studies and review. American art, with emphasis on early colonial, Geor- gian, nineteenth and twentieth century developments. Particular attention to Northern California in the latter part of the course.

188B. Painting of the United States (4.0). II. MacLeod.
Lecture—3 hours; discussion—1 hour. Term paper or gallery studies and review. American pictorial development from 1650 to the present, with emphasis on twentieth-century developments.

Lecture—term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substance term paper. Note: particular area of history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrolment.

192. Internship in Museums (2-12). I, II, III. The Staff (Chairperson in charge).
Term paper; catalog. Supervised program of student intern- ship in a public museum, private gallery, or private organization with major art collections. To be taken as part of the museum studies program, usually following course 401 or 402. May be repeated once for credit. (P&P grading only.)

198. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge).
(P&P grading only.)
Asian American Studies

119. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses

248. Problems in Representation and Iconology (4) III. Howard Seminar—3 hours; term paper. Research into the symbolic meanings of historic motifs in art, and their visual representations.


251. Seminar in Primitive Art (4) III. Crowley Seminar—3 hours. Selected areas of special study in the arts of Africa, Oceania, and Prehistoric Europe; in certain years, study of the Indians of the Americas, pre-Conquest to contemporary.

254. Seminar in Ancient Art: Greece (4) II. Howard Seminar—3 hours. Selected areas of special study in Greek art from Helladic to late Hellenistic.

263. Seminar in Chinese Art (4) I. Song Seminar—3 hours; paper. Selected areas of special study in Chinese Art.

276. Seminar in Medieval Art (4) II. Grigg Seminar—3 hours. Selected areas of special study in medieval art from early Christian to late Gothic.

277. Seminar in Northern Renaissance Art (4) II. Grigg Seminar—3 hours. Selected areas of special study in Dutch and German art of the fifteenth and sixteenth centuries.

278. Seminar in Italian Renaissance Art (4) III. Ruda Seminar—3 hours. Selected areas of special study in Italian art from fifteenth to sixteenth.

283. Seminar in Modern European Art (4) II. Macaulay Seminar—3 hours. Selected areas of special study in art since 1800 in Europe.

286. Seminar in American Art (4) I, Baird Seminar—3 hours. Selected areas of special study in art in the United States from colonial times to the present.

299. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

299D. Comprehensive Project (6) I, II, III. The Staff (Graduate Adviser in charge) An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.)

Professional Courses


Note: Various of the above courses are not offered each year; please check quarterly schedules.

Asian American Studies (College of Agricultural and Environmental Sciences)

Faculty

See under Department of Applied Behavioral Sciences.

The Program of Study

Concentration in Asian American Studies is available through the Applied Behavioral Sciences major (see page 143). A minor program, Asian American Studies (see page 144), is also available to students interested in this field of study.

American History and Institutions. This university requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2.

Related Courses

For other Asian languages, see courses in Cantonese (below), and courses in Chinese, Japanese, and Oriental Languages and Civilizations (page 283).

Courses in Asian American Studies

Direct questions pertaining to the following courses to the instructor or to the Applied Behavioral Sciences Departmental Office, 106 AOB-4 (752-0770).

Lower Division Courses

1. Introduction to Asian American Studies (4) I, II. Ambrion Lecture—3 hours; discussion—1 hour. Prerequisite: knowledge of Cantonese, Mandarin, or Japanese helpful. Introduction to Asian calligraphy stressing the technique of writing.


20. Asian Calligraphy (3) I. Leung Lecture—2 hours; laboratory—3 hours. Prerequisite: knowledge of Cantonese, Mandarin, or Japanese helpful. Introduction to Asian calligraphy stressing the technique of writing.

26. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Field placement—3-36 hours. Prerequisite: consent of instructor.

Courses in Cantonese

Lower Division Courses


4-5-5. Intermediate Cantonese (3-3-3) I-III. Leung Lecture—3 hours; recitation—1 hour. Prerequisite: course 3 or the equivalent. Continuation of course 1-2-3.

Asian Studies

See Asian American Studies (above); and East Asian Studies

Astronomy

See Physics
Atmospheric Science
(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Land, Air and Water Resources.

The Major Program
Atmospheric Science is the study of the physics of meteorological processes, including general circulation of the atmosphere and weather systems; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; turbulence and diffusion; atmospheric interaction with the biosphere; cloud physics and weather modification; air pollution meteorology; and developments in modern meteorological instrumentation. This field is based on applied mathematical physics, and is strongly relevant to environmental biology and human ecology. Numerous career opportunities exist in the federal and state governments, research and development in the private sector, and education. Examples of career areas are agricultural meteorology, air-pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, and numerical weather forecasting. The course of study provides a mathematical and physical science background on which a career can be built in research, education, resource management, or various areas of direct problem solving. In addition to a broad background in meteorology, the major includes a minor area to be chosen from either mathematics, computer science, environmental studies, resource management or a physical or biological science.

Atmospheric Science

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

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<tr>
<th>Units</th>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>Mathematics (Mathematics 21A, 21B, 21C, 22B, 22C and 22A or Statistics 30)</td>
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<tr>
<td>Computer Science (Engineering 5 or Math)</td>
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<tr>
<td>Mathematics 28</td>
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<tr>
<td>Physics (Physics 8A-8BC)</td>
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<td>Chemistry (Chemistry 1A, 1B)</td>
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<tr>
<td>Biological science (Biological Sciences 1, Botany 2 or Zoology 2-21)</td>
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<tr>
<td>English and/or rhetoric (see College requirement, page 71)</td>
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<tr>
<td>Meteorology (Atmospheric Science 20-20L)</td>
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<tr>
<th>Depth Subject Matter</th>
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<tbody>
<tr>
<td>Atmospheric Science 110A, 110B, 120C, 121A, and 121B</td>
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<tr>
<td>Upper division Atmospheric Science courses selected with advisor's approval</td>
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</tbody>
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<tr>
<th>Breadth Subject Matter</th>
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<tbody>
<tr>
<td>Social sciences and humanities electives</td>
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</table>

Restricted Electives

| Resource and environmental sciences | 21 |
| Coordinated group of courses (minor area) to be chosen with Adviser's approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science | 15 |

Unrestricted Electives

| Total Units for the Major | 30 |

Major Adviser: J.J. Carroll (Land, Air and Water Resources).

Advising Center for the major, as well as for graduate studies, is located in 122 Hoagland Hall, Resource Sciences Teaching Center (752-1689).

Graduate Study: You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and/or Ph.D. degrees. For details see under the Graduate Group in Atmospheric Science which follows and the Announcement of the Graduate Division.

Related Courses. See Civil Engineering 149B; Environmental Studies 150A; Geography 3, 115; Physics 104A, 104B; Resource Sciences 103, 131.

Courses in Atmospheric Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (752-1689).

Lower Division Courses


20L. Introduction to Meteorology/Laboratory (1) (S, J, Shaw Laboratory—1 hour credit. One or more field trips. Prerequisite: course 20 (preferably taken concurrently). Introduction to meteorological instruments and observations; cloud observation; atmospheric soundings; weather maps and charts; weather forecasting.)

92. Atmospheric Science Intensive (1-12) (I, II, III. The Staff (Chairperson in charge). Laboratory—3 to 8 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus in research sciences. Internship supervised by a member of the faculty. (PINP grading only.)

98. Directed Group Study (1-5) (I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor; restricted to lower division students. Group study of selected topics. (PINP grading only.)

99. Special Study for Undergraduates (1-5) (I, II, III. The Staff (Chairperson in charge). (PINP grading only.)

Upper Division Courses

105. Micrometeorology of Agricultural Systems (3) (I. The Staff Lecture—3 hours. Prerequisite: upper division standing in biological or physical sciences. Energy balance, air and soil temperature, wind, leaf temperature, water vapor, carbon dioxide patterns, and its microclimate within the microclimate structure. Micrometeorology modification by windbreaks, frost protection and other methods of energy balance manipulation.)

110A. Weather Analysis and Forecasting (4) (I. Grotjahn Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 20, 20L, 120, 121A, 121B (concurrently); knowledge of Fortran (Engineering 5). Examination of thermal dynamic variables and processes, kinematics, and dynamics as an integral part of the dynamic theory of weather systems. Graphical and numerical techniques, including vertical cross sections, thermodynamic diagrams and pressure surface analysis, for study of weather systems.

110B. Weather Analysis and Forecasting (4) (I. Carroll Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Application of dynamic theory to weather systems. Operational forecasting techniques including interpretation of numerical forecasts, local detailed forecasts, tropical meteorology, satellite meteorology and numerical analysis of meterological data.)

120. Atmospheric Thermodynamics and Statics (3) (I. The Staff Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 9C, course 20 (may be taken concurrently). 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.)

121A. Atmospheric Dynamics (3) (II. Myrup Lecture—3 hours. Prerequisite: course 121. The atmosphere in motion: equatorially trapped waves, dynamics of low-level motion across the earth, boundary layers: the Ekman layer. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes, cumulus models.)

124. Meteorological Instruments and Observations (3) (III. Footechin Lecture—2 hours; laboratory—3 hours. Prerequisite: course 20 or the equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.)

125. Atmospheric Physics (3) (II. The Staff Lecture—3 hours. Prerequisite: course 120. Study of physical processes in the atmosphere. Emphasis will be given to microwaves of cloud growth and atmospheric radiation and global energy balance.)

133. Biometeorology (4) (I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 and upper division course in a biological discipline; Mathematics 16B. An introduction to biometeorology and survey of atmospheric and biological interactions. Physical basis for plant, animal and human response and adaptation to short-term and long-term meteorological events.)

146A. Introduction to Air Pollution (3) (I, Carroll, Chang and Raabe (Civil Engineering) Lecture—3 hours. Prerequisite: Mathematics 22B, 22C, Chemistry 1B; course 121A or Engineering 103A. Examination of physical and technical aspects of air pollution. Emphasis is on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Civil Engineering 146A.)

150. Numerical Weather Prediction (4) (I. Grotjahn Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, 121A, 121B; computer programming, capability; or consent of instructor. Numerical weather prediction with the quasi-geostrophic system. Technical aspects of objective analysis, map projections and computational stability of prediction equations.)

158. Boundary-Layer Meteorology (4) (III. Shaw Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development, and structure of the atmospheric layer directly influenced by the underlying surface and extending to a maximum of about two kilometers under convective conditions. Turbulent heat diffusion in the boundary layer. The microclimate at and near the ground surface.)

192. Atmospheric Science Intensive (1-12) (I, II, III. The Staff (Chairperson in charge). Laboratory—3 to 8 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off and on campus in atmospheric science. Internship supervised by a member of the faculty. (PINP grading only.)

198. Directed Group Study (1-5) (I, II, III. The Staff (Chairperson in charge). Prerequisite: three upper division units in Atmospheric Science. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) (I, II, III. The Staff (Chairperson in charge). Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (PINP grading only.)
Graduate Courses

201. Atmospheric Processes (3) I. Carroll, Weare Lecture: 3 hours. Prerequisite: Mathematics 229-232, Physics 8C. Advanced phenomenological and physical study of atmospheric structure and processes including radiative, heat, water, thermal structure and weather phenomena. Accelerated presentation of the major topics covered in Atmospheric Science 200 and 110A-110B, 121A-121B, and 125. Credit not allowed for students having completed any two of these courses.

210. Atmospheric Physics (3) III. The Staff Lecture—3 hours. Prerequisite: course 121A and 125 (may be taken concurrently). Selective introduction to the physical processes within the atmosphere. Emphasis will be given to radiative transfer and remote sensing, climate, general circulation, stability, and the physical and dynamic processes in the upper atmosphere.

221. Advanced Atmospheric Dynamics (3) III. Grotjahn Lecture—3 hours. Prerequisite: courses 120, 121A, 121B, or the equivalent. Theoretical background of the basic physical processes in the atmosphere. Emphasis on the predictability of weather and climate.


231. Advanced Boundary Layer Meteorology (3) III. Mysnyk Lecture—3 hours. Prerequisite: course 156A. Conservation equations for turbulent boundary layers; similarity principles; the Reynolds equations; surface layer theory; radiation; boundary layer theory; marine boundary layer; special topics. Offered in even-numbered years.

232. Advanced Air Pollution Meteorology (3) III. Carroll Lecture—3 hours. Prerequisite: course 149A. Course emphasizes the interaction between atmospheric processes and air pollutants, primarily transport and diffusion of primary and secondary pollutants; their effects on local radiation budgets; and cloud and precipitation formation. Offered in even-numbered years.

233. Topics in Advanced Biometeorology (3) III. Lecture—2 hours; discussion—1 hour. Prerequisite: course 133 or consent of instructor. Study of current topics in biometeorology focusing on interactions of plants with the weather. Biological energy budgets and adaptations to changes in energy regime. Quantification of weather parameters for optimum biological response. Offered in odd-numbered years.

240. General Circulation of the Atmosphere (3) III. Grotjahn Lecture—3 hours. Prerequisites: courses 120, 121A, 121B. Description of global angular momentum, mass and energy balances. An introduction to the major processes and the dynamics of the atmosphere. Offered in even-numbered years.

241. Climate Dynamics (3) III. Weare Lecture—3 hours. Prerequisites: courses 120, 121A, 121B of the equivalent. Analysis of the conceptual models of the Earth’s atmosphere and their application to current issues in atmospheric science. Offered in odd-numbered years.

250. Meso-Scale Meteorology (3) II. The Staff Lecture—3 hours. Prerequisite: graduate standing, course 150, a course in partial differential equations, or consent of instructor. The study of the atmosphere’s mesoscale system, its structure and temporal behavior of the weather systems. Offered in even-numbered years.

260. Seminar (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science. Advanced study of a specific area of atmospheric science. (SU grading only.)

269. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Avian Science

Graduate Science (A Graduate Group)

Roger H. Shaw, Ph.D., Chairperson of the Group (752-1822)

Group Office, 139 Hoagland Hall (752-1406)

Faculty

Includes nineteen faculty members from the Departments of Land, Air and Water Resources, Agricultural Engineering, Civil Engineering, Geography, Physics, the Laboratory for Energy-Related Health Research, and the Division of Environmental Studies.

Graduate Study. The Graduate Group in Atmospheric Science offers the M.S. and Ph.D. degree programs. The student can place major emphasis on graduate work in one or more of the following fields: air quality meteorology, boundary-layer meteorology, biometeorology, and climate dynamics. In addition, members of the Group offer an option in solar energy in cooperation with Resource Sciences and Agricultural Engineering. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics at the level of vector calculus and differential equations, and one year of college-level physics. Considerable flexibility may be allowed for students with high academic potential. However, it is expected that deficiencies in preparatory material and in knowledge of undergraduate atmosphere science courses be completed within the first year of graduate study.

Requirements. The M.S. program requirements are 30 units of graduate and upper-division courses (36 units for the non-thesis option) composed of:

(a) At least 18 units of graduate level courses
(b) At least 6 additional units of atmospheric science courses (but not course 200), and
(c) Not including Atmospheric Science 290 or 299

At least 6 units of upper-division or graduate level courses in applied mathematics

Two units of Atmospheric Science 290

In addition, a thesis or successful completion of a comprehensive examination is required.

The Ph.D. program requires similar coursework to that described above (36 units beyond the B.S. degree) successful completion of a written Qualifying Examination, and the approval of a mentor's dissertation.

Graduate Adviser, L.O. Mysnyk (Land, Air and Water Resources).

Avian Science

See Epidemiology and Preventive Medicine

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

Avian Sciences

41 Units

Preparatory Subject Matter

Avian sciences ........................................................................................................................................ 3

Biology sciences (Biology 211, 212, 213, 214, 215, 216)

15

Chemistry (Chemistry 1A, 1B, 2A and 2B) .................................................................................. 13

Statistics (Statistics 13) ........................... ................................................................. 4

Physics (Physics 1A and 1B) ................................................................................................. 6

Depth Subject Matter

6 Units

Biochemistry (Biochemistry 101A, 101B) .................................................................................. 6

Genetics (Genetics 100A, 100B) ................................................................................................. 6

Nutrition (Nutrition 110) ........................................................................................................... 5

Physiology (Physiology 110) ........................................................................................................ 5

Laboratory units in the above listed only ................................................................................. 4

Specialized courses related to avian species ............................................................................. 25

Avian Medicine

See Epidemiology and Preventive Medicine

Avian Sciences

(Graduate Program; Designed for the Department of Agricultural and Environmental Sciences)

Avian Medicine

See Epidemiology and Preventive Medicine

Avian Sciences

(Designed for the Department of Agricultural and Environmental Sciences)

Avian Medicine

See Epidemiology and Preventive Medicine

Avian Sciences

See Epidemiology and Preventive Medicine
Courses in Avian Sciences

Lower Division Courses

11. Applied Avian Biology (3) I., Ogawara
Lecture—3 hours. A survey of principles and practices involved in poultry production. Designed for students not specializing in avian sciences.

11L. Laboratory in Applied Avian Biology (2) I., Ogawara
Lecture—1 hour, laboratory—3 hours. Prerequisite: course 11 (may be taken concurrently) or consent of instructor. Laboratory studies in poultry biology, techniques and economics of poultry production.

12. Survey of Poultry and Allied Industries (3) III. Ernst
Lecture—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. Offered in even-numbered years.

Lecture—2 hours, discussion—1 hour, project requiring minimum 20 hours; field trip. Prerequisite: course in biology recommended. Birds in the world of man; folklore, art, literature, unique domestication, recreation, game birds, zoo, falconry, endangered species, public health, in search, as food sources.

13L. Birds, Man, and the Environment: Laboratory (1) III. B. W. Wilson
Laboratory—3 hours. Demonstrations and field trips for students enrolled concurrently in course 13.

15. Biology of Birds of Prey (3) III. Weathers
Lecture—2 hours. Prerequisite: some familiarity with raptorial species and course 13 recommended. Introduction to birds of prey with emphasis on anatomy, physiology, behavior, handling, and husbandry.

92. Internship in the Avian Sciences (1-12) I., II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Work-study on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/N grading only.)

98. Special Study for Undergraduates (1-5) I., II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Problems in avian biology, nutrition, breeding, and physiology of poultry/wild birds and their products. (P/N grading only.)

Upper Division Courses

100. The Biology of Birds (3) I., Weathers
Lecture—2 hours; discussion—1 hour. Prerequisite: background in general biology recommended. Aspects of biolgy (anatomy, physiology, behavior, nutrition, reproduction, adaptation) that govern the life of birds. Emphasis on these features of birds, domestic, wild and experimental, which are distinctive and unique for animals with feathers.

100L. Biology of Birds Laboratory (1) I., Weathers
Laboratory—3 hours. Prerequisite: course 100 (concurrent-ly). Laboratory experience in general nutrition, reproduction, nutrition, and physiology of domestic and wild birds.

102. Fertility and Hatching (4) III. Abbott
Lecture—2 hours; discussion-demonstration—1 hour; laboratory—1 hour; written and oral term project, and one field trip. Prerequisite: Freshmen with 140 or 120 and Zoology 100. Analysis of normal avian embryonic development, and reproductive failures resulting from nutritional, genetic and environmental problems. Exploration of the use of avian embryos in research on drugs, pesticides and other contaminants, and in biomedical research.

103. The Avian Egg (1) III. Grau
Lecture—1 hour. Prerequisite: course 11 or 100 or the equivalent, or consent of instructor. Eggs of domestic and wild birds as components of the total reproductive process. Egg formation, structure, composition, appearance, genetics and environmental factors, including pollution. Eggs as foods for embryos and humans. Offered in odd-numbered years.

105. Caged Exotic Bird Management (3) I., Grau
Lecture—2 hours; classroom and field trips. Prerequisite: upper division standing in a biological sciences major; course 100. Cage birds, as an unique set of birds, will be examined with respect to anatomy, physiology, nutrition, diseases, history, incubation, space and other environmental needs, and history of use by man. Relationships between poultry and cage bird business will be explored.

110. Comparative Avian Microecology (4) I.
Lecture—2 hours; laboratory—6 hours. Prerequisite: Zoology 251 and Physiology 110. Development and aging of specific organs and variations among species will be studied in chickens, quail, turkeys and raptors, as well as mammals available at Davis. Comparisons will be made to reptiles and mammals in many cases.

116. Game Bird Production (3) I., Woodard
Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Sciences 1, 2; course 11. Introduction to husbandry of popular game bird species kept in captivity. Course will cover such basic facets as the game bird identification, incubation, housing, brooding and rearing, nutrition, disease, sanitation and marketing.

130. Genetics of Poultry (3) I., Apehian
Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107. Applications of genetic principles in poultry are reviewed. The action of major genes in the control of morphology, reproduction and disease resistance is examined. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance are reviewed.

149. Environmental Management of Poultry (1) I., Ernst
Lecture—1 hour. Prerequisite: Physiology 149 (may be taken concurrently). Application of physiological principles to environmental management of poultry.

150. Comparative Nutrition of Avian Species (3) III. Vohra, Grau
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 6A or consent of instructor. Comparison of avian nutritional habits, effects of nutrients on growth, sexual maturity, egg production, fertility and hatchability of eggs of wild and domestic species of birds. Effects of pesticides and other non-nutrient substances on their life cycles.

150A. Prosemnar in Avian Sciences (1) I., II, III, Millan, Weathers, Woodard
Seminar—1 hour; reports (minimum). Prerequisite: upper division standing in avian science or consent of instructor. May be repeated twice for credit. (P/N grading only.)

152. Internship in Avian Sciences (1-12) I., II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: completion of a minimum of 64 units or consent of instructor. Work-study on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/N grading only.)

185. Topics in Current Research (1-3) I., II, III. The Staff (Chairperson in charge)
Lecture-discussion—variable. Hours will depend on instructor with the number of units being commensurate with time in class. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.

197. Tutoring in Avian Sciences (1-3) I., II, III. The Staff (Chairperson in charge)
Hrs. and duties vary depending upon course being tutored. Prerequisite: Avian Sciences or related major; advanced standing; consent of instructor. Tutoring of students in lower division avian sciences courses; weekly confer- ence with instructors in charge of course; written critiques of teaching procedures. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I., II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Problems in avian biology related to nutrition, breeding, and physiology of poul- try/wild birds and their products. (P/N grading only.)

Graduate Courses

201L. Laboratory in Avian Experimental Embryology and Teratology (4) III. Abbott
Laboratory—2 hours, three consecutive 3 hr. days plus, 5 equal sessions—to be arranged. Prerequisite: consent of instructor. Causes of abnormal morphogenesis in avian embryos including genetic, chemical, and physical factors; the application of transplantations; organ culture, and other experimental techniques. Offered in even-numbered years.

250. Advanced Poultry Nutrition and Food Formulation (3) III.
Lecture—3 hours. Including use of computer for least cost formulation. Prerequisite: Nutrition 121 or the equivalent. Nutrient requirements of growing and reproducing poultry as influenced by environmental factors. Evaluation of conventional and nonconventional feedstuffs for dietary energy, protein quality, vitamins, minerals, growth promotants and toxicants. Use of computers for least cost formulations.

261. Seminar (1-5) I., II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Reports on discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

277. Supervised Teaching in Avian Sciences (1-4) I., II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. Tutoring of students in lower, upper-division and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (SU grading only.)

288. Group Study (1-5) I., II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I., II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

Avian Sciences (A Graduate Group)

Ursula K. Abbott, Ph. D., Chairperson of the Group
Group Office, 109 Armson Hall (752-1300)

Faculty

Consists of members from several departments in the College of Agricultural and Environmental Sciences and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. The areas of specialization that may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food products, management, ecolo-
Bacteriology

(College of Letters and Science)

JaRae S. Manning, Ph.D., Chairperson of the Department

Department Office, 156 Hutchison Hall (752-0265)

Faculty

Stanley W. Artz, Ph.D., Assistant Professor
Paul Baumann, Ph.D., Professor
Robert E. Hungate, Ph.D., Professor Emeritus
John L. Ingraham, Ph.D., Professor
Sydney G. Kustu, Ph.D., Associate Professor
Jadie S. Manning, Ph.D., Professor
Allen G. Parr, Ph.D., Professor
John C. Meeks, Ph.D., Assistant Professor
Page Painter, Ph.D., M.D., Visiting Lecturer
Herman J. Phaff, Ph.D., Professor (Bacteriology, Food Science and Technology)
Wilfrid J.C. Pfeiffer, Ph.D., Lecturer (Bacteriology, Biological Sciences)
David Pratt, Ph.D., Professor
Mortimer F. Starr, Ph.D., Professor
Mark L. Wellew, Ph.D., Lecturer

The Major Programs

The undergraduate major programs provide a balance of studies in the biology of bacteria and other microorganisms, together with appropriate courses in mathematics and physical science. Both the Bachelor of Arts and the Bachelor of Science programs 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 contemplating a career in Medical Technology. Such students are advised to take Veterinary Microbiology 126 and 127, Clinical Pathology 101 and a one-year laboratory course in physics in addition to the courses required for a major in bacteriology.

Students majoring in Bacteriology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the major for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choles of College. The Bachelor of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered by both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

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Bacteriology

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriology 2 or 102, 3</td>
<td>4-5</td>
</tr>
<tr>
<td>Biological Sciences 1</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C, 5, 8A, 8B</td>
<td>25</td>
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<tr>
<td>Statistics 1</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
<td>6</td>
</tr>
<tr>
<td>Physics</td>
<td>6</td>
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<tr>
<td>Recommended: Physics 2A, 2B, 2C</td>
<td>8</td>
</tr>
</tbody>
</table>

Depth Subject Matter

| Bacteriology 105, 106-109, 110-116, or 120-123 | 13-14 |
| Biochemistry 101A, 102B, or 101L                | 11    |
| Genetics 104A-106B or 120A                      | 4-6   |
| Additional units from Bacteriology 120, 220, 320-321, 328, 329, 330, 332, 333, 334, 335 | 8     |
| Total Units for the Major                       | 86-92 |

Bacteriology

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriology 2 or 102, 3</td>
<td>4-5</td>
</tr>
<tr>
<td>Biological Sciences 1</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C, 5</td>
<td>2</td>
</tr>
<tr>
<td>Statistics 1</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 16A, 16B, 16C, or 21A, 21B, 21C</td>
<td>12</td>
</tr>
<tr>
<td>Physics 2A, 2B, 2C</td>
<td>9</td>
</tr>
</tbody>
</table>

Depth Subject Matter

| Bacteriology 105, 106-109, 110-116, or 120-123 | 13-14 |
| Biochemistry 101A, 102B, or 101L                | 11    |
| Genetics 104A-106B or 120A                      | 4-6   |
| Additional units from Bacteriology 120, 220, 320-321, 328, 329, 330, 332, 333, 334, 335 | 8     |
| Total Units for the Major                       | 103-111 |

Breadth Subject Matter

| College of Agricultural and Environmental Sciences students | 24 |
| English and communication | 4 |
| Social sciences and/or humanities | 16 |
| Additional requirements as described on page 70 |
| College of Letters and Science students: Refer to page 88 for a description of requirements to be completed in addition to the major |


Honors and Honors Program. Contact a major adviser from those listed above.

Teaching Credential Subject Representative. W.J.C. Pfeiffer. See page 99 for the Teacher Education Program.

Graduate Study. 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, Biology, Food Science and Technology, Genetics, Virology, and the Schools of Medicine and of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Department of Bacteriology.

Related Courses. For other courses related to Bacteriology see course offerings in the Departments of Biological Sciences, Botany, Epidemiology and Preventive Medicine, Food Science and Technology, Medical Microbiology, Plant Pathology, Veterinary Microbiology.

Faculty of the Department of Bacteriology also teach in participatory courses: Botanical Sciences 1, 112, 116, 163, 165, 167; Veterinary Microbiology 120; Veterinary Microbiology 128.

Courses in Bacteriology

Lower Division Courses

2. General Bacteriology (3) I, II, III.

Lecture—3 hours. Prerequisite: Biological Sciences 1. The biology of bacteria with some applications.

3. Bacteriological Laboratory Techniques (1) I, II, III.

Wheels Laboratory—3 hours. Prerequisite: Biological Sciences 1. Designed to acquaint student with basic techniques of bacteriology, with major responsibility for organizing and accomplishing work resting with student. (P/N grading only.)


Lecture—3 hours. Survey of the biological aspects of bacterial growth and metabolism, genetics, and habitats. Emphasis on importance to man—role of bacteria in natural environments, in food production and in disease. Intended for students who are not majoring in the natural sciences.

98. Directed Group Study (1-5) I, II, III.

The Staff (Manning in charge) Prerequisite: consent of instructor. Primarily for lower division students. (P/N grading only.)

Upper Division Courses

Bacteriology 105 and 106 are designed for declared majors in Bacteriology and allied fields. Bacteriology 102 is primarily designed for Biological Sciences majors and other upper division and graduate students.

102. General Bacteriology (4) I, II, III.

Lecture—4 hours. Prerequisite: Biological Sciences 1 and Chemistry 88; Mathematics 15A recommended. Biology of bacteria and bacterial viruses. Survey course dealing with the physiology, genetics, and taxonomy of bacteria and their relation to man. Students who have had course 2 may receive only 2 units of credit for this course.

105. Bacterial Diversity: Morphology, Systematics, Habitats (5) I, Pfeiffer, wheels.

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 2 or 102, and 3, Chemistry 68B, or 128A and 128B. Major groups of prokaryotic organisms, with particular emphasis on morphology and natural history, isolation of bacteria from various habitats by enrichment culture techniques.

106. Bacterial Diversity: Metabolism Physiology (3) II. Baumann.

Lecture—3 hours. Prerequisite: course 105. Biochemistry 101B may be taken concurrently. Metabolic and physiological bases of prokaryotic diversity with particular emphasis on aerobic and anaerobic energy-yielding metabolism and the utilization of comparative biochemistry for classification of prokaryotes.

108. Laboratory in Physiological Basis of Bacterial Diversity (3) II. Baumann.

Laboratory—6 hours. Prerequisite: course 106 (may be taken concurrently). Practical experience in isolation and characterization of prokaryotes using a number of different analytical methods. Offered in even-numbered years.

120. Microbial Ecology (3) III.

Lecture—3 hours. Prerequisite: course 106; Biochemistry 101B. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

120L. Microbial Ecology Laboratory (2) III.

Lecture—6 hours; one optional overnight weekend field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experiments on ecologically important microbial activities. For remaining one-half, research projects will be done on student selected specific habitats of microorganisms. Limited enrollment.
Biochemistry

(College of Agricultural and Environmental Sciences)

The Major Program
The Biochemistry major is suitable if you plan to pursue a professional career in biochemistry, to do graduate work in biochemistry or another biological science, or if you intend to apply to schools of medicine, dentistry, medical technology, or veterinary medicine. Students majoring in Biochemistry in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree. Certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis. Further information can be obtained from the Division of Biological Sciences Office, 171 Mrak Hall.

Choice of College. The Bachelor of Science degree is offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science.

Biochemistry

B.S. Major Requirements:
For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
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<tbody>
<tr>
<td>Biological sciences: Biological Sciences 1 and at least one course from Bacteriology 7 or 102, Zoology 2 or Zoology 6, Chemistry 1A-1B-1C, 5, or 4A-4B-4C (students may start with Chemistry 4A and continue with 1B-1C but not vice versa)</td>
</tr>
<tr>
<td>Mathematcs</td>
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<tr>
<td>18A-18B-18C or 2A-2B-2C</td>
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<tr>
<td>and one additional course in statistics (e.g., Statistics 13, 102, or 190A)</td>
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<tr>
<td>13-16</td>
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<tr>
<td>Physics 12 units minimum (Physics 2A-2B-2C and 3A-3B-3C, or 8A-8B-8C)</td>
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<td>12</td>
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<tr>
<td>Depth Subject Matter</td>
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<tr>
<td>39-41</td>
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<tr>
<td>Biochemistry 10A-10B-110B, 110C</td>
</tr>
<tr>
<td>11</td>
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<tr>
<td>Genetics 100A-100B or 120</td>
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<tr>
<td>4-6</td>
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<tr>
<td>15</td>
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<tr>
<td>Physical chemistry: Chemistry 107A-107B-107C or 110A-110B-110C</td>
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<td>9</td>
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</table>

Breadth Subject Matter
32
College of Agricultural and Environmental Sciences:
Science students:
English 1, 2, 20, or 100; plus 4 additional units from the above or from English 3, 104, Rhetoric 1, 3, Comparative Literature 1, 2, 3, Philosophy 5 or 10 |
6 |
Social sciences and humanities (including foreign languages and additional English and rhetoric courses): |
24 |
College of Letters and Science students:
Refer to page 98 for a description of requirements to be completed in addition to the major.

Behavioral Biology

See Medicine

1Physics 8D is optional. Students electing the Physics 8 sequence should elect Mathematics 21A-21B-21C and 22A-22B-22C.
2Funds earned in satisfactory of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Biochemistry (Graduate Group); Biochemistry and Biophysics

Restricted Electives

15
Upper division courses in biochemistry and related areas, to include at least three courses from Biochemistry 122, 133, 143, 153, and at least one additional lecture or laboratory course in a biological science other than biochemistry.

No more than 3 units of courses numbered 192, 197, 198 or 199 may be used (check with adviser).

Recommended: Biochemistry 190 and any upper division chemistry course.

Unrestricted Electives (Including 199, etc.)

34-44
Total units for the Major

180

Major Adviser

L. Sprechman (Biochemistry and Biophysics).

Advising Center

for the major is located in 150 Mrak Hall (752-0410).

Graduate Study

See page 95, and under Biochemistry (A Graduate Group), below.

Courses

See under Biochemistry and Biophysics.

Biochemistry (A Graduate Group)

Merna R. Villarejo, Ph.D., Chairperson of the Group

Group Office, 149 Briggs Hall (752-3611)

Graduate Study

The Graduate Group in Biochemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding graduate study, address the chairperson of the group.

Graduate Adviser

G.E. Bruening (Biochemistry and Biophysics), H. Matthews (Biological Chemistry), P.K. Stumpf (Biochemistry and Biophysics).

Courses in Biochemistry

Graduate Courses

205. Seminar (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff

(SU grading only.)

Biochemistry and Biophysics

(College of Agricultural and Environmental Sciences)

Jerry L. Hedrick, Ph.D., Chairperson of the Department

Department Office, 149 Briggs Hall (752-3611)

Faculty

George E. Bruening, Ph.D., Professor
Sterling Chaykin, Ph.D., Professor
Eric L. Conn, Ph.D., Professor
Richard S. Cridde, Ph.D., Professor
Michael E. Dahmus, Ph.D., Associate Professor
Roy H. Doi, Ph.D., Professor

Christopher D. Epp, Ph.D., Visiting Lecturer
Christina M. Elzner, Ph.D., Professor
Judy L. Drednick, Ph.D., Professor
Lloyd L. Ingram, Ph.D., Professor
J. Clark Lagarias, Ph.D., Assistant Professor
Mark G. McNamara, Ph.D., Associate Professor
Jack Preiss, Ph.D., Professor
Geraldine Prot, Ph.D., Visiting Assistant Professor
Irwin H. Segel, Ph.D., Professor
Larry R. Sprechman, Ph.D., Visiting Lecturer
Valerie K. Stumpf, Ph.D., Professor
Merna R. Villarejo, Ph.D., Associate Professor

Major Programs and Graduate Study. See the major in Biochemistry (page 153) and for graduate study see page 95, and the Graduate Group in Biochemistry, this page.

Related Courses. See Food Science and Technology 210, 250, 251.

Courses in Biochemistry and Biophysics

Questions pertaining to the following courses should be directed to the instructor or to the Division of Biological Sciences, 150 Mrak Hall.

Upper Division Courses

101A. General Biochemistry (3) I, II, III. Cridde, Epp, Elzner, Lagarias, McNamara, Sprechman, Villarejo

Lecture—3 hours. Prerequisite: Chemistry 88 or 126B, Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with emphasis on animals, plants and microorganisms.

101B. General Biochemistry Laboratory (3) I, II, III. Conn, Doi, Press, Prot, Segel, Sprechman, Stumpf

Lecture—3 hours. Prerequisite: course 101A. Continuation of 101A.

101L General Biochemistry Laboratory (5) I, II, III. Bruening, Chaykin, Epp, Segel, Sprechman, Cridde

Lecture—2 hours; laboratory—10 hours. Prerequisite: course 101B (corequisite). Biochemistry Laboratory: General 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.

122. Plant Biochemistry (3) Conn, Stumpf, Lagarias

Lecture—3 hours. Prerequisite: course 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

123. An Introduction to Enzymology (3) Whitaker (Food Science and Technology); Conn, Cridde

Lecture—3 hours. Prerequisite: course 101B. Principles of physical, chemical and catalytic properties of enzymes and their utilization. Enzyme determination and quantitative evaluation of influence of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by consideration of selected enzymes.

123L. Enzymology Laboratory (3) Whitaker (Food Science and Technology)

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 101B; course 123 (corequisite). Laboratory procedures involved in separation and study of enzymes.

133. Behavior and Analysis of Enzyme Systems (3) Segel

Lecture—3 hours. Prerequisite: courses 101A and 101B. Introduction to enzyme kinetics and varieties of enzyme behavior, with emphasis on metabolic regulation. Topics include: steady-state kinetics; patterns of feedback inhibition, control by enzyme activation, allosteric enzymes, multiprotein systems, enzyme assays, and membrane transport

143. Structure-Function Relations of Proteins (3) Cridde, Villarejo

Lecture—3 hours. Prerequisite: courses 101A, 101B, and 101L (may be taken concurrently). Correlation of structure and biological function. Molecular models of enzymes that explain their physiological functioning. Physical and chemical methods used in determining protein structure. Function as measured by physical and chemical binding models and as affected by physiological considerations.

156. Biochemistry of Informational Macronuclei, Mechanisms and Regulation (3) J. Dahmus

Lecture—1 hour. Prerequisite: course 101B; Genetics 100A. Chromosome structure and function in prokaryotic and eukaryotic systems. Mechanisms of nucleic acid and protein synthesis with special emphasis on regulation. Regulation of multicellular level; development, immune system and carcinogenesis.

190. Undergraduate Seminar in Biochemistry (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: courses 101A, 101B (may be taken concurrently). Discussion of the historical development of modern biochemistry.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Biochemistry and Biophysics faculty. (P/NP grading only.)

197. Tutoring in Biochemistry (1-5) I, II, III. The Staff (Chairperson in charge)

Discussion—1.5 hours. Prerequisite: upper division standing and consent of instructor. To assist the instructor by tutoring students in one of the department's regular courses. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201A. Physical and Chemical Biochemistry (4) I, Bruening, Sprechman

Lecture—4 hours. Prerequisite: course 101B; Chemistry 107B or 110C; 128C, 129C. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules.

201B. Metabolism and Bioenergetics (3) Chaykin

Lecture—3 hours. Prerequisite: course 201A. Intermediary metabolism of amino acids, nucleotides, lipids and carbohydrates; biological oxidation reduction reactions; photosynthesis and oxidative phosphorylation; role of vitamins in metabolism; catalytic strategies of biosynthesis and biodegradation.

201C. Molecular Biology (3) H. Matthews (Biological Chemistry), Dahmus, Doi, Bradbury (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201B. Structure and organization of DNA and chromatin; DNA replication, repair and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and posttranscriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells and viruses.

201D. Integration of Metabolism and Regulatory Phenomenon (2) I. Press, Freedland (Physiological Sciences), Walsh (Biological Chemistry)

Lecture—2 hours. Prerequisite: course 201B or consent of instructor. Comprehensive description of various regulatory phenomena that occur in the control of metabolism; e.g., regulation at enzyme level; integration of metabolic pathways from the whole organism point of view including homoeostatic and hormonal influences, turnover of enzymes, comparative aspects of metabolism and regulation of amino acid and lipid metabolism in mammals.

201E. Cellular Biochemistry (3) McNamara

Lecture—3 hours. Prerequisite: course 201A. Structure and function of cell membranes and cell surface components with emphasis on biochemical principles involved in cell growth, cell development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system.


Lecture—1 hour. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Laboratory methods and procedures used in biochemical research. Current laboratory methods and procedures used in cell fractionation, enzymeology, protein carbohydrates, lipids, and nucleic acid chemistry and immunology. (SU grading only.)

202L. Advanced Biochemistry Laboratory (5) I, II, III. Graduate Group Staff (Lagarias, Doi in charge)

Laboratory—15 hours. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Two five-hour placements in biochemical research laboratories. Assigned individual research problem with emphasis on technical experience and experimental design. May be repeated twice for credit. (SU grading only.)

203. Carbohydrates (3) I. Press

Lecture—2 hours. Prerequisite: course 201B. Chemistry, metabolism, and biological functions of the various classes
of carbohydrates and their polymers. Biosynthesis of simple and complex carbohydrates and polysaccharides. Offered in even-numbered years.

204. Selected Topics in Nucleic Acids and Molecular Biology (II) II. Brueuing, Dalmas, Do

Lecture—2 hours: 1 hour. Prerequisite: course 201C; consent of instructor. An introduction to the structure and function of deoxyribonucleic acid and ribonucleic acid. The study of nucleic acids and their role in genetics. (S/U grading only.)

205. Biochemical Mechanisms (II) II. Inglishh, McNair

Lecture—2 hours. Prerequisite: course 218B or consent of instructor; Chemistry 110C, 131. Bond structures of biochemical compounds and the principles of reaction mechanisms. Offered in even-numbered years.

206. Physical Biochemistry of Macromolecules (II) II. Crippin, McNair

Lecture—3 hours. Prerequisite: course 215C or consent of instructor; Chemistry 110C. Application of physical methods to the study of structures of macromolecules of biological interest. Offered in even-numbered years.

207. Lipids (II) II. Smuckl

Lecture—2 hours. Prerequisite: course 215C, or consent of instructor. Discussion of chemistry, metabolism, and experimental methodology. Topics include fatty acids and triglycerides, phospholipids, steroids, and cholesterol. Offered in even-numbered years.

208. Membrane Biochemistry (II) II. McMaster, Villareal

Lecture—2 hours. Prerequisite: course 215C. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Offered in even-numbered years.

210. Protein Biochemistry (II) II.

Lecture—3 hours. Prerequisite: course 216C. Chemical, physical, and biological properties of amino acids, peptides, and proteins. The biological aspects include protein function, biosynthesis, and biodegradation pathways, and nutritional requirements for amino acids.

212. Chemical Modifications of Proteins (II) II. Feeny

Lecture—3 hours. Prerequisite: course 101B and Chemistry 125C. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of biological systems, particularly proteins, and relating the structure of proteins to their functions.

213. Principles of Comparative Biochemistry (II) II. Linderström (Biological Chemistry), Feeny (Food Science and Technology)

Lecture—1 hour. Prerequisite: course 215C or consent of instructor. An advanced treatment of comparative biochemistry. The effects of living systems, their structures and functions on a molecular level, biochemical unity and diversity, protein structures and organized enzyme systems. Compositors of biochemical processes related to photobiology, metabolism, and excretion. Offered in even-numbered years.

215. Kinetics of Biological Systems (II) II. Ingraham

Lecture—2 hours. Prerequisite: course 219B; Fortran IV may be taken concurrently. Kinetic behavior of multivariable biological systems; mathematical methods and analysis of models that describe the interactions of biological systems. Offered in even-numbered years.

226. Science, the Scholarly, and Society (II) II. Hedrick

Discussion—2 hours. Prerequisite: two years of graduate work and consent of instructor. Readings and discussions on the ethical, philosophical, and social issues that concern scientists, society, science, and society. Art and creativity: scientific explanation; organization and publication of science; basic versus applied research; axiology, antiscience. Offered in even-numbered years.

230. Biochemical Aspects of Endocrinology (II) II. Animal Science—Chemistry

Lecture—2 hours. Prerequisite: course 101B; a course in endocrinology or consent of instructor. Chemistry and function of animal hormones, with special reference to isolation and structure of hormones and other steroids from vertebrate origin. Assay, mechanisms of action, biosynthesis, and metabolism. Offered in even-numbered years.

240. Selected Topics in Biochemistry (II) II. The Staff

Seminar—1 hour. Prerequisite: course 210C or consent of instructor. (S/U grading only.)

250. Biochemical Literature (I) I, II, III. The Staff

Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Critical reading and evaluation of current biochemical literature. Selected papers will be presented and discussed in detail. (S/U grading only.)

260. Advanced Research Conference (I) I, II, III. Hedrick Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Presentation and critical discussion of research activities of various members of the local biochemical community; primarily designed for graduate students. (S/U grading only.)

261. Current Progress in Biochemistry (I) I, II, III. Hedrick Seminar—1 hour. Prerequisite: course 210C or consent of instructor. Seminar presented by guest lecturers on subjects of their own research activities. (S/U grading only.)

262. Group Study (I-5) I, II, III. The Staff

Prerequisite: consent of instructor. A group study of special topics in biochemistry. (S/U grading only.)

265. Research (I-12) I, II, III. The Staff

(S/U grading only.)

300. The Teaching of Biochemistry (I) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of teaching techniques, evaluation of teaching methods, and problems of teaching, especially in the area of biochemistry. (S/U grading only.)

Biological Sciences

Biological Chemistry

See Medicine

Biological Sciences

(Intercollegiate Division)

Donald L. McLean, Ph.D., Dean, Division of Biological Sciences

Armand M. Maggioni, Ph.D., Associate Dean

Division Office, 171 Mirak Hall (752-0410)

Faculty

Includes members of the departments of Animal Physiology, Bacteriology, Biochemistry and Biophysics, Botany, Genetics, and Zoology. The division offers undergraduate and graduate study in the fields of biological sciences. Offered in even-numbered years.

Programs of Study

The Division of Biological Sciences is an intercollegiate unit which coordinates the teaching and research of the departments of Animal Physiology, Bacteriology, Biochemistry and Biophysics, Botany, Genetics, and Zoology. The major programs leading to the B.A. degree are offered by the departments of Biological Sciences, Bacteriology, Botany, and Zoology. The major programs are offered within the Division leading to a B.S. degree in disciplines of the six above-named departments, and in Biological Sciences. The major programs are described under the respective departmental listings, except for the majors in Biological Sciences (outlined below).

The Major Programs

The majors in Biological Sciences provide an opportunity for broader study of basic biology than is possible with most departmental majors. The programs provide suitable undergraduate preparation for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. Students interested in a career involving considerable personal interactions, such as some of the health science areas, may be best served by the Bachelor of Arts program; for those interested in a more laboratorially-oriented program, the Bachelor of Science program is more suitable.

Students majoring in Biological Sciences in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choice of College.

The Baccalaureate of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered only by the College of Letters and Science and the College of Agricultural and Environmental Sciences.

Biological Sciences

A.B. Major Requirements:

Preparatory Subject Matter

Bacteriology 2 or 102 4-8

Biological Science 1 5

Botany 2 5

Zoology 2-2L 6

Chemistry 1A 1B 10

Chemistry B-88 or 128A-128B-128C-128A 6-11

Mathematics for statistics 6

Recommended: Chemistry 1C, Physics 2A, 2B, 2C; a course in computer programming.

Depth Subject Matter

Genetics 100A or 100B 36

Restrictive Electives, sufficient to achieve a total of 36 upper division units in the biological sciences, and to include at least one course from each of the following areas:

Area 1: animal biology, microbiology, or plant biology, shown below; at least one course from each of the following areas:

Area 2: biology, shown below. A course that appears on both the Area and Group Requirement lists below may be used to satisfy both requirements. Both halves of a sequence of courses connected by a hyphen are taken, shown below. (A course that appears on both the Area and Group Requirement lists below may be used to satisfy both requirements. Both halves of a sequence of courses connected by a hyphen are taken, shown below.)

Total Units for the Major 78-84

Breadth Subject Matter

College of Letters and Science students. Refer to page 330 for a description of requirements to be completed in addition to the major.

NOTE: For key to footnote symbols, see page 124.
Biological Sciences

B.S. Major Requirements:

Other Upper Division Courses
A list of courses which will be accepted in satisfaction of the upper division major requirement, without petitioning, is available in the Division of Biological Sciences Office.

There is a limitation of variable-unit courses which may be counted toward the major. Of these courses, up to 6 units of upper division courses may be counted, and no units of 197T courses may be counted.

Major Adviser. Contact Division Office for advisor assignments.

Honors and Honors Programs. Students who have met the minimum grade-point average and the units-complete criteria, and who have obtained a sponsoring faculty supervisor may elect to participate in the Biological Sciences Honors Program. The program entails completion of a research project and honors thesis through enrollment in course 194I.

The Division of Biological Sciences also confers Citations for achievement in upper division undergraduate majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a Citation must first complete a stipulated number of upper-division units required in the major for a letter grade, meet or exceed a specified grade-point average, and participate in an appropriate research project.

For further details on the above programs and awards, contact the Division Office.

Minor Program Requirements:

The minor in Biological Sciences is designed to acquaint students with the range and variety of modern biology, including work in two of three areas: animal biology, plant biology, and microbiology; and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and cell-molecular biology. The list of required courses is restricted to those which are acceptable for the major program in Biological Sciences but which do not require extensive upper division prerequisites; substitutions of more advanced courses can be made, as appropriate, with the approval of an advisor for the minor.

Information on certification of completion of the minor program can be obtained from the Division Office.

Teaching Credential Subject Representative. Associate Dean (Biological Sciences). See page 99 for the Teacher Education Program.

Courses in Biological Sciences

Lower Division Courses
1. Principles of Biology (5) I. Thornton (Botany), Murphy (Botany), I. Pratt (Bacteriology), Pfeffer (Biological Sciences, Bacteriology), Fisher (Biological Sciences, Education); II. Cross (Zoology), Wolfe (Zoology).
Lecture—4 hours OR lectures and laboratory—2 hours; laboratory—3 hours. Prerequisite: Chemistry 1B. An interdisciplinary course designed for majors in the biological sciences. The emphasis is on the unify of basic biological principles as related to cell structure and function, reproduction, genetics, evolution, and ecology.

10. General Biology (4) I. Jameson (Zoology); II. Ketelapper (Botany).
Lecture—3 hours; discussion—1 hour. Consideration of the main features and principles of biology, with emphasis on biologic fundamentals and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology. Not open for credit to those who have had course 1.

19. Biology of Cancer (3) III.
Lecture—3 hours. Prerequisite: either course 1 or 10, or Genetics 10, or Physiology 10 recommended. Interdisciplinary course offers an integrated view of the biological, clinical, and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background.

99. Directed Group Study (1-5) I., II., III. The Staff (Associate Dean in charge). Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses
115. Problems in Marine Biology (15) III.
Full-time study at Bodega Marine Laboratory. Prerequisite: consent of instructor based on adequate preparation for topic under consideration. I.e., appropriate laboratory courses in invertebrate zoology (normaly Zoology 112A or 112B), microbiology (normally Bacteriology 105 or 120), bacteriology, genetics, etc. Lecture, laboratory, and field work, and directed study of a selected topical in marine biology, stressing experience in original research. Offered depending upon availability of instructors. Limited enrollment.

182. General Virology (4) I. Pratt (Bacteriology). Bruening (Biochemistry); Manning (Bacteriology).
Lecture—4 hours. Prerequisite: course 1; Genetics 100A and Biochemistry 101B recommended. An integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication, and genetics.

194A-194BH-194CH. Research Honors (3-5) I., II., III. Maggenti, Prerequisite: open to majors in Biological Sciences who have completed course 150. Prerequisite: honors program (see this page of catalog). Opportunity for Biological Sciences majors to pursue intensive research under the guidance of a faculty advisor. Students are expected to complete the full three-quarter sequence culminating in writing of an honors thesis. (P/NP grading only pending completion of course.)

197T. Tutoring in Biological Sciences (1-3) I., II., III. Maggenti. Prerequisite: upper division standing; appropriate background in biological sciences. Assisting in courses in Biological Sciences under the direction of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5) I., II., III. The Staff (Associate Dean in charge). Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
211. Designing Instruction in the Biological Sciences (3) I. Fisher (Biological Sciences, Education).
Lecture—1 hour. Prerequisite: graduate standing. Students will each develop a unit of biological science instruction such as a lecture, laboratory experiment, a curriculum unit, test chapter, audio-visual module. Will consider goals, objectives; selection of appropriate pedagogical strategies, methods, and source materials; organization, development, and evaluation.

298. Group Study (1-5) I., II., III. The Staff (Associate Dean in charge). Prerequisite: consent of instructor. Division of Biological Sciences students may offer group study courses under this number.
Biomedical Engineering (A Graduate Group)

Stanley A. Brown, D.Eng., Chairperson of the Group

Group Office, Temporary Building 139
(752-3333)

Faculty
Includes faculty members from the Departments of Animal Physiology, Human Physiology, Engineering, Physical Education, and the Schools of Veterinary and Human Medicine. Those listed below are members of the Group Executive Committee or the faculty advisors.

Fitz-Roy E. Curry, Ph.D., Associate Professor (Human Physiology)
Tien C. Hua, Ph.D., Professor (Electrical and Computer Engineering)
Maury L. Hull, Ph.D., Associate Professor (Mechanical Engineering)
David F. Katz, Ph.D., Associate Professor in Residence (Obstetrics and Gynecology)
James F. Stackfallord, Ph.D., Associate Professor (Materials Science and Engineering)
Richard F. Walters, Ph.D., Professor (Community Health)
Keith R. Williams, Ph.D., Assistant Professor (Physical Education)

Graduate Study: The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding graduate study in biomedical engineering address the chairperson or advisor of the group.

Courses in Biomedical Engineering

Graduate Courses

200. Introduction to Biomedical Engineering (4) I. Brown Lecture—3 hours. Introduction to and interaction between engineering technology and the biological and medical sciences and demonstration of some clinical applications.

210. Introduction to Biomedical Engineering (4) II. Brown Orthopedic Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials; corrosion; degradation, and failure of implants: Inflammation, wound and fracture healing; blood coagulation: properties of bones, knees, and blood vessels: biocompatibility of orthopedic and cardiovascular materials.

252. Advanced Information System (3) II. Walters Lecture—2 hours; laboratory—2 hours. Prerequisites: experience in initial phases of data preparation, editing and sorting; Community Health 151 or equivalent; must be capable to perform at graduate level. To increase knowledge of abstracts, projects and discussions, understanding of the components of information systems, including hardware.

NOTE: For key to footnote symbols, see page 124.

Biophysics (A Graduate Group)

Ronald J. Baskin, Ph.D., Chairperson of the Group

Group Office, 196 Briggs Hall (752-2175/6418)

Faculty
Includes faculty members from the Departments of Biochemistry and Biophysics, Chemistry, Physics, Radiobiology, Zoology, and others, and the School of Medicine.

Graduate Study: The Graduate Group in Biophysics offers programs of study leading to the M.S. and Ph.D. degrees. Biophysics is a broad interdepartmental program that is ideal for students who are interested in the study of biology and who have considerable background in biology, chemistry, and physics, followed by one of the three specializations: (1) biological biophysics, (2) physical biostatistics, and (3) nuclear science (that includes nuclear medical or radioactivity, radiobiology, and environmental biophysics).

Specific program requirements are as follows:

1. Curriculum Committee consisting of a research advisor, a Graduate Adviser, and a Group member chosen at random. The Curriculum Committee meets to meet individual educational needs of the student.

2. Graduate Adviser: N. Seek (Physics), M.G. McNamee (Biochemistry and Biophysics).

Botany

Michael G. Babour, Ph.D., Chairperson of the Department

Department Office, 151 Robbins Hall (752-0617)

Faculty
Fredrick T. Addis, Ph.D., Professor Emeritus
Floyd A. Ashtohn, Ph.D., Professor
Daniel A. Axelrod, Ph.D., Professor Emeritus
Michael G. Babour, Ph.D., Professor
David E. Beyer, Ph.D., Professor
Bruce A. Bonnar, Ph.D., Associate Professor
Paul A. Castelfrancio, Ph.D., Professor
Aiden S. Crafts, Ph.D., LL.D., Professor Emeritus
Herbert B. Cumler, Ph.D., Professor Emeritus
James A. Doyle, Ph.D., Professor
Emmanuel Epstein, Ph.D., Professor (Botany; Land, Air and Water Resources)
Richard H. F. Fank, Ph.D., Professor
Emanuel S. Gifford, Jr., Ph.D., Professor
Hendrik J. Ketelapper, Ph.D., Professor
Donald W. Kyhos, Ph.D., Professor

Norma J. Lang, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Jack Major, Ph.D., Professor Emeritus
Terence M. Murphy, Ph.D., Professor
Robert F. Morris, Ph.D., Associate Professor
Robert W. Peacock, Ph.D., Professor
Thomas L. Root, Ph.D., Professor
Maureen L. Stanton, Ph.D., Assistant Professor
Alan J. Stutler, Ph.D., Associate Professor
C. Ralph Stocking, Ph.D., Professor Emeritus
Robert M. Thornton, Ph.D., Senior Lecturer
John M. Tucker, Ph.D., Professor
Grady L. Webster, Ph.D., Professor
T. Elliott Weier, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor

The Major Programs

Study leading to Bachelor of Arts or Bachelor of Science degrees in botany covers several specialized areas: anatomy (internal plant structure), cytology (cellular structure and function), morphology (external plant form), physiology (plant function), taxonomy (plant classification), ecology (plant and environmental relationships), palynology (fossil plants), and studies of specific plant groups such as plant pathology (algae) and mycology (fungi). In addition, the department is a center for the study of weed science and herbicide physiology.

Botanists may teach, conduct research, or perform administrative duties. Many botanists perform public service jobs, such as in government agencies or conservation organizations. Plant scientists also have specialized in one of the applied botanical areas, such as forestry or horticulture, are usually involved in administration and research. Most botanists are employed by educational institutions, governmental agencies, and industrial firms. The U.S. Department of Agriculture and the U.S. Forest Service employ many botanists. Some find employment in the pharmaceutical, petroleum or chemical industries, seed companies, fruit growers, and food companies.

Students who wish to major in botany may major in that degree by completing the Bachelor of Arts degree, but one that acquaints the student with plant life and its importance, should elect the Bachelor of Arts major program.

Students majoring in Botany in the College of Letters and Science may petition the Dean of the College to receive credit toward the upper division unit requirements for the degree for certain institutions in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

Choice of College: The Bachelor of Arts degree is offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

Botany

A.B. Major Requirements

Preparatory Subject Matter

34-36

Biology Sciences

5

Botany 2

5

Chemistry 1A, 1B, 8A, 8B

16

Statistics 10 or 102

4

Zoology 2-3L, or Bacteriology 2 or 102 3L, or Geology 3-3L

4-6

Depth Subject Matter

41-42

Botany 102 or 108, 105, 111A, 111B, 114, 118 or 140, 117

29

Genetics 120

4

Additional upper division units in Botany or related natural science courses

9-9

Total Units for the Major

75-78
Botany

Recommended
Botany 118, 119; Chemistry 1C
For students in majors in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.) certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.

Botany

B.S. Major Requirements:

Option I: For those who plan (a) an advanced study in some area of botany, or related discipline, (b) to obtain a general secondary teaching credential, or (c) training for a position requiring a detailed knowledge of plants.

UNITs

Preparatory Subject Matter .......................................................... 54-61
Botany 2 .......................................................... 5
Botany 1A, 1B, 1C .......................................................... 15
Chemistry 1A, 1B, 1C .......................................................... 18
Biology 1A, 1B, 1C .......................................................... 18
Zoology 2-2L, or Botany 202, 203 ................................. 4-6
Geology 3-3C .......................................................... 4-6
Statistics 13, 14 .......................................................... 6
Total Units for the Major .......................................................... 101-118

Recommended
Botany 199 (3-5 units): German, French, or Russian. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.) certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.

Option II: For those who plan advanced study in physiology and/or biochemistry of plants.

UNITs

Preparatory Subject Matter .......................................................... 56-68
Botany 2 .......................................................... 5
Botany 1A, 1B, 1C .......................................................... 15
Chemistry 8A-8B .......................................................... 9
Chemistry 1A-1B, 1C-2B .......................................................... 6-11
Mathematics 1A-1B, 1C-2B .......................................................... 6-11
Physics 202-203 .......................................................... 9-12
Physics 205-206 .......................................................... 9-12
Total Units for the Major .......................................................... 100-121

Courses in Botany

Lower Division Courses

2. Introductory Survey of Botany (5) .................................................. 3

Biology 101 .......................................................... 3

Lecture—3 hours; laboratory—2 hours. Prerequisite: Introduction to botany in biology and chemistry (or the equivalent) recommended. Basic knowledge of botany and classification. Special emphasis on flowering plants.

10. Plants, People and the Biosphere (3) .................................................. 3

Lecture—3 hours. Ethnobotanical and ecological taxonomy are emphasized. The relation of plants to the environment, the development of botany as a contemporary science. Non-science majors are encouraged to enroll.

98. Internship (1-12) .......................................................... 3

Lecture—1-12 hours. Prerequisite: Internship in charge.

99. Directed Group Study (1-3) .......................................................... 3

Lecture—1-3 hours. Prerequisite: Internship in charge.

99. Special Study for Undergraduates (1-3) .......................................................... 3

Lecture—1-3 hours. Prerequisite: Internship in charge.

Upper Division Courses

101. Survey of Plant Communities of California (3) .................................................. 3

Lecture—3 hours; laboratory—3 hours. Prerequisite: Upper division standing and consent of instructor. Course 2 recommended. Structure of selected plant communities and the relationships of the species component to the environment. Recommended for non-majors.

Major Advisers: E. M. Gifford, N. J. Land (Fall and Winter Quarters), A. J. Stenmer, K. Wells (Spring Quarter) (for A.B. and B.S., Option I); P. A. Castelfranco (B.S., Option II).

Minor Program Requirements:

Botany

To satisfy the requirements for a Botany minor, a student must complete Botany 2 (or equivalent) introductory botany course) .......................................................... 3

Upper division units including at least one course from each of the four groups ................................. 18

(a) Structural botany: Botany 105, 114, 117, 118, 140
(b) Biological botany: Botany 112, 118, 121, 127, 131
(c) Plant physiology: Botany 106, 114, 117, 141
(d) Zoology 149

(d) Systemsatics and evolution: Botany 105, 106, 114, 117, 118, 119, 120
Botany 114, 116, 118 and 119 may be offered toward satisfaction of either group (a) or (b) of above. However, a single course may not satisfy both groups' requirements.

Minor Adviser: Same as for Major above.

Honors and Honors Program. Students on the honors list may elect to substitute a maximum of 5 units of 194H for upper division units of the major program; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. See page 2 for Dean's Honors List Information.

Teaching Credential Subject Representative. E. M. Gifford (Fall and Winter Quarters), K. Wells (Spring Quarter). See page 99 for the Teacher Education Program.

Graduate Study. Graduate programs leading to M.S. and Ph.D. degrees are offered in ecology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, physiologic, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

102. California Flora (3) .................................................. 3

Webster Lecture—2 hours; discussion—1 hour. Laboratory included (3). Eight days; one day weekly field trips. Prerequisite: course 2 or an equivalent in plant science. Survey of the flora of California, with emphasis on field recognition and identification of important vegetable plants and families. Generalizing character of the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographic patterns of California flora.

105. Plant Anatomy (3) .................................................. 3

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Survey of structure and function of vascular plant cells, tissues, and organs, with an emphasis on developmental and developmental plant development. Current literature in plant development is discussed.

108. Systematic Botany of Flowering Plants (3) .................................................. 3

Tucker Lecture—3 hours, laboratory—6 hours. Prerequisite: course 2. Laboratory and field trips to study the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of sources by means of keys.


O'connor Lecture—2 hours; discussion—1 hour. Laboratory—2 hours. Prerequisite: course 2. Description of various methods in systematics and ecology including mathematical, computational, and the use of computer graphics in systematic biology and one course in ecology. Examination of the theoretical background and applications of computer assisted methods in systematics and ecology including measurement of similarity and differences, cluster analysis, ordination techniques, and evolutionary estimating procedures. A project using these methods is offered in each quarter.

111A. Introduction to Plant Physiology (3) .................................................. 3

Stemler, L. Lucas Lecture—3 hours. Prerequisite: course 2. Chemistry 2B may be taken concurrently. Activities of the plant cell as a functioning unit. The processes of absorption, transportation, and utilization of water. Photosynthesis, respiration; growth, development, and reproduction.

111B. Introduction to Plant Physiology (3) .................................................. 3

Thompson, I.; Kasteleirpke Lecture—3 hours. Prerequisite: course 111A; Biochemistry 101A recommended. Oxygen, CO2, N2; CO2 assimilation; metabolism. The dynamics and control of growth and development.

111L. Introductory Plant Physiology Laboratory (3) .................................................. 3

Bonner Discussion—1 hour. Laboratory—6 hours. Prerequisite: course 111B (may be taken concurrently). An introduction to basic experimental techniques and instrumentation used in the investigation of plant physiological processes such as water/leaf absorption and their movement and utilization; transpiration, transpiration, and photosynthesis; respiration; growth, development, and reproduction.

112A. Problems in Plant Physiology (1) .................................................. 1

Stemler, I.; Lucas Discussion—1 hour. Prerequisite: course 111A (concurrent). Discussion of plant physiology and applications relating to plant physiology as presented in course 111A. Students will be assigned problems each week that show novel applications of the principles described in the lecture course and will prepare answers to be delivered orally during the class period. (P/NP grading only.)

112B. Problems in Plant Physiology (1) .................................................. 1

Thompson, I.; Kasteleirpke Discussion—1 hour. Prerequisite: course 111B (concurrent). Discussion of problems and applications relating to plant physiology as presented in course 111B. Students will be assigned problems each week that show novel applications of the principles described in the lecture course and will prepare answers to be delivered orally during the class period. (P/NP grading only.)

114. Biology of Fungi and Algae (3) .................................................. 3

Lang, Wells Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Not open for credit to students having received credit for courses 118 or 119. An introduction to the morphology, taxonomy, physiology, and biology of algae and fungi.

115. Morphology and Evolution of Vascular Plants (4) .................................................. 4

Gifford Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. A comprehensive introduction to the morphological and evolutionary history of selected plants from major phyla, emphasis given to living ferns and seed-producing plants and their possible relationships to plants of the past. Function—structure relationships and adaptations to changing environments.

117. Plant Ecology (4) .................................................. 4

Stemler, I.; Peary Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. An in-depth examination of the interaction between plant populations, vegetation types and the special emphasis on California. Students taking course 111B may not receive credit for course 101.
Botany (Graduate Group): Chemistry

Preparation. Applicants are expected to hold a bachelor’s degree in botany, biology, or a closely related discipline. Courses in the following areas are considered to be prerequisite to advanced degrees: plant morphology (including courses treating algae and/or fungi), anatomy, systematics, ecology, physiology, genetics, organic chemistry, biochemistry, inorganic chemistry, and statistics. The Graduate Adviser and major professor will designate advanced courses to meet individual academic needs.

Cantonese

See Asian American Studies

Chemistry (College of Letters and Science)

Peter A. Rock, Ph.D., Chairperson of the Department
Richard F. Gware, Ph.D., Vice-Chairperson of the Department
Department Office, 106 Chemistry Building
(752-0503/0953)

Faculty

Thomas L. Allen, Ph.D., Professor
Lawrence J. Andrews, Ph.D., Professor
Alan L. Balch, Ph.D., Professor
Albert T. Bottiri, Ph.D., Professor
Robert K. Brinck, Ph.D., Professor Emeritus
David A. Case, Ph.D., Associate Professor
Joyce T. Dool, Ph.D., Adjunct Lecturer
Timothy C. Donnelly, Ph.D., Visiting Lecturer
William H. Fink, Ph.D., Professor
Edwin C. Ford, Ph.D., Professor
Stefi S. Frohlich, Ph.D., Visiting Lecturer
Hakan Hoppe, Cand. real., Professor
Raymond M. Keffer, Ph.D., Professor Emeritus
Joe E. Ketcher, Ph.D., Professor
Richard E. Kepner, Ph.D., Professor
Mark J. Kurth, Ph.D., Assistant Professor
Gerd N. LaMar, Ph.D., Professor
August H. Maki, Ph.D., Professor
Donald A. McQuarrie, Ph.D., Professor
W. Kenneth Musker, Ph.D., Professor
Charles P. Nash, Ph.D., Professor
Edgar P. Painter, Ph.D., Professor Emeritus
Philip P. Power, Ph.D., Assistant Professor
Peter A. Rock, Ph.D., Professor
John W. Rod, Ph.D., Professor
Robert N. Rosefeld, Ph.D., Assistant Professor
Carl W. Schmidt, Ph.D., Professor
Neil E. Schore, Ph.D., Associate Professor
Kevin M. Smith, Ph.D., Professor
Leo H. Sommer, Ph.D., Professor
James H. Swinehart, Ph.D., Professor
Dino S. Tinti, Ph.D., Professor
Nancy S. Truesdell, Ph.D., Professor
David H. Volman, Ph.D., Professor
George S. Zweifel, Sc.D., Professor

The Major Programs

The goal of a bachelor's program in chemistry is to provide a broad introduction to the principles of the field and to provide enough of the factual knowledge so that the student may quickly learn the specific chemistry applicable to the field in which the student chooses to work. Two programs in chemistry are available, one leading to the Bachelor of Arts and the other to the Bachelor of Science. Students who are interested in chemistry as a profession would normally elect the program leading to the Bachelor of Science degree, which is accredited by the American Chemical Society. The curriculum leading to an A.B. degree offers a less intensive program in chemistry and is appropriate for a student with a strong interest in chemistry, but who also has another goal such as professional school preparation or secondary school teaching. Students who plan to pursue graduate work in chemistry or related fields are strongly advised to obtain a reading knowledge of German or Russian. High school students should note that the preparation for either the A.B. or the B.S. degree is simplified if their high school programs include chemistry and four years of mathematics. Degree candidates in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

Career Alternatives. Chemistry graduates with bachelor’s degrees are employed extensively throughout the industry in production supervision, quality control, technical marketing, and other areas of applied chemistry. Some of the firms employing these graduates are in the food and beverage processing industries, the petroleum industry, paper and textile production and processing, the chemical industry, pharmaceuticals, and the photographic industry. An advanced degree is usually required for a career in research or education.

Chemistry

A.B. Major Requirements:

Preparatory Subject Matter ........................................ 30-43
Chemistry 1A-1B-1C or 4A-4B-4C ................................ 15-19
Physics 2A, 2B, 2C, 3A, 3B ........................................... 12
Mathematics 21A-21B-21C or 1A-1B-1C ...................... 9-12
Depth Subject Matter .................................................. 36
Chemistry 110A, 110B, 110C ....................................... 22
Chemistry 129A, 129B, 129C ....................................... 22
At least 14 additional upper division units in chemistry, biochemistry, or physics .................. 14
Total Units for the Major ............................................... 72-79

Chemistry

B.S. Major Requirements:

Preparatory Subject Matter ........................................ 49-53
Chemistry 1A-1B-1C or 4A-4B-4C ................................ 15-19
Physics 8A, 8B, 8C, 8D .................................................. 16
Mathematics 21A, 21B, 21C, 22B, 22A or 22C ................. 18
Depth Subject Matter .................................................... 45
At least 9 additional upper division units in chemistry (except Chemistry 107A, 107B) ...... 9
Total Units for the Major ................................................. 96-102


Honors and Honors Program. The honors program comprises 6 units of course 194H.
Courses in Chemistry

Lower Division Courses

1A. General Chemistry (5) I, Allen, S. Friedrich, Tinti; II, McQuarrie, Rock

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: course 1A or 1B. Course 1A covers the principles of chemistry; high school physics and three years of high school mathematics (with an average grade of B or higher). Course 1B covers the principles of chemistry; high school chemistry, physics, and three years of high school mathematics (with an average grade of B or higher). Course 1B is recommended for students with a background in high school physics and mathematics.

1B. General Chemistry (5) I, Baich, Donnelly, Volman; III, Donnelly, True
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: course 1A or 1B. Course 1B covers the principles of chemistry; high school chemistry and mathematics, and an understanding of chemical reactions and processes. Course 1B is recommended for students with a background in high school chemistry and mathematics.

1C. General Chemistry (5) I, Musker, Swinehart; III, Allen, Lapham, Power
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: course 1B or 1C. Course 1C covers the principles of chemistry; high school chemistry and mathematics, and an understanding of chemical reactions and processes. Course 1C is recommended for students with a background in high school chemistry and mathematics.

1D. General Chemistry (5) II, Nash
Lecture—3 hours; laboratory—6 hours. Prerequisites: course 1A. Course 1D covers the principles of chemistry; high school chemistry and mathematics, and an understanding of chemical reactions and processes. Course 1D is recommended for students with a background in high school chemistry and mathematics.

1E. Quantitative Analysis (4) I, Donnelly; III, Nash
Lecture—2 hours; laboratory—6 hours. Prerequisites: course 1C with a grade of C or higher. Course 1E covers the principles of chemical analysis with an emphasis on the application of chemical reactions to analytical procedures. Students who have received credit for course 1A-4B-1C sequence may enroll in course 2 for 2 units only; not open to students who have received credit for course 2A-4B-1C.

8A. Organic Chemistry: Brief Course (3) I, Sommer; II, Bottni, Musker, III, Smith
Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. Course 8A covers the principles of organic chemistry with an emphasis on the application of chemical reactions to analytical procedures. Students who have received credit for course 1A-4B-1B sequence may enroll in course 8 for 2 units only; not open to students who have received credit for course 8A.

8B. Organic Chemistry: Brief Course (3) I, Doi; II, Sommer; III, Bottni
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 8A. Course 8B covers the principles of organic chemistry with an emphasis on the application of chemical reactions to analytical procedures. Students who have received credit for course 1A-4B-1B sequence may enroll in course 8 for 2 units only; not open to students who have received credit for course 8A.

10. Concepts of Chemistry (4) I, Case
Lecture—4 hours. A survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 1A. Course not open to students who have had Chemistry 1A, but students with credit for course 10 may take Chemistry 1A for full credit.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Directed group study primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Directed study of a special topic. (P/NP grading only.)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3) Meares, Schmid
Lecture—3 hours. Prerequisite: course 4C or 5 or consent of instructor. Mathematicians 1CE or 21C; one year college level physics. A basic course in physical chemistry intended for majors in the life sciences. Emphasis on the application of spectroscopic methods to organic chemistry.

108. Physical Chemistry of Macromolecules (3) III. Schmid
Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules. Emphasis on the understanding of the principles of physical chemistry.

Lecture—3 hours. Prerequisite: course 5 or 4C. Mathematicians 1CE or 21C, one year college level physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry: Quantum Mechanics (3) III, Kirk; II, McQuarrie
Lecture—3 hours. Prerequisite: course 110A. Atoms and molecules. Emphasis on the application of quantum mechanics to chemical problems.

111. Physical Chemistry: Methods and Applications (4) I, True, II, Tinti
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107B or 110C (may be taken concurrently). Course 111 covers the topics of chemical analysis with an emphasis on the application of chemical reactions to analytical procedures. Students who have received credit for course 1A-4B-1B sequence may enroll in course 111 for 2 units only; not open to students who have received credit for course 1A-4B-1B.

111A. Classical Methods and Applications (4) I, True, II, Tinti
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 111A or 111B. Physical chemistry and molecular structure. Emphasis on the application of quantum mechanics to chemical problems.

111B. Physical Chemistry: Methods and Applications (4) II, Hoppe, III, Tinti
Lecture—1 hour; laboratory—9 hours. Prerequisite: course 111A or 111B. Modern theoretical and experimental methods used to solve problems of molecules and chemical bonding. Emphasis on spectroscopic techniques.

112. Inorganic Chemistry (4) I, Swinehart
Lecture—4 hours. Prerequisite: course 107B or 110B (any of which may be taken concurrently). Emphasis on the application of spectroscopic methods to inorganic chemistry.

126. Nuclear and Radiochemistry (3) I, Root
Lecture—3 hours. Prerequisite: course 110B (may be taken concurrently). Classical theory and experimental methods in nuclear and radiochemistry including nuclear properties, radioactive decay, nuclear reactions, nuclear radiation, and short-lived radiotracer applications in medicine and physical chemistry.

128A. Organic Chemistry (3) I, Schore, II, Kurb, III, Rosenfeld
Lecture—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher. Course 128A is recommended for majors in the life sciences. Emphasis on the application of spectroscopic methods to organic chemistry.

128C. Organic Chemistry (3) I, Friedrich, II, Keper, III, Snorr
Lecture—3 hours. Prerequisite: course 128B. Chemistry majors should enroll in course 128C concurrently. Emphasis on the application of spectroscopic methods to organic chemistry.

128D. Organic Chemistry Laboratory (2) Kurth, II, E. Friedrich
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 128B. Chemistry majors should enroll in course 128D concurrently. Emphasis on the application of spectroscopic methods to organic chemistry.

128E. Organic Chemistry Laboratory (2) I, Schore, II, Kurb
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 128B. Chemistry majors should enroll in course 128E concurrently. Emphasis on the application of spectroscopic methods to organic chemistry.

130. Qualitative Organic Chemistry (3) III. Miller
Lecture—1 hour; laboratory—9 hours. Prerequisite: course 110B. Emphasis on the application of qualitative organic chemistry to the qualitative identification of organic compounds.

131. Modern Methods of Organic Synthesis (4) II. Zellweger
Lecture—4 hours. Prerequisite: course 110C. Modern methods of organic synthesis. Emphasis on the application of modern synthetic methodology to the qualitative and quantitative identification of organic compounds.

134. Synthetic Methods (4) II. Back
Lecture—1 hour; laboratory—9 hours. Prerequisite: course 128C. Emphasis on the application of modern synthetic methodology to the qualitative and quantitative identification of organic compounds.

135. Chemistry of Natural Products (3) I, Miller
Lecture—3 hours. Prerequisite: course 128B. Emphasis on the application of modern synthetic methodology to the qualitative and quantitative identification of organic compounds.

138H. Undergraduate Research (2-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: course 110C (may be taken concurrently) and honors status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research. (P/NP grading only.)

139. Projects in Chemical Education (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeatable for credit a total of 12 units. (P/NP grading only.)

139A. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeatable for credit a total of 12 units. (P/NP grading only.)
Child Development

(A Graduate Group)

Keith Barton, Ph.D., Chairperson of the Group

Group Office, 106 Academic Office Building-4
(752-2244/0770)

Faculty. Includes faculty members from depart-ments such as Applied Behavioral Sciences, Anthropology, Psychology, and the Schools of Law and Medicine.

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program in which leads to the M.S. degree under master's degree Plan I, the thesis. The aim of the program is to provide students an opportunity to pursue a cor-

coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Opportunities are provided to work with children and adults in the community including the University's Early Childhood Laboratory (ECL). Recipients of the degree gain sufficient background in the biological and social sciences to engage in professions dealing with children, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development or related fields.


Chinese

See Asian American Studies, and Oriental Languages and Civilizations

Clas.sics

(College of Letters and Science)

Department Office (Spanish and Classics), 622 Sproul Hall (752-6885)

Faculty

Martha W. Baldwin, M.A., Visiting Assistant Professor
Richard E. Grinn, Ph.D., Associate Professor
Lynn E. Rollins, Ph.D., Assistant Professor
Wesley E. Thompson, Ph.D., Professor
David A. Traill, Ph.D., Associate Professor

Preparatory Subject Matter

Greek 1, 2, 3 (or the equivalent)

Automatic Art 156

Preparatory Subject Matter

Greek 1, 2, 3 (or the equivalent)

Total Units for the Major

61-64

Recommended

Art 1A; History 2; Philosophy 21; Comparative Literature 1

Religious Studies 40

Greek

A.B. Major Requirements:

Preparatory Subject Matter

Greek 1, 2, 3 (or the equivalent)

Total Units for the Major

36-51

Recommended

Latin 1, 2, 3

The Major Programs

Classics offers three major programs: Latin, Greek, and Classical Civilization. The major programs in Greek and Latin consist of the detailed study of the great works of Greek or Latin literature in the original language, including epic, lyric, drama, philosop-

phy, history, and oratory. Both majors cover the study of language and literature. The major program in Classical Civilization offers an interdisciplinary approach to the ancient world. Students choosing this major supplement a core of courses in Greek or Latin (or both) with courses in ancient art, archaeology, history, philosophy, etc. All three majors provide the opportunity to study in depth a civilization that has profoundly influenced the west-

ern world.

The programs in Latin and Greek and, with careful planning, the program in Classical Civilization offer excellent preparation for graduate study in Classics, ancient history, comparative literature, and archaeology. In addition, the major in Greek provides suitable background for divinity school or for graduate work in philosophy.

The majors in Latin and Classical Civilization may lead to careers in teaching (Latin, history, general humanities) or museum work (Classical Civilization). All three majors can lead to careers in librarianship, journalism, and civil service. The professional schools, particularly law schools, have tradi-

tionally looked with favor on highly qualified students with training in Latin or Greek.

Classical Civilization

A. B. Major Requirements:

Preparatory Subject Matter

Greek 1, 2, 3 or Latin 1, 2, 3 or the equivalent

Three courses from the following, including at least one from Group (a)

(a) Classics 17A, 17B, 17C, 20

(b) Classics 4A, 10, 40, 41

Depth Subject Matter

Three upper division courses in Latin or Greek

At least 28 units from the following, with or with emphasis in a single area, chosen in consultation with a major advisor

(a) Language and Literature: All upper division courses in Latin and Greek. Classics 139B, 141

(b) History: History 111A, 111B, 111C, 112

Religious Studies 102

(c) Art, Archaeology, and Drama:

Classics 174, 179

Art 154A, 154B, 154C, 155

Dramatic Art 156

(d) Philosophy and Political Theory:

Classics 150

Philosophy 143, 161, 162

Political Science 116A

Rhetoric 110

Total Units for the Major

61-64

Recommended

Art 1A; History 2; Philosophy 21; Comparative Literature 1

Religious Studies 40

Greek

A.B. Major Requirements:

Preparatory Subject Matter

Greek 1, 2, 3 (or the equivalent)

Depth Subject Matter

Two upper division units in Greek (two courses may be chosen from department-approved courses in related fields)

Total Units for the Major

36-51

Recommended

Latin 1, 2, 3
Latin

A.B. Major Requirements:

Preparatory Subject Matter ................................................................. 0-12
Latin 1, 2, 3 (or the equivalent) .......................................................... 12

Depth Subject Matter ......................................................................... 36
Latin 121 ............................................................................................ 5
At least 31 additional upper division units in Latin .................................... 31

Total Units for the Major ................................................................. 36-48

Minor Advisers: D. A. Trail (Classical Civilization), W. E. Thompson (Greek), and E. R. Grimm (Latin).

Minor Program Requirements:

Greek .................................................................................................. 21
Four upper division courses in Greek ..................................................... 16

Latin ................................................................................................... 20
Latin 3 ............................................................................................... 4
Four upper division courses in Latin ..................................................... 16

Teaching Credential Subject Representative, R. E. Grimm. See page 99 for the Teacher Education Program.

Graduate Study. A program of study and research leading to the M.A. degree in Classics is offered. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser, W. E. Thompson.

Courses in Classics

Lower Division Courses

4A. Classical Civilization (3) III. Thompson

Lecture—3 hours. Introduction to the literature, art, and institutions of classical Greece.

10. Greek and Roman Mythology (3) I. Thompson

Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

17A. Greek Archaeology (3) I. Roller

Lecture—3 hours. Greece, Crete, and the Aegean world during the Bronze Age with emphasis on the Minoan and Mycenaean civilizations. Consideration of various aspects of Hellenic civilization in light of the archaeological remains.

17B. Greek Archaeology (3) II. Roller

Lecture—3 hours. The archaeological monuments of Archaic and Classical Greece. Selections from Greek literature are related to the archaeological remains.

*17C. Roman Archaeology (3) I. Thompson

Lecture—3 hours. The development of Rome and its Empire as illustrated by the monuments.

20. Pompeii AD 79 (3) III. Trail

Lecture—3 hours. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archaeological evidence will be supplemented by selected readings from Petronius' Satyricon and other ancient authors.

30. The Latin Element in Current English (3) II. Thompson, Grimm

Lecture—3 hours. Prerequisite: knowledge of Latin is not required. The study of the derivations and usage of English words of Latin origin; analysis into their component elements directed toward understanding of form and meaning.

31. The Greek Element in Current English (3) II. Thompson, Trail

Lecture—3 hours. Prerequisite: knowledge of Greek is not required. Study of the derivations and usage of English words of Greek origin; analysis into their component elements directed toward understanding of form and meaning.

40. Homer and the Tradition of Ancient Epic (3) II. Trail


41. Greek Tragedy (3) III. Grimm

Lecture—3 hours. Reading in translation of selected plays of Aeschylus, Sophocles, and Euripides. Lectures on the development and influence of Athenian tragedy.

Upper Division Courses

*18B. Greek Literature in Translation (3) II. Thompson

Lecture—3 hours. Development of historical writing in Greece: Herodotus, Thucydides, and selections from the minor historians. Offered in even numbered years.

141. Greek and Roman Comedy (4) II. Grimm

Lecture—3 hours. Comedies—1 hour. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd numbered years.

142. Greek and Roman Novel (4) I. Trail

Lecture—3 hours. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' Satyricon and the religious mysticism of Apuleius' The Golden Ass.

150. Athenian Political and Social Institutions (3) II. Thompson

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.

17A. Ancient Greek Sanctuaries (4) III. Roller

Lecture-discussion—4 hours. Prerequisite: course 17B or consent of instructor. The history, cults, and monuments of Olympia, Delphi, and other sanctuaries. Study reports on major monuments with emphasis placed on restoration, chronology, and on the relating of documentary to excavational evidence. Offered in odd numbered years.

17DTC. Community Tutoring in Classical Languages (1-5) I, II, III, III, Grimm

Prerequisite: consent of instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated for credit up to 5 units. (P/N grading only.)

Graduate Courses

201. Introduction to Classical Philology (4) I. Thompson

Seminar—3 hours. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism.

202. Homer (4) III. The Staff

Seminar—3 hours. Readings in the Iliad and Odyssey; the origins and transmission of the poems.

203. Vergil (4) II. Grimm

Seminar—3 hours. Readings selected from the Eclogues, Georgics, and Aeneid. Emphasis will be placed on the structure of Vergilian poetic language.

204. Greek and Roman Comedy (4) I. Thompson

Seminar—3 hours. Historical and critical problems in Attic comedies or New Comedy. May be repeated for credit.

205. Latin and Elegy (4) I. Trail

Seminar—3 hours. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

206. Greek Historiography (4) III. Thompson

Seminar—3 hours. Development of historical writing in Greece. May be repeated for credit.

207. Greek Drama (4) II. Grimm

Seminar—3 hours. I. Plot and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

Greek

Lower Division Courses

1. Elementary Greek (5) I. The Staff

Lecture—4 hours. Students who have successfully completed Greek 201 or 203 in the 13th or higher grade may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be charged to the student's P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.

2. Elementary Greek (5) II. The Staff

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1.

3. Elementary Greek (5) III. The Staff

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2.

10. The Structure of Latin (4) III. Thompson

Lecture—4 hours. Prerequisite: not open to students who have received credit for any other course in Latin. Survey of the Latin language with special emphasis on the morphological and syntactical relationships of classical Latin.

98. Directed Group Study (1-5) I. II. III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Group study of selected topics. (P/N grading only.)

Latin

Lower Division Courses

1. Elementary Latin (4) I. The Staff

Lecture—4 hours. Students who have successfully completed Latin 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. Although a passing grade will be charged to the student's P/N option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.

1X. Intensive Latin (5) II. Trail

Lecture—5 hours. An intensive course designed primarily for graduate students and advanced undergraduates wishing to acquire rapidly a rudimentary knowledge of Latin. Covers the same material as Latin 1 and 2.

2. Elementary Latin (4) II. The Staff

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1.

3. Elementary Latin (4) III. The Staff

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2.

10. The Structure of Latin (4) III. Thompson

Lecture—4 hours. Prerequisite: not open to students who have received credit for any other course in Latin. Survey of the Latin language with special emphasis on the morphological and syntactical relationships of classical Latin.

98. Directed Group Study (1-5) I. II. III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Group study of selected topics. (P/N grading only.)
Clinical Pathology
(School of Veterinary Medicine)
Jiro J. Kaneko, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1319 Haring Hall (752-0153)

Faculty
Bernard F. Feldman, D.V.M., Ph.D., Associate Professor
Nemi C. Jain, M.V.Sc., Ph.D., Professor
Donald E. Jasper, D.V.M., Ph.D., Professor
Jiro J. Kaneko, D.V.M., Ph.D., Professor
Michael E. Mount, D.V.M., Ph.D., Assistant Professor
Joseph G. Zinkl, D.V.M., Ph.D., Associate Professor

Part-Time Clinical Faculty
John W. Switzer, D.V.M., Assistant Clinical Professor

Courses in Clinical Pathology

Upper Division Courses

101. Comparative Hematology (2) I. Kaneko, Jain, Zinkl, Feldman
   Lecture—2 hours. Prerequisite: Biological Sciences 1, Physiology 110, Biochemistry 101A-101B or Physiology Sciences 101A-101B or consent of instructor. Principles, interpretation, and applications of clinical hematology; comparative blood cellular morphology and function.

101L. Comparative Hematology Laboratory (2) II. Kaneko, Zinkl, Jain, Feldman
   Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

102. Clinical Biochemistry (4) I. Kaneko
   Lecture—3 hours; laboratory—2 hours. Prerequisite: Physiology 112, 113; Physiological Sciences 101A-101B or Biochemistry 101A-101B, or consent of instructor. Principles and methods of clinical biochemistry; determination and interpretation of the biochemical constituents of the blood, urine, and other body fluids.

108. Special Study for Undergraduates (1-5) I, II, III. The Staff
   Chairperson in charge
   (P/NP grading only.)

Graduate Courses

204. Normal and Abnormal Bone Marrow Cytology (1) I. Feldman, Zinkl
   Lecture—2 hours. Prerequisite: course 101. Examination of bone marrow smears for the presence of neoplastic and reactive elements. Offered in even-numbered years.

205. Physiology and Pathology of Leukocytes (2) I. Jain
   Lecture—2 hours. Prerequisite: course 101. Biochemistry 101A-101B or consent of instructor. Examination of the normal and abnormal functions of leukocytes and their role in immunohematology. Offered in odd-numbered years.

261. The Bovine Mammary Glands in Health and Disease (1)
   Lecture—1 hour. Prerequisite: consent of instructor. Relationship of milk production to the health of the mammary gland. Offered in odd-numbered years.

Clinical Psychology
See Medicine

Community Development (A Graduate Group)
E. Dean MacCannell, Ph.D., Chairperson of the Group
Group Office, 106 Academic Office Building-4 (Applied Behavioral Sciences), (752-6437/0770)

Faculty. Includes faculty members from various departments in the area of community development.

Graduate Study. The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree under both master's degree plans, the thesis or the comprehensive examination. The program is designed to prepare students for professional roles in rural, nonmetropolitan communities and human service organizations as administrators, planners, or technicians. Training in community development is also aimed at preparing an individual to work within government or non-profit organizations working in the realm of social and economic change. There are three areas of specialization, (1) community economic and social development; (2) community program administration and management; and (3) community organization and development.

Preparation. Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, cultural geography, or political science, and courses in community studies.

Graduate Adviser. See Class Schedule and Room Directory.

Community Health
See Medicine
Community Nutrition
(College of Agricultural and Environmental Sciences)

The Major Program
Community Nutrition focuses on the biological, economic, environmental, and socio-cultural factors which influence the nutrition status of individuals and groups. The aim of Community Nutrition is the application of knowledge in the development and implementation of programs to improve the availability and use of food in the community. The major is designed for students who seek to combine a foundation in the biological and nutritional sciences with a concentrated study in a social science discipline. All students in the major are required to complete a common core of preparatory and depth subject matter courses. Students select one of three subject matter options emphasizing the socio-cultural, psychological, or economic aspects of food, diet, and nutrition.

Graduates are prepared for entry-level positions in health and social service agencies in the United States and abroad. Job possibilities include nutrition specialists in community programs for ethnic minorities in the United States or nutrition research and education programs abroad (Socio-Cultural option); nutrition counselors in behavioral modification programs for weight control, cardiovascular disease, child development, and community mental health programs (Psychological option); staff analysts or administrative assistants or nutrition specialists in agriculture, health, and welfare agencies having food assistance or nutrition education components (Economics option).

Advance to positions of professional responsibility in each field will require additional training and experience. The major is unique in that it provides opportunities for graduate study in either Nutrition or the selected Social Science discipline.

Community Nutrition

B.S. Major Requirements:
(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter .......................... 50-53
Bacteriology with laboratory (Microbiology 2.1) .......................... 4
Biology (Biology Sciences 2) .................................. 4
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B) ................. 5
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B) ................. 5
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B) ................. 5
Computer logic or programming (Computer Science 31 or Mathematics 19) .......................... 4
Cultural social science (Anthropology 2, Geography 2 or Sociology 3) .......................... 4
Cultural food habits (Nutrition 20) .................................. 4
Oral and written expression (see College requirements, page 71) ................. 8
Social research methods (Psychology 41) .................................. 4
Social statistics (Economics 12, Sociology 46A, or Statistics 13) ................. 5

Depth Subject Matter .......................... 50-51
Biochemistry 101A-101B or Prone .......................... 6-7
Food Science and Technology 100A, 100B, 101A, 101B .......................... 10
Physiology 110, 110L .................................. 7

NOTE: For key to footnote symbols, see page 124.

Comparative Literature
(Comparison of Letters and Science)

Roland W. Hoerniman, Ph.D, Program Director
Program Office, 912 Sprague Hall (752-1219)

Committee in Charge
Samuel G. Armistead, Ph.D. (Spanish)
Richard N. Coe, Ph.D., A.F.A.A. (French)
Ruby Cohn, Ph.D. (Comparative Literature, Dramatic Art)
Peter A. Dale, Ph.D. (Comparative Literature, Dramatic Art)
Michael Schaffer, Ph.D. (German)
Robert M. Torrance, Ph.D. (Comparative Literature)
Hugo J. Verani, Ph.D. (Spanish)

Faculty
Samuel G. Armistead, Ph.D, Professor (Spanish)
Richard N. Coe, Ph.D, Professor (French)
Ruby Cohn, Ph.D. (Comparative Literature, Dramatic Art)
Peter A. Dale, Ph.D., Associate Professor (English)
Roland W. Hoerniman, Ph.D., Professor (Comparative Literature, German)
Michael Schaffer, Ph.D., Associate Professor (French)
Peter M. Schaffer, Ph.D., Professor (German)
Robert M. Torrance, Ph.D., Professor
Marian B. Ury, Ph.D., Associate Professor

The Major Program
Few people are interested in studying only English, French, German, or Spanish literature. Yet most of literature majors read books originally written in a single language. Comparative Literature, on the other hand, encourages students to read and study about, and to compare books from different national languages and from different parts of the world—from Italy and Russia as well as England and the United States, and from Asia and Latin America as well as North America and Europe.

Comparative Literature thus enlarges students’ horizons by bridging the divisions between national cultures instead of concentrating on a single tradition. Both the major and minor programs allow students to concentrate in one of the following areas: Comparative Literature (minor), Comparative Literature (major), or Comparative Literature (major) with other majors. Comparative Literature students enjoy reading books, exploring ideas, and learning about different civilizations will find Comparative Literature a stimulating field of study.

The introductory course sequence, "Great Books of Western Civilization," provides both an overview of the evolution of Western literature from ancient times to the present and intensive practice in analytical thought and English composition. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign language in the original language. No foreign language is required for the minor.

Students majoring in Comparative Literature choose a first and a second literature of concentration, one of which may be English. After the introductory sequence, each student’s major course work is divided between courses in the two literatures of concentration—American and Comparative Literature courses. These Comparative Literature courses encourage students to take a broader view of a historical period, a theme, a genre, or a literary movement.

The wide variety of courses in the program permits great flexibility and encourages interdisciplinary connections between literature and philosophy, psychology, history, and the arts. Each student’s plan of study must be approved by an advisor at the beginning and end of each academic year.

Career Alternatives. Careers directly related to Comparative Literature include teaching, journalism, publishing, and translation. Most Comparative Literature majors, however, are preparing other careers that will employ the skills they have learned in the process of acquiring a stimulating and enriching education. The major in Comparative Literature gains useful experience in one or more foreign languages, in careful analytical thinking, and in precise use of the English language. Because many professional schools consider a literature major an excellent background for their graduate disciplines, Comparative Literature provides valuable preparation (along with supplementary courses outside the major) for careers in business, government, medicine, or law.

Comparative Literature

A.B. Major Requirements:

Preparatory Subject Matter .......................... 12-42
Comparative Literature 1, 2, 3 .......................... 12
Foreign language sufficient to ensure satisfactory performance at the upper division level .......................... 0-30

Depth Subject Matter .......................... 40-70

Seven upper division courses in one or more languages (one of which may be English) distributed between the first and second languages of concentration with the approval of the advisor .......................... 28
Comparative Literature 141 .......................... 4
Comparative Literature

Two additional upper division Comparative Literature courses, preferably including one in a major literary period or movement.

Total Units for the Major: 52-62

Recommended:
At 10PA: Dramatic Art 40; Classics 10, 40, 41; History 44, 48, 4C, Philosophy 21, 22, 23.

Major Adviser: R.W. Hoermann (Comparative Literature)

All Comparative Literature majors and minors must consult their Major Adviser, individually, at least once at the beginning and once at the end of each academic year.

Minor Program Requirements:

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no language requirement for the minor.

UNITS

Comparative Literature 1, 2, or 3
Two upper division Comparative Literature courses (College credit only for Comparative literature 141)
12
Three upper division courses in one or two national literatures (including English)
12

Courses should form a coherent program, with emphasis on a historical period, a literary movement, and should be chosen in consultation with and the approval of the advisor.

Minor Adviser.

Same as for Major Adviser.

All Comparative Literature majors and minors must consult with their advisor, individually, at least once at the beginning and once at the end of each academic year.

Teaching Credential Subject Representative.

R.W. Hoermann. See page 99 for the Teacher Education Program.

Graduate Study.

Refer to the Graduate Group in Comparative Literature (page 187).

Courses in Comparative Literature

Lower Division Courses

1. Great Books of Western Civilization: From Myth to Fiction (4) I, II, Ill. Director in charge
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from The Epic of Gilgamesh to St. Augustine's Confessions.

2. Great Books of Western Civilization: From Reason to the Natural World (4) I, II, III. Director in charge
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Dante's Inferno to Swift's Gulliver's Travels.

3. Great Books of Western Civilization: The Modern Crisis (4) I, II, III. Director in charge
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great works of western civilization from Goethe's Faust to Beckett's Waiting for Godot.

4. The Short Story and Novella (4) I, II. Ury
Lecture-discussion—3 hours; term paper. An introduction to short stories and novels of major authors of different countries, with special emphasis on the rhythm period.

5. Fairy Tales, Fables, and Parables (3) II. Hoermann
Lecture-discussion—3 hours. An introduction to fairy tales, fables, and parables as recurrent themes and motifs in literature, with readings from such diverse writers as Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges.

6. Myths and Legends (3) II. The Staff
Lecture-discussion—3 hours. An introduction to the comparative study of myths and legends, especially those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, and Japanese literary sources.

7. Literature of Fantasy and the Supernatural (3) II. Hoermann
Lecture-discussion—3 hours. An inquiry into the interrelations between the fantastic and the real in the literature of dreams and hallucination, fabulous landscapes and voyages, grotesque satire, and gothic horror.

8. Utopias and Their Transformations (3) III. Hoermann
Lecture-discussion—3 hours. A consideration of utopian writings, from classical and rationalistic visions of the perfect society of Plato and Aristotle to the utopian dreams of the modern world.

10A-R. Masterpieces of World Literature (2) I, II, III. The Staff (Director in charge)
Lecture-discussion—2 hours. A representative series of courses offered primarily to acquaint the non-literature major with a cross-section of the world's most important literary readings in English translation. Content will vary. A selection of possible readings: (A) Gilgamesh, Rameyana, Beowulf, Nibelungenlied; (B) Mennybros, Decameron, Arabian Nights, Canterbury Tales; (C) Chanson de Roland, El Cid, Igi's Campaign of Morte d'Arthur; (D) Don Quixote, Don Juan, and selected works from other languages.

10A-R. Masterpieces of World Literature (2) I, II, III. The Staff (Director in charge)
Lecture-discussion—2 hours. A representative series of courses offered primarily to acquaint the non-literature major with a cross-section of the world's most important literary readings in English translation. Content will vary. A selection of possible readings: (A) Gilgamesh, Rameyana, Beowulf, Nibelungenlied; (B) Mennybros, Decameron, Arabian Nights, Canterbury Tales; (C) Chanson de Roland, El Cid, Igi's Campaign of Morte d'Arthur; (D) Don Quixote, Don Juan, and selected works from other languages.

10A-R. Masterpieces of World Literature (2) I, II, III. The Staff (Director in charge)
Lecture-discussion—2 hours. A representative series of courses offered primarily to acquaint the non-literature major with a cross-section of the world's most important literary readings in English translation. Content will vary. A selection of possible readings: (A) Gilgamesh, Rameyana, Beowulf, Nibelungenlied; (B) Mennybros, Decameron, Arabian Nights, Canterbury Tales; (C) Chanson de Roland, El Cid, Igi's Campaign of Morte d'Arthur; (D) Don Quixote, Don Juan, and selected works from other languages.

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Lecture-discussion—2 hours. A representative series of courses offered primarily to acquaint the non-literature major with a cross-section of the world's most important literary readings in English translation. Content will vary. A selection of possible readings: (A) Gilgamesh, Rameyana, Beowulf, Nibelungenlied; (B) Mennybros, Decameron, Arabian Nights, Canterbury Tales; (C) Chanson de Roland, El Cid, Igi's Campaign of Morte d'Arthur; (D) Don Quixote, Don Juan, and selected works from other languages.
the modern period: (A) Romanticism; (B) Symbolism; (C) Realism and Naturalism. May be repeated for credit in different subject areas.

169. The Avant-Garde (4) I. Cohn Lecture discussion—3 hours, term paper. Studies in movement in literature such as surrealism, expressionism, and the absurd. (PAP grading only.)

170. Tutoring in Comparative Literature (2) I, II, III. Heer- mann Discussion—2-4 hours. Prerequisite: upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated for credit for a total of 6 units. (PAP grading only.)

196. Directed Group Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge) (PAP grading only.)

197. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge) (PAP grading only.)

Graduate Courses

200. Introduction to the Graduate Study of Comparative Literature (4) I, Kusche Seminar—3 hours, research paper. Prerequisite: reading knowledge of one foreign language. Introduction to research tools, library resources, and critical concerns of Comparative Literature, with focus on the comparative study of a single work, culminating in a related research project.

211. Theories of Comparative Literature (4) I. Tortense Seminar or course, research paper. Prerequisite: reading knowledge of one foreign language, course 141 of the equivalent recommended. An examination of international theories of literature with reference to language, genre, semantics, and social and historical context.

250A. Research in Comparative Literature (4) I, II, III. The Staff (Director in charge) Individual instruction—1 hour. Prerequisite: course 200. Individual guided research, under the supervision of a faculty member, in a comparative topic culminating in a term paper. Required of M.A. and Ph.D. candidates.

250B. Research in Comparative Study of Authors, Period, or Genre (4) I, II, III. The Staff (Director in charge) Individual instruction—1 hour. Prerequisite: course 200 and 201. Individual guided research, under the supervision of a faculty member, in the specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of Ph.D. candidates.

250C. Basic Research for the Dissertation (4) I, II, III. The Staff (Director in charge) Individual instruction—1 hour. Prerequisite: course 200 and 201. Individual guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.

299A. Individual Study (1-12) I, II, III. The Staff (Director in charge) (SU grading only.)

299B. Special Study for the Doctoral Dissertation (1-12) I, II, III. (SU grading only.)

Comparative Literature (A Graduate Group)

Rudy Cohn, Ph.D., Chairperson of the Group
Group Office, 909 Sproul Hall (752-1453/1219)
Graduate Study. The Comparative Literature Program offers the M.A. and Ph.D. degrees with a strong emphasis on individual research under the supervision of a faculty member. The M.A. degree is awarded under both master's programs, Plan I or Plan II (see page 97). Candidates for the M.A. combine study of Comparative Literature with study of two literatures in the original languages, one of which may be English. Ph.D. candidates, in addition to further research of a comparative nature, study three literatures in the original languages, acquiring an extensive knowledge of the overall development of one. Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age, a genre, such as drama, fiction, or criticism, or an author, and may explore relationships between literature and the arts, linguistics, philosophy, or psychology.

Preparation. For admission to the Program, M.A. candidates should have an undergraduate major in literature and reading ability in one foreign language. Ph.D. candidates should have an undergraduate major in literature and reading ability in two foreign languages. The program requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

Graduate Adviser, R. Cohn (Comparative Literature).

Comparative Pathology (A Graduate Group)

Richard Yamamoto, Ph.D., Chairperson of the Group
Group Office, 3155 Medical Science 1A (752-3156)
Graduate Study. The Graduate Group in Comparative Pathology offers the M.S. and Ph.D. degrees for graduate study in disciplines concerned with various aspects of disease processes and their effects upon individuals and populations. Comparative Pathology has evolved from recent years from a primary concern with diseases of animals and of those animals having an economic, household or companion value to encompass most forms of animal life. For the unified central theme in this broadly based major is, by definition, "the study of disease." To this study is brought a wide array of scientific disciplines related to diseases of interest and the techniques that can be used to prepare professionals for diseases in their individual needs.

This program is primarily designed for students who have a professional medical degree, i.e., D.V.M., M.D., D.D.S. These students usually select programs which emphasize pathology, epidemiology, or host-parasite interactions.

Students may also be admitted on the basis of a bachelor's degree in some field of, or related to, biological science. The latter persons will become biologists, who, in addition to the usual background expected of such persons, will also have an appreciation of disease; an ability to design meaningful experiments relating to both normal and pathological processes; and a breadth of understanding allowing the use of diverse species of living organisms, such as invertebrates, fish, terrestrial wildlife or marine organisms.

Beyond core courses selected for both the M.S. and Ph.D. degrees from anatomy, bacteriology, genetics, immunology, parasitology, pathology, physiology, and virology, course programs are intentionally very flexible. The goal is that each student will specialize in one field of principal interest and attain competence in one or more related areas.

Graduate Adviser J.H. Theis (Medical Microbiology).

Computing Science

See Engineering: Electrical and Computer Science, Mathematics, or Statistics; Graduate Group in (see below)

Computing Science (A Graduate Group)

Richard F. Walters, Ph.D., Chairperson of the Group
Group Office, 3116 Gainer Hall (Electrical and Computer Engineering), (752-0583)
Faculty. Includes faculty members from the Departments of Electrical and Computer Engineering, Mathematics, Community Health, and other departments on the Davis campus: the Applied Science Department; Davis-Livermore, and associated staff of the Lawrence Livermore Laboratory, and the Computer Science Department, California State University, Chico.

Graduate Study. The Graduate Group in Computing Science offers programs of study leading to the M.S. (comprehensive examination plan) and Ph.D. degrees. Research and instruction is multidisciplinary in the areas of computer design and architecture, information systems; and application of computers to the biological and medical sciences, to physical and social sciences and to engineering.

Preparation. Students with backgrounds in some field other than computers are encouraged to apply. Examinations for all students include a test of undergraduate level material in six areas of computer science: computer architecture and hardware, operation systems, languages and programming, formal basis for computing science, software engineering and database systems, and numerical analysis. Master's degree candidates must pass graduate level in-depth examinations in any two of these areas, and Ph.D. candidates must pass three subject area examinations at a high pass level or substitute an oral examination covering these areas, or complete a thesis on a topic approved by the Graduate Group.

Graduate Adviser C.U. Martel, M.M. Blatner.
Consumer Economics

College of Agricultural and Environmental Sciences

Major Program and Graduate Study

See the major in Development, Resource, and Consumer Economics (page 170) and see page 99.

Related Courses. See Agricultural Economics.

Courses in Consumer Economics

Questions pertaining to the following courses should be directed to the instructor or to the Department of Agricultural Economics, 106 Voorhees Hall.

Upper Division Courses

141. Consumers and the Market (4) K. Kushman Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. The structure of the market and the effects of its performance on consumers. Agencies advising and protecting consumers, sources of information available to consumers. Students who have had or are taking Agricultural Economics 100A, Economics 100B, or the equivalent may require only 3 units of credit, as must enroll in course 141A.

141A. Consumers and the Market (3) K. Kushman Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. The structure of the market and the effects of its performance on consumers. Agencies advising and protecting consumers, sources of information available to consumers. Students who have had or are taking Agricultural Economics 100A, Economics 100B, or the equivalent must enroll in this course for 3 units rather than course 141.

142, Personal Finance (3) I. Butler, III, Sheppard Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of consumer installment savings, and insurance by households. Principles of tax, retirement, and estate planning. (Same course as Agricultural Economics 142.)

148. Directed Group Study (1-0) II, III. The Staff (Chairperson in charge) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

220, Economics of Consumer Policy (3) H. Heiser Lecture—3 hours. Prerequisite: one graduate course in social science and one course in economics or the equivalent. Policy criteria; sources of waste; failure; consumer policy alternatives; empirical evaluation of selected economic policies.

258, Economics of Consumption (3) H. Heiser Lecture—3 hours. Prerequisite: one graduate course in micro-economic theory. Advanced analysis of individual and aggregate consumption models; empirical determinants of consumer behavior, application of consumption economics to selected issues.

260, Seminar (1) I, II, III. The Staff Seminar—1 hour. Current issues in consumer economics and the economics of consumption.

299, Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Consumer Food Science

College of Agricultural and Environmental Sciences

The Major Program

The Consumer Food Science major emphasizes both the biological properties of foods and the socio-economic and cultural aspects of foods as they relate to consumer acceptability and use. Students are provided with diverse range in study of the biological, natural, and social sciences to prepare them for careers such as food product development, quality assurance, marketing and sensory analysis, extension service, consumer communication, and community service. The major provides academic preparation for those who plan to pursue similar careers or to undertake graduate study in Food Science or Nutrition.

Consumer Food Science

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-61</td>
<td>Biochemistry (Biochemistry 101A or 101B)</td>
</tr>
<tr>
<td>6-7</td>
<td>Physiology by laboratory (Biological Sciences 1)</td>
</tr>
<tr>
<td>5</td>
<td>Chemistry, general and organic (Chemistry 1A-1B, 1A-BB)</td>
</tr>
<tr>
<td>21</td>
<td>Mathematics and physics (Mathematics 19, Physics 10)</td>
</tr>
<tr>
<td>7</td>
<td>Microbiology by laboratory (Bacteriology 2)</td>
</tr>
<tr>
<td>4</td>
<td>Physiology (Physiology 110)</td>
</tr>
<tr>
<td>4</td>
<td>Statistics (Agricultural Science and Management 150)</td>
</tr>
<tr>
<td>8</td>
<td>Written and oral expression (see College requirement)</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>Community nutrition (Nutrition 118)</td>
</tr>
<tr>
<td>4</td>
<td>Consumer economics (Consumer Economics 141)</td>
</tr>
<tr>
<td>4</td>
<td>Food Science and Technology including (101A, 101C, 101A, 101B, 102) Nutrition 20 or 120, and one additional course each in food toxicology, food microbiology, and food processing (Food Science and Technology 128, 104, 111)</td>
</tr>
<tr>
<td>28</td>
<td>Human nutrition with laboratory (Nutrition 110)</td>
</tr>
<tr>
<td>10</td>
<td>Consumer Science 135</td>
</tr>
<tr>
<td>10</td>
<td>Breadth Subject Matter</td>
</tr>
<tr>
<td>29</td>
<td>Principles of economics (Economics 1A-1B)</td>
</tr>
<tr>
<td>10</td>
<td>Consumer behavior (Consumer Science 100)</td>
</tr>
<tr>
<td>11</td>
<td>Agricultural Economics 112</td>
</tr>
</tbody>
</table>

At least one of the following areas: agriculture, behavioral sciences, cultural anthropology, psychology, or sociology. Remainder in social sciences and humanities electives

Restricted Electives

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Food and consumer related courses selected in accordance with student's educational goal with approval of adviser.</td>
</tr>
</tbody>
</table>

Unrestricted Electives

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22-23</td>
<td>Total Units for the Major 180</td>
</tr>
</tbody>
</table>

Recommended

It is recommended that students interested in graduate work take Chemistry 6, English 104, Mathematics 16A-16B- 16C and Physics 2A-2B-2C.

Consumer Science

College of Agricultural and Environmental Sciences

Faculty

See under the Division of Textiles and Clothing, and the Departments of Agricultural Economics and Food Science and Technology.

Major Programs and Graduate Study

Consumer Food Science (this page) and Home Economics (page 237) are related majors for graduate study, see page 95.

Related Courses. See Consumer Economics, Food Science and Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing, 109 Everson Hall.

Lower Division Courses

97, Food Product Development Field Study (1) I. Schutz Discussion—three 2-hour sessions; field trip—3 to 2 days. To observe commercial aspects of the large-scale development, distribution, and evaluation of foods intended for human consumption. Course given between Winter and Spring Quarters and considered a Spring course for pre-enrollment. Advance enrollment by instructor required. (P/NP grading only.)

98, Internship in Consumer Science (1-12) I, II, III. The Staff (Zerion in charge) Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-study experience on and off campus in a consumer science related area. (P/NP grading only.)

Upper Division Courses

100, Consumer Behavior (3) I. Schutz Lecture—3 hours. Prerequisite: preparation in areas of psychology or sociology and economics recommended. Provides a set of behavioral concepts and theories useful in understanding consumer behavior on the part of the individual, business, and social organizations. Conceptual model to help guide and understand consumer research will be presented.

136, Principles of Food Product Development (3) I. Schutz Lecture—3 hours. Prerequisite: one course in introductory food science. Presents basic concepts of product research and development, organizational, activities, new product development, product management. Role of food regulation, consumerism, marketing, advertising, consumer research.

192, Internship in Consumer Science (1-12) I, II, III. The Staff (Zerion in charge) Laboratory—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Work-study experience on and off campus in a consumer science related area. (P/NP grading only.)

198, Directed Group Study (1-0) I, II, III. The Staff (Zerion in charge) Group study or experimentation on consumer related topics. (P/NP grading only.)

199, Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Zerion in charge) Individual student reading, library research or experimentation. (P/NP grading only.)
Consumer Technology

(Company of Agricultural and Environmental Sciences)

Faculty

See under Department of Agricultural Engineering.

Courses in Consumer Technology

Questions pertaining to the following courses should be directed to the instructor of the Department of Agricultural Engineering, 2030 Bainer Hall.

Lower Division Courses

15. Experiments in Creative Woodworking [(1) II, III, O'Brien] Labor—1 hour; laboratory—2 hours. Prerequisite: Chemistry 1A and Physics 2A recommended. Experimental comparison of techniques for creating objects and structures of wood. Physical principles and properties of woods as related to structural stability of designs; influence of finishing to enhance, or create, aesthetics.

16. Experiments in Creative Metalworking [(2) III, Garrett] Lecture—1 hour; laboratory—2 hours. Prerequisite: Chemistry 1A and Physics 2A recommended. Experimental comparison of techniques for creating objects and structures of metal. Physical principles and design considerations; effects of techniques on quality and appearance; basics of self-evaluation of skills. Layout, cutting, forming, welding and finishing. (P/NP grading only.)

17. Electrical Appliances and Systems [(2) III, O'Brien] Lecture—1 hour; laboratory—3 hours. Characteristics and principles of electrical appliances and systems for lighting, heating, and power. Principles of electricity; loads, distribution, and control; safety; planning systems and selecting appliances.


98. Directed Group Study [(1-5) I, II, III] The Staff (Garrett in charge) Prerequisite: consent of instructor. Group study of selected topics. Restricted to lower division students. (P/NP grading only.)

16. Special Study for Lower Division Students [(1-5) I, II, III] The Staff (Garrett in charge) (P/NP grading only.)

Upper Division Courses


111. hearty Design [(1) II] O'Brien Lecture—1 hour. Prerequisite: upper division standing or consent of instructor. Study of factors to be considered in planning new or remodeled homes. Factors include size, layout, location, orientation, materials, utilities, traffic patterns, facilities, aesthetics, cost, and building codes and regulations.

113. Sanitation and Water Supply for Remote Locations [(1) III, Hills] Lecture—1 hour. Prerequisite: upper division standing; Physics 2B and Chemistry 1B recommended. Sources of domestic water at remote locations; sanitary precautions; methods and equipment for sanitary disposal of domestic wastes.

113. Laboratory Studies in Sanitation and Water Supply for Remote Locations [(1) III, Hills] Laboratory—3 hours. Prerequisite: course 113 (concurrent). Directed laboratory exercises, field trips, and special projects to augment the study of course 113. (P/NP grading only.)

196. Individual Projects [(1-2) I, II, III, Garrett, O'Brien] Prerequisite: consent of instructor. Directed exercises in planning and implementing projects consistent with the student's abilities. (P/NP grading only.)

196. Directed Group Study [(1-5) I, II, III] The Staff (Garrett in charge) (P/NP grading only.)

Dermatology

See Medicine

Design

(Company of Agricultural and Environmental Sciences)

Faculty

See under the Department of Environmental Design.

The Major Program

Design, as taught and practiced at UC Davis, brings together creativity and ingenuity, and is interdisciplinary in nature. This major attracts students who are interested in studies which will involve them in constructing the future shape of our everyday lives. This program is flexible, changing in content and size to reflect the needs and interests of the students, faculty, and society. Self-directed and motivated students contribute to the character of the Design program. They are guided by the faculty to form individualized programs of study around a core of required courses. Students gain not just knowledge of fundamentals of the design professions as they currently exist, but also the outlook necessary to create new approaches to design, and to the development of design as a social tool. The program provides opportunities to acquire a knowledgeable hand background in design, the skills to use effectively, and the confidence to apply these skills to innovative design.

At the present time, this curriculum offers study in the areas of costume, textiles, environments, and courses in visual and graphic imagery. The lower division courses prepare the student in basic design practice and theory. Students are encouraged to develop an upper division program which includes courses from textile design, design of the environment, and wearable design and image making, in order to understand the role of design in the formation of our culture. Students may elect to concentrate in one of these areas. Through individual planning, the program offers flexibility to allow for (1) concentration on a specialty, (2) preparation for graduate programs, (3) general education in design stimulating the creativity of the individual, (4) development toward self-education throughout one's entire life span, and (5) techniques to transmit knowledge and skill to one person or many, whenever the need arises.

The faculty is composed of a diverse group of designers and artists working in the fields of play environments and toys, wearable design and ethnic costume, the study of fantasy, printed imagery and book design, energy-efficient architecture, historical and contemporary textiles, interior design, handprinted and dyed textiles, constructed costumes, display and exhibition design, building renovation and conversion, contemporary furniture and small art press printing.

D.S. Major Requirements:

Preparatory Subject Matter ........................................... 12
Introductions to design, Design 6 .................................. 12
Drawing; Design 20A ...................................................... 4
Media; Design 208 ......................................................... 4

Depth Subject Matter ...................................................... 48
Individualized program of study ..................................... 48
Design courses to include at least 36 upper division units, determined by the student and faculty adviser. To include 192 or 199 course units as part of major requirements, the student must have prior approval of faculty adviser and the Master adviser.

Breadth Subject Matter ..................................................... 81
Natural sciences .......................................................... 27
Social sciences ........................................................... 27
Humanities .............................................................. 27

Unrestricted Electives ...................................................... 39

Total Units for the major ................................................. 160

Additional requirements

Development of a course of study in consultation with an adviser, no later than the second quarter of the junior year.

Major Adviser, V.Z. Rivers (Environmental Design)

Courses in Design

Questions pertaining to the following courses should be directed to the instructor of the Advising Center for the major, 152 Walker Hall (752-1166).

Lower Division Courses

8. Introduction to Design [(4) I] The Staff (Olsen in charge) Lecture—3 hours; discussion—1 hour. Development of an awareness of the world of design, and a design vocabulary.

20A. Drawing [(4) I, II, III] The Staff (Beratba in charge) Studio—8 hours. Drawing as an aid to perception and communication of ideas, objects, and plans. May be repeated with different instructor for a total of 8 units.

20B. Media [(4) I, II, III] Butler Studio—8 hours; field trip. Introduction to the tools, materials, and techniques used in the designer's studio.

20C. Photographic Media [(4) I, II, III] The Staff (Butler in charge) Studio—8 hours.


*Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Development, Resource, and Consumer Economics

22. Basic Imagery (4) II. The Staff (Butler in charge). Studio—hours. Prepares courses 6, 20A, 20B. Presentation of the fundamentals of designed images, combining a theoretical perspective with practice using the complete visual, form, and conceptual variety. Specific topics from (1) abstract structure, (2) symbolism, and (3) representation.

23. Personal Adornment (4) III. Stabb Studio—8 hours; field trip. Exploration of the human image achieved through ornament and its relation to the human structure.

24. Hand Constructed Textiles (4) I. L. interchange. studio—hours; one or two field trips. Prequisite courses 6, 19A. A contemporary approach to textile techniques of construction such as netting, plaiting, knotting and basketry.


26. Internship (1-12) II, III, III. The Staff (Olsen in charge). Field placement—3 to 36 hours. Prequisite: lower division standing and consent of instructor. Supervised internship, of and or on campus, in areas of design, including environmental, costume, textile, museum, display, and interior design.

27. Special Study for Undergraduates (1-5) I, II, III. The Staff (Olsen in charge). Prequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

121. Design Delinieg (4) II. Olsen Studio—8 hours; field trip. Prequisite: courses 20A, 20B, and 20C. Exploration of the process of delinieg, including principles of perspective drawing, rapid visualization techniques (the quick sketch), rendering, and graphic presentation methods.

124. Textile Structures (4) III. L. interchange. Studio—8 hours; field trip. Prequisite: course 23 or 24. Art and the design of color and building structures in textile materials. Studio projects in experimental two- and three-dimensional form and with emphasis on relationships to architecture, furniture, and interior design.

126. Visual Presentation (4) I. Gotlieb Studio—8 hours; two field trips. Prequisite courses 6, 20A, 20B. Study of display and exhibition design. Emphasis on concepts and techniques of three-dimensional design, including visual exhibit and museum installation.


131. Layered Textiles (4) II. L. interchange. Studio—8 hours; one or two field trips. Prequisite: background knowledge of woven ornament and new textile techniques recommended. Exploration of multi-choice and layered textiles: applique, patchwork, quilting, stumpwork. The individualized research of materials and techniques on contemporary textiles.


133A-133B, 133C. Visual Metaphor (4-4-4) III 133A only. The Staff (Butler in charge). Studio—8 hours; field trip (133C only). Prequisite: courses 20C, 22, 25. Study and practice of image generation and production with emphasis on clarity of visual expression, the perception and use of color, and visual composition in the three-dimensional context.

135. Furniture Design (4) III. Olsen Studio—8 hours; one or two field trips. Prequisite: course 21. Study and production of furniture for interior and exterior spaces. Includes behavioral and physiological requirements, historical expression, structural and aesthetic considerations.

140A. History of Design (3) III. The Staff (Butler in charge). Lecture—5 hours. Prequisite: Art 1A (May be taken concurrently). The history of Western design from Ancient Egypt and the Middle East through the Aegian and Classical civilizations to the waning of the Middle Ages.

140B. History of Design (3) II. The Staff (Butler in charge). Lecture—5 hours. Prequisite: 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, industrialization to the emergence of modernism.

142A. World Textiles, Far East and Pacific (4) I, II. Rivers Lecture—5 hours; discussion—1 hour. Prequisite: Art 1A. Exploration through lectures and visual material of the textile arts of Japan, Korea, China, India, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of prime cultures.

142B. World Textiles, Middle East, Europe and United States (4) I, II. Lecture—3 hours; discussion—1 hour. Prequisite: Art 1A. Exploration through lectures and visual material of the textile arts of the Middle East, Europe and the United States with emphasis on aesthetic and stylistic qualities. The influence of Eastern textiles on textiles of Europe and the United States.

143. History of Costume Design (4) I, II. Stabb Lecture—3 hours; discussion—1 hour. Prequisite: Art 1A. History of costume design from the earliest period to the present with emphasis on both aesthetic and functional aspects.

144. History of Interior Design (4) III. The Staff (Gotlieb in charge). Lecture—4 hours. Prequisite: course 140A and Art 1C or the equivalent. History of interior design in Europe and America from the classical period to modern times. Emphasis on the dwelling in its cultural setting and the development of the theory of modern interior design.

190A-190B, 190C. Textile Design (4-4-4) I, II, III. Olsen Studio—8 hours; one or two field trips. Prequisite: courses 20A and 20B recommended. Exploration of the design and appreciation of hand printed textiles; emphasis on the unique qualities of the individual as a producer.

172A-170B-170C. Costume Design (4-4-4) I, II, III. Stabb Studio—8 hours; field trip. Prequisite courses 20A and 20C. Studio projects in costume design, consideration of functional and aesthetic factors influencing the historic, contemporary, and projected image of man as expressed through costume.

190A-190B, 190C. Interior Design (4-4-4) I, II, III. The Staff (Olsen in charge). Studio—8 hours; one or two field trips. Prequisite: course 21. Analysis, organization, and solution of interior design problems involving the social, cultural, economic, and esthetic needs of man. Consideration of the relationship of interior design to architectural and landscape design.

190D. Workshops in Design (4-12) I, II, III. The Staff (Olsen in charge). Seminar—2 hours; field experience—3 hours per week. Prequisite: course 190C. Instructors selected on the basis of training and current experience.

191A-D. Workshops in Design (4-12) I, II, III. The Staff (Olsen in charge). Seminar—2 hours; field experience—3 hours per week. Prequisite: course 190C. Instructors selected on the basis of training and current experience.

Preparatory Subject Matter

40 Written and oral expression (See College requirements, page 71)

American History and Institutions

8 Economic principles (Economics 1A-1B)

10 Statistics (Statistics 13, 103)

6 Mathematics, including calculus

Depth Subject Matter


11-13 Quant methods. Agricultural Economics 106

Policy and Planning: Choose one course from Agricultural Economics 120, 148: Economics 125A, 125B, 130, 131, 150B; Applied Behavioral Sciences 151, 152; Political Science 100, 174; Environmental Studies 160, 168A, 168B or the equivalent.

† Students meeting the American History and Institutions requirement must substitute Social Science as interpreted under the Social Sciences Breadth Subiect Matter requirement.

‡ Students graduating with this major are required to attain a grade of C (2.0) in upper division Agricultural Economics, Consumer Economics and Environmental Economics courses, plus any other upper division courses taken at the University which are specialization requirements.
Breadth Subject Matter........................................ 32
Natural sciences (including mathematics beyond Preparatory Subject Matter above) and agricultural and environmental sciences, including agricultural economics, consumer economics, and applied behavioral sciences........................................12 units minimum
Social sciences (excluding economics), history, and philosophy........................................ 20 units minimum
Restricted Electives............................................. 24
Specified within the Department of Agriculture Economics, Agricultural Economics 108, 148; Natural resource economics: Agricultural Economics 108, 176; Humant- resource economics: Agricultural Economics 150; Consumer- economics: Consumer Economics 141, 142; 4 units of Agricultural Economics 190A-190B or 4 upper division units of restricted electives.
Unrestricted Electives........................................... 51-53
Total Units for the Major........................................ 180

Preparatory Subject Matter...................................... 42-50
Written and oral expression (English I and Rhetoric 1 or 3)............................................. 6
Statistics (Statistics 13 or Economics 12)............................................. 4-5
Physics (Physics 1A-1B or 2A-2B-2C or 16 or Consumer Technology 17)............................................. 4-9
Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B, 8C)............................................. 16
Biology (Biology Sciences 1)............................................. 5
Bacteriology with laboratory (Bacteriology 2, 3)............................................. 4
Computer logic or programming (Consumer Technology 21 or Mathematics 19)............................................. 1-3

Depth Subject Matter.............................................. 51-63
Biochemistry (Biochemistry 101, 101B)............................................. 6
Physiology (Physiology 110, 110L)............................................. 7
Food Science and human nutrition: Food Science and human nutrition 101A, 101B, 102A, 102B, 103A, 103B, 110, 111, 11L, 116A, 116B, 190; and 114 or 117 or 118............................................. 20-22
Food Service Management 120, 120L, 121; 122, 123, 124; 14
Agricultural Economics 141, 142; 4

Breadth Subject Matter............................................ 17
Principles of economics (Economics 1A)............................................. 5
Sociology or cultural anthropology............................................. 4
General psychology............................................. 4
Principles of learning or methods of teaching (Applied Behavioral Sciences 173 or Education 119)............................................. 4

Unrestricted Electives............................................. 50-60
Total Units for the Major........................................ 180

Additional Specialization (Optional)
Students wishing to complete an additional specialization in Dietetics may elect any of the series of courses indicated below. Students are not required to elect any of these courses.

Clinical Dietetics specialization, include the following courses:
Biochemistry laboratory (Biochemistry 101L)............................................. 5
Chemistry, qualitative and quantitative analysis (Chemistry 1C, 5)............................................. 9
Human Anatomy (Medicine 101)............................................. 4
Community Nutrition specialization: include the following courses:
Nutrition 116A, 116B, 118, 119............................................. 10
Anthropology 2, 3, 143, 145............................................. 12
Food Service Management specialization, include the following courses:
Agricultural Economics 154............................................. 4
Economics 18, 11A-11B, 190A............................................. 17

Major Adviser. F.J. Zerman (Nutrition).
Advising Center for the major is located in 109 Everson Hall (752-2522).
Graduate Study. See page 95.

Dramatic Art

(College of Letters and Science)

Robert A. Farnham, Ph.D., Chairperson of the Department
Department Office, 222 Dramatic Art Building (752-0886)

Faculty
*Ruby Conk, Ph.D., Professor (Dramatic Art, Comparative Literature)
*Everald d'Hamoncourt Ph.D., Professor
Robert A. Farnham, Ph.D., Professor
Ralph Fetterly, M.A., Assistant Professor
Harry C. Johnston, M.A., Associate Professor
William E. Klieb, D.F.A., Associate Professor
Phillip J. Kress, M.F.A., Adjunct Lecturer
Robert K. Sarlo, Ph.D., Professor
Theodore J. Sharp, Ph.D., Professor
Daniel E. Snyder, Professor
Alan A. Stambusky, Ph.D., Professor
Darrell F. Winn, M.A., Adjunct Lecturer

The Major Program
Dramatic Art, with its program of coursework in each of the scholarly and artistic areas of the discipline, and with its University Theatre Season and its Pre- Professional Season, has the following objectives: to form intelligent theatre-goers as part of a liberal arts education (in both lower division and upper division work); to provide a foundation for potential professionals (primarily in upper division work); and to train specialists for careers in theatre, film, video, education, or related fields (graduate work).

The University Theatre. Each year the Department of Dramatic Art presents a series of stage productions of outstanding drama 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.

Dramatic Art A.B. Major Requirements:

Units
Preparatory Subject Matter...................................... 22
Dramatic Art 20, 21A, 24, 25 ............................................. 14
Dramatic Art 21B or 27 ............................................. 3-4
Additional units to achieve a total of 22 lower division units in Dramatic Art ............................................. 4-5

Depth Subject Matter.............................................. 40
In exceptional cases with the adviser's consent, he may petition to substitute up to 7 units from other Dramatic Art courses for any of the above courses.

A minimum of 4 elective units chosen from the following: Dramatic Art 115, 121A, 121B, 124C, 124D, 125, 152, 153, 154, or, with the adviser's consent, from appropriate literature courses in language and literature departments............................................. 4

Additional Requirements
During the undergraduate career majors are to participate in at least eight dramatic productions (exclusive of student or classroom projects). Participation must include work in acting, directing, stage management, and related activities.
Majors are also expected to attend theatre performances.

Total Units for the Major........................................ 62

Minor Program Requirements:

Units
Dramatic Art 124A, 124B, 156, 157 or 158, 159 ............................................. 20
Major Adviser. W.E. Klieb, T.J. Shank
Transfer Students. If you are a transfer student you should see the major adviser for an evaluation of your experience.

Teaching Credential Subject Representative. T.J. Shank. See page 99 for the Teacher Education Program.

Graduate Study. The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. (acting, directing, playwriting, or any combination of these), and Ph.D. (theatre research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser. E. d'Hamoncourt.
Dramatic Art

Lower Division Courses


115. Advanced Study of Major Film Makers (4) II. H'Domoncourt Lecture—3 hours; laboratory—2 hours. Prerequisites: course 124, a film genre course, and permission of instructor. Study of four major directors. Equipment may be required for credit when different film creator studied.

121A. Advanced Acting (4) I, II, III. The Staff Lecture—4 hours; laboratory—1 hour. Prerequisites: course 122 and consent of instructor. Advanced study of acting with emphasis on different countries and cultures. May be repeated for credit.

177. Tutoring in Dramatic Art (1-2) I, II, III. The Staff (Chairperson in charge) Prerequisites: upper division or graduate standing in major in dramatic art; consent of department chairperson. Leading of small volunteer groups affiliated with one of the department's regular courses. May be repeated for credit. (P/N grading only.)

186. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses

200. Methods and Materials in Theatre Research (4) I, II. Sarlo Lecture—3 hours. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluation and presenting evidence; delineating research areas in the field. Offered in alternate years.

211. Advanced Voice and Speech (2) I, II, III. The Staff Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical and modern plays. May be repeated for credit.

212. Advanced Stage Movement (2) I, II. The Staff Laboratory—2 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythmic movement patterns relating to acting problems in classic and modern plays. May be repeated for credit.

213. Special Problems in Advanced Acting (4) I, II, III. Johnson Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from the style and type of plays selected from Greece to the present. May be repeated for credit.

224A. Visual Problems in Theatre and Performance (4) I, II. Sarlo Seminar—2 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to advanced Art, Art History, and Drama majors. May be repeated for credit.

224B. Advanced Principles and Theories of Theatrical Design (4) I, II. The Staff Lecture—4 hours. Selected problems in the design of stage scenery and costumes; practice in design. May be repeated for credit.

224C, 224D. Advanced Principles and Theories of Theatrical Design (4) I, II. The Staff Seminar—3 hours. Design of a production for three different types of theatres: open stage, arena, and proscenium. May be repeated for credit.

224E. Advanced Principles and Theories of Theatrical Costume Design (4) II, III. The Staff Seminar—3 hours; research and design projects—30 hours (minimum). Prerequisite: course 123, consent of instructor. Costume design projects emphasizing research, principles, and theories; the planning and presentation of costume renderings, detail accessory sketches, and scale drawings of patterns. Projects from classic theatre, musical comedy, ballet, and opera. Offered in even-numbered years.

224F. Advanced Principles and Theories of Theatrical Lighting Design (4) III. Winn Seminar—3 hours; laboratory—2 hours. Prerequisite: course 124, a scenic design course, and consent of instructor. Design concepts, scripts, score analysis, color, composition and style. Projects presented in studio atmosphere. Equipment included: design, analyses, and drafted plots. Offered in odd-numbered years.

225. Seminar in Directing Theory: Realism (4) I, II. Kress Seminar—3 hours; term project. Modern directing theory as it applies to theatrical realism; development of dramatic concepts for productions of selected realistic plays; emphasis on textual analysis. Offered in even-numbered years.

226. Seminar in Directing Theory: Non-Realism (4) I, II. Kress Seminar—3 hours; term paper. Modern directing theory as it applies to non-realistic theatre: development of directing concepts for production of selected non-realistic plays. Presented emphasis on textual analysis. Offered in odd-numbered years.

228. Seminar in Directing Theory: Non-Realism (4) I, II. Kress Seminar—3 hours; term paper. Modern directing theory as it applies to non-realistic theatre: development of directing concepts for production of selected non-realistic plays. Presented emphasis on textual analysis. Offered in even-numbered years.
Earth Sciences and Resources; East Asian Studies

Faculty
The Group consists of forty-four faculty members from the Departments of Applied Science Engineering, Chemistry, Civil Engineering, Environmental Studies, Geography, Geology, Land, Air and Water Resources, Mechanical Engineering, and Physics.

Graduate Study. The Graduate Group in Earth Sciences and Resources offers M.S. and Ph.D. degrees for advanced training in a variety of interdisciplinary areas within the earth sciences. Among these areas are solid earth geophysics, geophysical fluid dynamics, climate dynamics, geological and materials science, renewable and nonrenewable resources, geochemistry and geophysics. The Group encourages applications from students with a strong background in the physical sciences but little previous background in the earth sciences.

Preparation. Applicants to the program are expected to have completed or be in the process of completing an undergraduate degree in some aspect of the physical sciences, mathematics, or engineering. Undergraduate study must include one year of calculus, one year of physics with calculus, and one year of chemistry. Additional courses in advanced calculus and computer programming are recommended. Also, before entering the program or during the first year of graduate study, students will be expected to acquire some familiarity with thermodynamics and continuum mechanics.

Core Curriculum. The core curriculum consists of the courses in Earth Sciences and Resources listed below. A master’s degree candidate is required to take five of the courses, and a doctoral candidate is required to take all seven courses (although not necessarily within the first year). Students will be exempted from courses in which they have already had previous training.

Earth sciences and resources, Earth Sciences and Resources 200

Solid-earth geophysics, Earth Sciences and Resources 240

Geothermodynamics, Geology 115

Physical and chemical oceanography, Environmental Studies 150

Groundwater hydrology, Civil Engineering 142

Specialization. Each student will pursue an individual program of advanced studies under the direction of a group of faculty members with similar interests but diverse backgrounds. Coursework in addition to the above is typically taken in the most appropriate graduate departments.

Graduate Advisers. K. L. Verous (Geology), T. M. Powell (Environmental Studies), J. A. Cheney (Civil Engineering)

Courses in Earth Sciences and Resources

Graduate Courses


207. Seminar in Earth Sciences (3) III. The Staff Seminar—3 hours. Prerequisite: graduate standing; consent of instructor. Seminar on current research in earth sciences and resources. Topic will change from year to year. May be repeated for credit.

208. Group Study (1-2) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU or grading only)

209. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only)

East Asian Studies

(Chapel of Letters and Science)

Donald Gibbs, Ph.D., Program Director
Program Office, 912 Sprout Hall (752-1219)

Committee in Charge

Mary H. Fong, Ph.D. (Art History)
Donald Gibbs, Ph.D. (Comparative Literature)
Gary G. Hamilton, Ph.D. (Sociology)
Earl H. Kinnmont, Ph.D. (History)
Whalen W. Leu, Ph.D. (Religious Studies)
Kwong-Ching Liu, Ph.D. (History)
Don C. Price, Ph.D. (History)
Janet S. Shihamoto, Ph.D. (Comparative Literature)
Barbara E. Wallacker, Ph.D. (Comparative Literature)

The Major Program

The East Asian Studies major is designed to give the student an understanding of East Asia (especially China and Japan) through interdisciplinary studies, combining a wide range of knowledge in an oriental language with courses on East Asian countries. The program provides a foundation either for a career that involves work with East Asian affairs and people (e.g., journalism, business, government service, teaching, and counseling), or as preparation for graduate studies in the East Asian field. Students are required to develop a special field (e.g., anthropology, art history, oriental languages) within the major, either in consultation with their advisor.

Since six quarters of language work are required, students normally should apply to this program in their sophomore year.

East Asian Studies

A.B. Major Requirements:

Preparatory Subject Matter

52-58 History 9B, 9C

6 One course from Art 10, 20, Comparative Literature 53A, History 90A, 90B

6 Political Science 9, Religious Studies 4A, 4B

4 Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2-3-4-5-6; Japanese 1-2-3-4-5-6).

30-36
Minor Program Requirements:
Courses taken for the minor are expected to reflect a predominant interest in either China or Japan, but to provide some exposure to the other of the two countries. All courses count towards the East Asian Studies major, including individual and group study courses (198, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominantly with China, Japan, or both.

Courses in East Asian Studies:
The following courses count toward the major and are open to students throughout the campus. Refer to departmental listings for course descriptions.

Anthropology
190. Cultures of China and Korea
191. Culture of Japan

Art
10. Asian Art
20. Myths and Symbols in Chinese Art
163A. Chinese Painting
163B. Chinese Painting
154. The Arts of Japan

Chinese
213-2, Elementary Modern Chinese
214-45, Intermediate Modern Chinese
101. Classical Chinese
111. Modern Chinese Literature: Reading and Discussion

Comparative Literature
103A. Literature of the Eastern World: China and Japan

Economics
171. Economy of Asia

Geography
127. Geography of Contemporary China

History
94. History of East Asian Civilization
98. History of East Asian Civilization (Japan)
90A. Modernization of China
90B. Modernization of Japan
1020. Undergraduate Proseminar: China to 1800
1021. Undergraduate Proseminar: China since 1800
1022. Undergraduate Proseminar: Japan

190A, 190B. Late Imperial China: Background to Revolution
190C, 190D. The Chinese Revolution
191A. Classical China
191B. Civil War Era
193. History of the People's Republic of China, 1949 to the Present
194A. Antiqua and Faustian Japan
194B. Early Modern Japan
194C. Modern Japan
194D. Topics in Japanese Social and Economic History
195. Modern China and the World

Japanese
4-8. Intermediate Modern Japanese
101. Literary-Style Japanese
111. Japanese Composition
121-122. Modern Japanese: Reading and Discussion

Oral Languages and Civilizations
100. Languages of Eastern Asia

Political Science
91. Government in Contemporary Countries and Regions
133. The American Role in Asia
138. International Relations: East Asia
148A. East Asia: Government and Politics in East Asia

Religious Studies
70. Introduction to Buddhism
112. Ch'an (Zen) Buddhism

Sociology
147. Sociological Perspectives on East Asia

Courses in East Asian Studies:

Lower Division Courses
1. Modern Chinese Literature (In English) (3) II. GIBB Lecture—3 hours. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels. Designed to provide a feeling for what China has experienced in the twentieth century.


Upper Division Course
*150. The East Asian World Order: Its Evolution and Transformation (4) II. GIBB Lecture—3 hours. Term paper. Prerequisite: History 190A and/or 199 recommended. Survey of Chinese, Japanese, and Korean history in East Asia from 1800 to the present, focusing on the region's premodern system of inter-state relations, and a history of relations among China, Japan, Korea, and Vietnam in modern times.

Ecology (A Graduate Group)

P. Merton Love, Ph.D., Chairperson of the Group (752-6751)

Group Office, 2146 Wickson Hall (752-6752)

Faculty. The Group includes faculty from 45 departments in five schools and colleges.

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in three broad study options: (1) biological, (2) human, and (3) physical and chemical ecology. Specializations are possible in each of the three. Details of the program may be obtained from the Chairperson of the Group.

Preparation. Appropriate preparation is under-graduate work in any of the biological, social, or behavioral, and physical sciences, mathematics or engineering. But note that all applicants to the (1) biological and (3) physical-chemical areas will normally be expected to have completed a one-year sequence in basic biology, in elementary chemistry (organic chemistry strongly recommended), in elementary physics, a course in statistics, calculus and computer programming, or other suitable mathematical training, and a course in ecology. Applicants to the (2) human ecology area will normally be expected to have completed a one-year sequence in basic biology; a course in evolution or genetics; two courses in chemistry; one course in physics; one course in calculus, one in statistics; and a course in ecology. Each of the three broad areas requires certain advanced preparation appropriate to the area.

Breadth Requirement. All degree candidates are required to take a course from each of the following three study areas. Recommended:

a. Biological Ecology courses: Environmental Studies 100 (general ecology), Zoology 125 (animal ecology), Entomology 104 (insect ecology), or Botany 117 (plant ecology).

b. Human Ecology courses: Environmental Studies/Anthropology 161 (principles of human ecology), Environmental Studies/Anthropology 141 (cultural ecology), or Geography 170 (cultural ecology).

c. Physical and Chemical Ecology courses: Environmental Studies 151-151L (limnology), Environmental Studies/Geology 150A (physical and chemical oceanography), Meteorology 133 (biomechanics), or Wildlife and Fisheries Biology 153 (Wildlife in Polluted Environments).

Graduate Advisor. R. M. Love.

Related Courses. Many departments offer such courses. A list of these courses is available at the Group Office.

Courses in Ecology

Graduate Courses

201A-201B* Advanced Biological Ecology (4-4) II. Schorrer in charge (Zoology), Bot (Zoology). Zoo (Zoology), Sex (Zoology), Wildlife (Zoology)

103A. Literature of the Eastern World: China and Japan

210A. Advanced Topics in Human Ecology (4) III. Orlove (Environmental Studies)

101. Introduction to Buddhism

112. Ch'an (Zen) Buddhism

147. Sociological Perspectives on East Asia

150. The East Asian World Order: Its Evolution and Transformation (4) II. GIBB

212A. Environmental Policy Analysis: Evaluation (4) I. Schwartz, Cramer, and Willer (Environmental Studies)

212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz, Cramer, and Willer (Environmental Studies)
Economics (College of Letters and Science)

Steven M. Sheffrin, Ph.D., Acting Chairperson of the Department
Department Office, 380 Kerr Hall (752-0741)

Faculty
Moshe Adler, Ph.D., Assistant Professor
Andrei Brzostki, Ph.D., Professor
Mark Dynarski, Ph.D., Assistant Professor
*Bruce Glassburner, Ph.D., Professor
W. Eric Gustafson, Ph.D., Senior Lecturer

NOTE: For key to footnote symbols, see page 124.

Economics


American History and Institutions. This University requirement can be satisfied by Economics 111A, 111B. (See also page 62.)

Teaching Credential Subject Representative. A. Breski. See page 99 for the Teacher Education Program.


For information on admission to graduate study, degree requirements, and financial aid, consult the Announcement of the Graduate Division and contact the chairperson of the departmental graduate committee.


Courses in Economics

Lower Division Courses

1A. Principles of Microeconomics (5) L, I, II, III. The Staff Lecture—4 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems.

1B. Principles of Macroeconomics (5) L, I, II, III. The Staff Lecture—4 hours; discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the economy as a whole, determinants of the level of income, employment, and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy.

11A. Elementary Accounting (4). Oettinger Lecture—4 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. (Debited granting only, pending completion of 11A-11B sequence.)

11B. Elementary Accounting (4). Oettinger Lecture—4 hours; discussion—1 hour. Prerequisite: course 1A. Continuation of course 11A. (Debited granting only, pending completion of 11A-11B sequence.)

12. Introduction to Quantitative Methods in Economics (5). Oettinger Lecture—4 hours; labor—2 hours. Prerequisite: two years of high school algebra. 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. Not open to students having credit for Statistics 13, or Sociology 48A-48B.

48. Lower Division Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1 to 3 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

92. Internship and Field Work (1-12) I, II, III. Oettinger Laboratory—3 to 6 hours; term paper. Prerequisite: junior or senior standing; availability of internship positions or approved field work project; stock-brokerage intern must have completed course 11A-11B; consent of instructor. Internship, study of practice of disciplines in economics, stressing research methods and empirical analysis. (P/NP grading only.)

98. Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)
12.18. Industrial Organization (4) III. The Staff Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other public policies toward industry; economics of regulated industries.

12.3. Ecology and Economics (4) I. Gustafson Lecture—6 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M). The environment and economic growth; growth and quality of the environment; policy instruments, costs and benefits of pollution control; social equity; and comparative policy analysis; the role of government in the environment.

12.5A. Urban Economics (4) II. Sullivan, D.yniki Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M), or consent of instructor. Analysis of the economic and social factors influencing urban systems. Topics include: the role of government in urban systems; urban systems in the context of the national economy; and the impact of urban systems on the national economy.

12.6. Public Microeconomics (4) II. Dynanski Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, or consent of instructor. Public expenditures: theory and applications. Efficiency and equity of competitive markets; externalities; public goods, and market failures; policies to reverse the effects of policy failure; the role of public policy in international trade; and the role of international trade in the economy.

13.1. Public Finance (4) II. Helms Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 100M, or consent of instructor. Public revenues and expenditures. Theory and applications. Efficiency and equity of taxes, including taxes on income, property, and sales; and tax policy and tax reform.

13.4. Corporation Finance (4) II. Shen Lecture—6 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 100M, or consent of instructor. Corporate finance. Capital structure and capital budgeting. The role of government in corporate finance. The role of government in the stock market. The role of government in the bond market.

13.5. Money, Bank and Financial Institutions (3) II. Mayer Lecture—3 hours. Prerequisite: courses 1A-1B or consent of instructor. The role of government in the operation of banks and financial institutions. The role of government in the management of money.

13.6. Monetary Theory (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Monetary theory and its applications. The role of government in the economy. The role of government in the financial system. The role of government in the international economy.

13.6A. Trade Unionism (4) II. Getter Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. The role of government in the trade union movement. The role of government in the labor market.

13.6B. Labor and Public Policy (4) II. Getter Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. The role of government in the labor market. The role of government in the labor market. The role of government in the labor market.

15.1B. Economics of Human Resources (4) III. Shafter Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. The role of government in the labor market. The role of government in the labor market. The role of government in the labor market.

20.1. Urban Economics (4) II. Staley Lecture—6 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 100M, or consent of instructor. The role of government in the urban system. The role of government in the urban system. The role of government in the urban system.

20.3. Public Microeconomics (4) II. Dynanski Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, or consent of instructor. The role of government in the microeconomy. The role of government in the microeconomy. The role of government in the microeconomy.

20.6. Corporation Finance (4) II. Shen Lecture—6 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 100M, or consent of instructor. The role of government in the corporate finance. The role of government in the corporate finance. The role of government in the corporate finance.

20.6A. Monetary Theory (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. The role of government in the monetary theory. The role of government in the monetary theory. The role of government in the monetary theory.

20.6B. Labor and Public Policy (4) II. Getter Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. The role of government in the labor market. The role of government in the labor market. The role of government in the labor market.

15.1B. Economics of Human Resources (4) III. Shafter Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. Human resource analysis; introduction to human resource management; the role of government in the human resource management. The role of government in the human resource management. The role of government in the human resource management.

15.1C. Labor and Public Policy (4) II. Getter Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. The role of government in the labor market. The role of government in the labor market. The role of government in the labor market.
19B. Economic History (4) III. Tuma
Seminar—4 hours. Prerequisite: course 20A or 20B or consent of instructor. Content may vary from one year to another.

19C. Introduction to Microeconomics (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 or 100C or 101A or 101 or 214A.

20A. Microeconomics (5) II. The Staff (Chairperson in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 or 100C or 101A or 101 or 214A. This course is a prerequisite for the major in economics.

20B. Economic History (4) III. Tuma
Lecture—2 hours; seminar—2 hours. Prerequisite: course 20A or 20B or consent of instructor. This course is a prerequisite for the major in economics.

20C. Introduction to Microeconomics (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 or 100C or 101A or 101 or 214A. This course is a prerequisite for the major in economics.

20D. Public Finance (4) III. Heims
Lecture—2 hours; seminar—2 hours. Prerequisite: course 20A or 20B or consent of instructor. This course is a prerequisite for the major in economics.

211B. Economic History (4) III. Tuma
Lecture—discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest.

211C. Economic History (4) I. Olmstead
Lecture—discussion—4 hours. The United States from colonial times to the present. Other aspects of the western hemisphere may be studied, according to student interest.

212D. Economic History (4) I. The Staff (Chairperson in charge)
Lecture—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research.

215A. Economic Development (4) I. Kaneda
Seminar—3 hours; discussion—1 hour. Prerequisite: a graduate course in economic development or the equivalent, or consent of instructor. Topics such as economic development as they relate to demographic processes, distribution issues in economic development. (Same course as Agricultural Economics 215A.)

215B. Macroeconomic Development (4) V. Glassbunton
Seminar—3 hours; discussion—1 hour. Prerequisite: course 215A. The macroeconomics of economic development: monetary policy; poverty problems; international trade; specific country studies. (Same course as Agricultural Economics 215B.)

215C. Economic Development in Agriculture: Policy and Planning (4) III. McCalla (Agricultural Economics)
Lecture—4 hours. Discussion—2 hours. Prerequisite: course 215A or the equivalent. Agriculture in the structure of developing nations; its role in economic development; agriculture and national development; index numbers relating to prices; inputs, productivity and marketing; international aspects of trade; aid, and technical assistance; country case studies. (Same course as Agricultural Economics 215C.)

215D. Development Programming (4) I. The Staff
Seminar—3 hours; discussion—1 hour. Prerequisite: course 215A or the equivalent. Development plans, programs and policies. Application of input-output programming, and operations research. Techniques of program evaluation. (Same course as Agricultural Economics 215D.)

216. Economic Systems (4) II. Braverman
Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance.

217. Economics of Planning (4) III. Braverman
Lecture—4 hours. Theories and principles of economic planning under various economic systems.

219. Marxian Economic Theory (4) I, II, III. The Staff
Lecture—4 hours. Prerequisite: course 20A or 200C. Advanced topics in the theory of the firm, distribution theory, welfare economics.

219A. Advanced Economic Theory (4) III. Knorin
Seminar—4 hours. Prerequisite: courses 20A and 200C and 200E General equilibrium theory: capital theory; growth theory.

224. Microeconomic Analysis (5) I, Shaffer
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 (or 100M) or Agricultural Economics 100A, 100B and Mathematics 16A, 16B. Open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics. Illustrations and applications. (Same course as Agricultural Economics 224.)

225. Macroeconomic Analysis (5) II. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 101. Mathematical theory of the way in which supply and demand determine the balance of payments, inflation, and unemployment.

227. Special Topics in Mathematical Economics (4) II. Poore
Seminar—3 hours. Prerequisite: courses 20A and 20B or consent of instructor. Special topics in mathematical economics. Contents may vary from one year to another.

230B. Economic History (4) I, Tuma
Seminar—4 hours. Method and theory of economic history. Critical analysis of the literary and theoretical history of economic change as illustrated by major economic phenomena drawn from the history of different countries.

NOTE: For key to footnote symbols, see page 124.
Education

(College of Letters and Science)

Julius M. Sassenrath, Ph.D., Chairperson of the Department

David R. Wampler, Ph.D., Head of Teacher Education

Department Office, 180 Kerr Hall (752-0759)

Faculty

Donald G. Armitage, Ph.D., Professor

Glen R. Bacon, Ed.D., Lecturer in and Coordinator of Teacher Education

Hugh C. Black, Ph.D., Professor

Vincent A. Crockenberg, Ph.D., Associate Professor

W. Augustine Davis, Ph.D., Lecturer in and Supervisor of Teacher Education

Lynnea C. Ehrl, Ph.D., Professor

Richard A. Figueroa, Ph.D., Associate Professor

Kathleen M. Fisher, Ph.D., Associate Professor (Education, Biological Sciences)

Jane Garrity, M.A., Lecturer in Teacher Education

Maryanne Governor, B.A., Lecturer in and Supervisor of Teacher Education

Jack E. Lowry, M.A., Lecturer in and Supervisor of Teacher Education

Barbara J. Menino, Ph.D., Assistant Professor

Douglas L. Minnis, Ed.D., Senior Lecturer

Susan A. Ostergard, Ed.D., Lecturer in and Supervisor of Teacher Education

Victor A. Perkes, Ed.D., Lecturer in and Supervisor of Teacher Education

Jonathan H. Sandoval, Ph.D., Associate Professor

Julius S. Sassenrath, Ph.D., Professor

S. Joan Skinner, M.A., Lecturer in

Carlton J. Spring, Jr., Ph.D., Associate Professor

Larry F. Thompson, Ph.D., Associate Professor

David R. Wampler, Ph.D., Lecturer in and Supervisor of Teacher Education

George D. Yorgo, Ph.D., Professor

Student Services. Office is located at 174 Kerr Hall.

Teacher Education Curricula

For a statement of complete requirements and appointments with credential advisers, contact the departmental Student Advising Office. 174 Kerr Hall. Interested students are urged to do this as early as possible in their academic career.

Applicants to the basic (multiple subject or single subject) credential programs should contact the Student Advising Office for forms and procedural information early in the fall quarter of their senior year.


(The Department of Education does not offer an undergraduate major program. However, it does offer a minor.)

Minor Program Requirements:

Educational theory is considered to be the foundation or basic area for undergraduates to elect as a minor if they wish to (1) major in an allied program, (2) obtain a teaching credential, (3) obtain a master's degree in education or allied field, (4) obtain a Ph.D. in Education, or (5) enter a profession that focuses on work with people, (6) seek employment in governmental or industrial training pro-

grams, or (7) obtain a better understanding of the issues and concerns of public and private education.

<table>
<thead>
<tr>
<th>MINISTRY (minimum units)</th>
<th>29-32</th>
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<tbody>
<tr>
<td>Education</td>
<td>110</td>
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<tr>
<td>Education</td>
<td>115</td>
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<td>Education</td>
<td>120</td>
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<tr>
<td>Depth courses</td>
<td>122</td>
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<td>8-11</td>
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At least 8-11 units from Education 100, 116, 117A, 117B, 120, 122, 123, 130, 140, 149, 151, 152 or 163, chosen in consultation with an Education advisor. Minor Advisers. All faculty members with professional titles.

Courses in Education

Lower Division Course

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. For primarily for upper division students. (NPN grading only.)

Upper Division Courses

100. Introduction to Teaching (3) I, II, III. Minnis, Crockenberg, Lowry. Lecture—1 hour, seminar—1 hour, field work—3 hours. Study of the classroom teacher's responsibilities and work environment. Skills for classroom activities, observation, and tutoring in a public school.

110. Educational Psychology: General (4) I, II, III. Ehrl, Sassenrath, Yorgo. Lecture—4 hours, Prerequisite: Psychology 1, upper division standing, learning processes, intellectual development, individual differences and testing.


115. Educating Handicapped Children (4) I, II, III. The Staff. Lecture—4 hours, Prerequisite: upper division standing, educational processes and skills required for teaching handicapped children who are integrated into regular classrooms.


117A. Psychology of Reading (3) I, Ehrl. Lecture—3 hours. Prerequisite: Psychology 1 or the equivalent and upper division standing. Analysis of the verbal-learning and motivational principles to the design of a curriculum for the world-identification stage of beginning reading.

117B. Psychology of Reading (4) II, Spring. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 117A recommended. Theory and research on psychological processes involved in learning to read.


130. Issues in Higher Education (4) III. Crockenberg, Armitage, Minnis. (Mathematics) Discussion—3 hours, lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Analysis of current issues in higher education and some practical implications of various philosophical approaches to the role of the university.

130L. Issues in Higher Education Laboratory (1-4) I, II, III. Armitage, Crockenberg, Minnis. (Mathematics) Discussion—1-2 hours, fieldwork—research—3-6 hours. Prerequisite: course 130 (with a passing grade) and consent of instructor. Individual and/or group research on a current issue in higher education. (NPN grading only.)

140. Radical Education: Critique of Schooling (4) I, III. Troumer. Lecture—2 hours, discussion—2 hours. Prerequisites: designed primarily for upper division students with some background in social sciences. Discussion and analysis of the ideas of Hox, Marx (primarily through commentaries), and Freire particularly as they critically analyze schooling within the context of modern industrial, capitalist society. A critical analysis of the conservative trend in education.

145. Aesthetics in Education (4) I, Armitage. Lecture—2 hours, discussion—2 hours. Prerequisite: upper division standing. Consider the role of the arts in education. Exercises on various concepts of the nature of art and aesthetic experience, and relate this to instructional procedures.

149. Teaching Urban Youth (4) II, Davis. Lecture—2 hours, discussion—2 hours. Prerequisite: upper division standing. Assessing, analyzing, and seeking solutions to urban educational problems. Focus on learning to understand and cope with problems in the urban classroom and school.

150. Tutoring Children and Youth (2) I, II, III. Davis. Lecture—1 hour, tutoring or teaching aide—3 hours. Prerequisite: upper division standing. Planning, choosing, and implementing strategies for tutoring or working as a teacher's aide in schools. An analysis of factors that affect pupil performance in schools. May be repeated twice for credit when tutoring is done in different major area.

151. Language Development in the Chicano Child (3) I, Minnis. Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom.

152. Communication Skills for Bilingual Teachers (3) I. The Staff (Merrin in charge). Lecture-discussion—2 hours, field work—3 hours, Prerequisite: course 151; Spanish 1A-1B, consent of instructor. The development of communication skills of prospective teachers with an emphasis on the study use of standard Spanish and Southwest Spanish dialects in teaching science, mathematics, social science, music, art, and language arts in bilingual elementary school. (NPN grading only.)

153. Guidance and Counseling (4) I, II, III. Figueroa, Sandoval. Lecture—4 hours. Prerequisite: course 150 (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.

154. Practicum and Seminar in Counseling (2) I, II, III. The Staff. Seminar—2 hours. Prerequisite: course 163 and consent of instructor. Practicum and seminar in counseling in youth and adults. May be repeated twice for credit. (NPN grading only.)

156. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. (NPN grading only.)

157. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: upper division standing and consent of instructor. (NPN grading only.)

Graduate Courses

200. Educational Research (2) I, II, III. Lecture—1 hour, seminar—1 hour. Prerequisite: course 114 for the equivalent, or consent of instructor. A study of how to design, interpret, and conduct educational research.

204. Existential Thought and Education (4) II. Trotter Lecture—1 hour; discussion—1 hour; seminar—2 hours. A study and critical analysis of the implications of existential thought for modern language and education. 

205. The Concept of Blind in Teaching (4) I. Armstrong Seminar—4 hours. A philosophical analysis of the problems of educational practices which are cruel, degrading, and sometimes solved by varying conceptualizations of mind and thinking.

207. Concepts of the Curriculum (5) III. Armstrong, Crockett, Berg Seminar—5 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis in the determination of curriculum theory and practice, including the conceptual analyses of purposes, the organization of subject matter, and the methods of instruction.

236. Education and the Law (4) I. Crockett Seminar—4 hours. Prerequisite: graduate standing. An analysis of how selected areas of school law have developed the roles of school judges and teachers under the First and Fourteenth Amendments to the U.S. Constitution, criticism of the present state of that area, and an understanding of the legal issues involved.

239. Pedagogy (4) III. Yonge, Trotter Seminar—4 hours. A critical analysis of the literature available in English dealing with theoretical and practical issues in education and learning. Pedagogy (i.e., an existential phenomenological approach to the systemic study of education).

247. Psychopedagogy (4) II. Yonge Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. A phenomenological approach to the psychological aspects of the educational situation (psychopedagogical). A critical consideration of how psychopedagogy contributes to the theory and practice of education.


249. Individual Assessment (4) I. Sandoval Lecture—4 hours. Prerequisite: courses 114 and 219, admission to school psychology credential program. Theories of intellectual functioning and the role of language in cognitive development. A critical consideration of the relationship between language and intellectual development.

251. Motivation and Behavior Modification (3) III. Spring Lecture—17 hours; discussion—19 hours. Prerequisite: course 110 or consent of instructor. Analysis of the various theories of motivation and behavior modification. Special emphasis on the use of these theories in the classroom and in the development of educational programs.

252. Testing Minority Children (4) I. Figueroa Lecture—4 hours. Prerequisite: graduate standing or consent of instructor. Analysis of the various theories of motivation and behavior modification. Special emphasis on the use of these theories in the classroom and in the development of educational programs.

256. Educational Testing and Evaluation (3) III. Saksenrahan Seminar—3 hours. Prerequisite: courses 114 and 300 or consent of instructor. A study of test theory as it applies to research and evaluation in education, with an emphasis on general ability and reading tests.

257. Research in Bilingual and Second Language Education (3) III. Meier Lecture—4 hours. Discussion—1 hour; seminar—2 hours. Prerequisite: course 151; knowledge of a foreign language. Discussion and analysis of the role of bilingual and second language education in education. Topics include: language acquisition in second language learners and bilinguals; second language teaching methods; bilingual education; interaction analysis in bilingual and second language classrooms; use of the vernacular in classroon.

258. Multilingual/Multi-Cultural Instructional Strategies and Curriculum (4) III. Saksenrahan Seminar—3 hours; field work—3 hours. Prerequisite: proficiency in Spanish; courses 151, 152; Methods and techniques for teaching multicultural bilingual/literature and content instruction in elementary school. Topics include: use of cross-cultural strategies in classroom instruction; multicultural research on cognition and motivation; development of multimedia bilingual cross-cultural curriculum.

NOTE: For key to footnote symbols, see page 124.

259. Language Arts in Bilingual Education (3) II. Merino Seminar—2 hours; field work—2 hours. Prerequisite: course 151 or the equivalent; proficiency in Spanish. Analysis and development of language arts curriculum for bilingual and cross-cultural classrooms. Topics include: language assessment, methods of teaching reading in Spanish, use of dual-language curricula in the teaching of reading and writing in English and Spanish as a first and second language.

269. Reading Diagnosis and Prescription (3) II. Gatmaitan Lecture—2 hours; discussion—1 hour. Prerequisite: course 300 or the equivalent. The diagnosis and treatment of reading disabilities with emphasis on the recognition of reading abilities. Analysis of clinical techniques, testing, use of material and teaching procedures.

270. Clinical Laboratory and Seminar in Reading Problems (5) III. II. Bacon Seminar—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Development and application of diagnostic and prescriptive techniques in a reading clinic. (Deferred grading only, pending completion of two-quarter sequence.)

271. Recent Developments in Social Studies Education (3) III. Lewy, Wappler Lecture—2 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rational, goals, objectives, methods, and evaluation of social studies curriculum projects.

272. Recent Developments in Science Education (3) III. Zuckerman Lecture—2 hours. Prerequisite: consent of instructor. Analysis of contemporary science programs with special emphasis on philosophical, psychological and pedagogical attributes of their design, issues, and research in science curriculum and instruction.


275. Effective Teaching (4) II. Minnis Seminar—4 hours. Review of research on the relationship of effective teacher behavior and student learning. Use research on teacher effectiveness to develop teaching strategies. Ways to decide on the most appropriate instructional strategies in specific teaching situations.

276. Design of Staff Development Programs (4) III. Minnis Seminar—4 hours. Use of research and best professional practices, and legislative guidelines to design staff development programs for school personnel. Emphasis on the role of the teacher and the development of staff development programs. Consideration of political perspectives and the views of teacher organizations.

278. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing; consent of instructor. Small group study of special problems of a related student. (SU grading only.)

279. Individual Research (1-5) I, II, III. The Staff (Chairperson in charge) Individual research for graduate students. (SU grading only.)

Professional Courses

300. Reading in the Elementary Schools (4) I, II. Bacon, Gallagher, Skinner Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching reading in the classroom. Special emphasis on the teaching of reading skills to related students and families. (SU grading only.)

301. Reading in the Elementary School (4) I, II. Discussion—4 hours. Prerequisite: teaching reading in the classroom. Principles, procedures, and curriculum materials for teaching reading in the classroom. Special emphasis on the teaching of reading skills to related students and families.

302. Language Arts in the Elementary School (2) I, II. Bacon, Gallagher, Skinner Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching reading in the classroom. Special emphasis on the teaching of reading skills to related students and families.

303. Art Education (3) I, II. Garrison Lecture—1 hour; discussion—1 hour. Laboratory—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in the arts through participation. Development of concepts, instruction in art media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration.

304A. Teaching in the Elementary Schools (3-3.5) I. The Staff (Wampler in charge) Lecture—2 hours; seminar—2 hours. Prerequisite: teaching reading in the classroom. Preparation for an elementary school teaching position. Supervised teaching in regular or special education classrooms in regular or special education schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement. (SU grading only.)

305B. Teaching in the Middle Grades (5-7.5) I. The Staff (Wampler in charge) Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades or elementary school. Current conceptions of the middle grades curriculum with emphasis on special education, physical and social sciences. Emphasis on effective teaching methods.

305C. Teaching in the Middle Grades (5-7.5) III. The Staff (Wampler in charge) Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades or elementary school. Current conceptions of the middle grades curriculum with emphasis on special education, physical and social sciences. Emphasis on effective teaching methods.

306B. Teaching in the Middle Grades (5-7.5) II. The Staff (Wampler in charge) Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades or elementary school. Current conceptions of the middle grades curriculum with emphasis on special education, physical and social sciences. Emphasis on effective teaching methods.

306C. Teaching in Secondary Schools (5-9.5) I, II, III. The Staff Lecture—2 hours; seminar—2 hours; student teaching—10-21 hours. Prerequisite: acceptance into teacher education program. Supervised teaching in regular or special education classrooms in secondary school. Techniques for classroom communications, constructing goals and objectives, assessment of learning, special problems of adolescents, auto-visual techniques. Must be repeated by undergraduates for a total of 15 units; 21 units by graduate students in Physical Education and Music, and 24 units by all other graduate students.

308. Early Childhood and Kindergarten Education (3) III. Skinner Lecture—2 hours. Prerequisite: upper division or preprofessional student standing. Methods, materials, and history of educational programs for the preschool through primary grades. Development of curriculum methods and materials which stress integration of all subject areas with emotional, social, creative, physical, and cognitive development.

313. Secondary Art Methods (3) I. Garrison Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: open to students with Art major or secondary teaching specialty, or consent of instructor. Current readings and discussion of contemporary art and teaching. Formulation of curriculum and practice of techniques used in secondary schools. Observation and evaluation of several art education programs.

322. Methods in Secondary Social Studies (4) II. Lowry Lecture—4 hours. Prerequisite: acceptance into credential program and consent of instructor. A study of teaching concepts and thinking skills. Recent developments in teaching and learning relevant to teaching social studies.

323. Secondary School Curriculum: Science (4) I. Perkes Lecture—4 hours. Prerequisite: graduate or professional standing. Concepts of science curriculum and instruc-
Education Abroad Program

Robert A. Fahmner, Ph.D., Campus Coordinator Coordinator's Office, 150 Mank Hall
(752-0392)

Program Office, 323 South Hall (752-3014)

Programs of Study

The Educations Abroad Program (EAP) of the University of California offers upper-division students who meet the minimum course requirements (see page 48) the opportunity to experience a different culture while making progress toward degree objectives. Students interested in the language, literature, art, culture, history, or governmental or social institutions of the countries or areas where study centers are located will gain substantially from first-hand academic and practical experience. The same is true for students of foreign affairs. All students, whatever their field of study, will broaden their outlook and gain new skills as the result of study in a foreign country. The academic and non-academic experience of all participants in the EAP should be weighted carefully prior to departure, however.

Application

Applicants must participate in the program during their junior year. The program is designed to be taken during the academic year and cannot be taken as an independent study. Students interested in participating in the program should apply during their junior year. The application deadline for the program is the last day of classes in the fall quarter. Applications should be submitted to the EAP Office by the deadline specified in the EAP Office's guidelines.

Selection

The Academic Senate Committee on the Education Abroad Program is responsible for selecting EAP participants. Participants are selected on the basis of academic achievement and personal qualifications. Applicants will be notified of their selection status by the end of the fall quarter. Participants will be required to attend an orientation session prior to departure. The orientation will be held in the EAP Office and will include information on health and safety procedures, cultural sensitivity training, and academic expectations.

Graduation Requirements

All participants in the EAP program must fulfill the graduation requirements of their home institutions. The program offers opportunities to earn credits toward graduation at the University of California. Participants are encouraged to consult with their academic advisors to determine how the credits earned in the program will apply to their degree requirements.

Application:

All interested students should submit the application form and required documentation by the deadline specified in the EAP Office's guidelines. The application form and additional information can be found on the EAP Office's website.

Selection:

The selection process is based on academic achievement, personal qualifications, and the ability of the applicant to benefit from the program. The selection committee will consider the student's academic record, extracurricular activities, and personal statement. The committee will also consider the student's interest in the program and their ability to contribute to the cultural exchange.

Graduation Requirements:

Participants in the EAP program must fulfill the graduation requirements of their home institutions. The program offers opportunities to earn credits toward graduation at the University of California. Participants are encouraged to consult with their academic advisors to determine how the credits earned in the program will apply to their degree requirements. Participants should also ensure that their home institutions are aware of their participation in the program.

On-campus housing is available for participants in the EAP program. The housing options include apartments, dormitories, and other off-campus housing. Participants are encouraged to provide early notification of their housing preferences to the EAP Office.

Participants should ensure that their home institutions are aware of their participation in the program. Participants should also provide early notification of their housing preferences to the EAP Office.

Participants should ensure that their home institutions are aware of their participation in the program. Participants should also provide early notification of their housing preferences to the EAP Office.
Study Centers

At any one center, the courses and fields of study open to UC students may be limited. Moreover, each of the host institutions has special areas of excellence and strength. The listing of centers below incorporates select institutions concerning these points. More detailed information is available in the flyers describing each of the centers from and the academic counselor in the Coordinator's Office.

In addition to the programs listed below, Davis students have access to some special programs, such as the UC Davis-Quebec exchange, and consortium programs, such as language programs in the People's Republic of China. Information can be obtained in the EAP Office at South Hall.

Europe

Austria. The program is small and is designed to offer an opportunity to pursue a specialization in a limited number of highly qualified students. A compulsory intensive language course at Georg-August Universität in Goettingen, Germany, precedes the beginning of the academic year. All courses are taught in German.

University of Vienna. Eastern European studies (Bekans, Soviet Union), fine arts (history of art, music, theatre arts), folklore, history. (This is a cooperative program with Stanford University.)

France. A compulsory intensive language course precedes the beginning of the academic year. All courses in the universities are taught in French. UC faculty directors are in residence at Bordeaux, Grenoble, and Paris.

University of Bordeaux. Broad areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Anthropology) are well known.

University of Grenoble. Mainly in the social sciences through the Université des Sciences Sociales (Grenoble II); some humanities; mathematics and computer science. Offerings in anthropology, psychology, and history are severely limited. Not suitable for physical or life sciences.

University of Marseille. Biological sciences and environmental marine biology. The Marseille program is open only to students in the biological sciences. Students who have completed only one year of French are accepted for participation, but they must take part in the two-month summer intensive French program at the University of Montpellier, followed by the normal, compulsory intensive language program.

University of Montpellier. Humanities and literature, primarily through Paul Valéry University.

University of Paris. Film studies and some theatre studies. Graduate programs in history and literature.

Pau-Paris. The participants spend the first semester at the University of Pau and then, at the end of January, move to Paris to study at the University of the New Sorbonne (Paris III). In addition to required core courses in French civilization, students are able to take courses in humanities and social sciences, with emphasis on comparative cultural studies, French civilization, and language.

University of Poitiers. Humanities, with major emphasis in history and medieval studies, mathematics, physics.

Germany. A compulsory intensive language program precedes the beginning of the academic year. All courses are taught in German.

Georg-August Universität, Goettingen. Broad curricula covering most majors. Excellent science programs, with strengths in biology, chemistry, and physics. Space in laboratory courses in biology and psychology may be limited.

Italy. A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may become eligible for participation by attending a summer, intensive-language program offered by a UC campus in order to attain the required third-year-level, followed by the normal compulsory intensive language program in Padua. A UC faculty director resident in Padua administers all EAP programs in Italy. All courses are taught in Italian.

University of Padua. History of art (including archaeology), Italian literature (including linguistics), and political science (which includes history, social sciences, geography, and demography, as well as political science in the American sense). Sciences are not available for UC students.


Academia delle Belle Arti di Venezia, Venice. Art studio and some art history. Color slides of portfolio of artistic work must be submitted for admission.

Cini Foundation, Venice. Independent study projects for graduate students in art history.

Norway. Knowledge of Norwegian is not required, but a compulsory intensive course in Norwegian (mid-June to mid-August) precedes the beginning of the academic year. Intensive language study is continued during the fall semester. All courses are taught in Norwegian.

University of Bergen. Humanities, social sciences, natural sciences, and mathematics are available, but space in the sciences may be limited. The usual pattern is study of a single subject, usually the major or a closely allied field, for the entire year.

Spain. A compulsory intensive language program precedes the beginning of the academic year. All instruction is in Spanish.

University of Barcelona. Humanities (with emphasis on Spanish art, history, literature, linguistics) and some social sciences. A study program consists entirely of core courses developed for the Center and taught by the University of Barcelona. This is a cooperative program with the University of Illinois.

University of Madrid. Humanities and some social sciences. The core program, developed for the UC Study Center and other American programs, concentrates on Spanish studies in the broadest sense. Core and Study Center courses are taught by Spanish faculty. EAP students are required to take one regular-year-long course in the University of Madrid.

Sweden. Compulsory intensive language course during the summer for students who are not already fluent in Swedish. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of Swedish. Most courses are taught in Swedish, but a few courses offered in English may be available.

University of Lund. Broad curriculum. Excellent science programs.

United Kingdom and Ireland. The program, which includes 14 institutions, is administered by a director and associate director located in London. The UK program is highly competitive, largely due to its popularity with students. Following selection for participation by the EAP administration, a student must still be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in department only. Participating institutions are:

England: University of Birmingham, University of Bristol, University of Exeter, University of Hull, University of Kent, University of Lancaster, University of Leeds, University of Sussex, Westfield College (at the University of London), University of York. Occasionally, students may be placed on an ad hoc basis at other institutions.

Ireland: Trinity College (of the University of Dublin)

Scotland: University of St. Andrews, University of Stirling.

Wales: University of Wales (at Aberystwyth and Lampeter).

Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are unavailable. Polytechnic Cental London is open to students in architecture; and Wimbledon offers art studio, art history, and three-dimensional design, including theatre design.

USSR. The Russian program is a one-semester program organized by a consortium of American universities. Three years of Russian at the university level is a prerequisite. The program is primarily intended for language majors, but it is open to students of literature, history, area studies, etc. Leningrad State University. Russian language and civilization only.

Middle East

Egypt. All courses are taught in English; except courses in Arabic language and literature.

The American University of Cairo. A broad curriculum offered by the Faculty of Arts and Sciences. All students are required to take at least one year-long course in Arabic. Offerings in science are limited.

Israel. First priority is given to students who have completed at least one year of Hebrew. A compulsory language course precedes the beginning of the academic year. Study centers in Israel are administered by a UC faculty director located in Jerusalem.

University of Haifa. Humanities and social sciences, with special emphasis on contemporary Israeli and Arab-Jewish studies. Limited opportunities in the sciences. Special programs in Near Eastern Archaeology. Courses are taught in Hebrew. The Department of Study Programs for Overseas Students offers a core curriculum in Jewish, Middle East and Israel studies, social sciences, and history of modern Israel in English.

Hebrew University, Jerusalem. Broad curriculum: emphasis on Israeli and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English. The program offers courses in Judaic, Israel, Middle Eastern studies, and a few courses in the general social science and humanities. In addition, the School for Overseas Students in cooperation with the mathematics and science faculty offers an extensive one-year program in the sciences based mainly on laboratory courses. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

Far East

Hong Kong. A limited selection of courses is offered in English. Knowledge of Chinese is not required. Students must accept the enrollment requirement to include 18 units of Mandarin or Cantonese in their annual program. A compulsory intensive Cantonese program precedes the beginning of the academic year.
Endocrinology; Engineering

Chinese University of Hong Kong. Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available. (Information about courses to be offered in English is announced only one week before instruction begins.)

Japant. Completion of one year of Japanese at the university level or the equivalent is required for acceptance. (A compulsory intensive language course precedes the academic year.) Students are expected to complete an additional 18 units of Japanese language during their year in Japan. A limited number of courses taught in English are available.

International Christian University, Meitaka (Tokyo). Humanities and social sciences; emphasis on Japanese language and problems of the Orient.

University of Tsukuba. Open to graduate students only. Admission requires completion of at least two years of college-level Japanese. Major fields of graduate study are available; most UC students will be accepted in the Area Studies program.

Africa

Kenya. Enrollment open to undergraduate and graduate students. As in the British system, students may choose a program of study in their major or area of specialization. Examinations are given once, at the end of the academic year, and are mandatory for receiving credit. At this writing the Kenya Center is closed and it is not known when it will reopen. When it does reopen, the Center will change to a Southern Hemisphere calendar, with the academic year extending from early March through December. (Since operation of the Center is unpredictable, interested students should contact the EAP Office in South Hall for the latest status reports.)

University of Nairobi. Humanities and social sciences; emphasis on African studies. Limited opportunities in the sciences and in veterinary science. Graduate students in history, political science, sociology, architecture, and design may associate with the Institute for Development Studies, Institute for African Studies, and the Housing and Research Development Unit.

West Africa. The West African Study Center includes three universities in three different countries: University of Ghana (Ghana), University of Sierra Leone (Sierra Leone), and the University of Benin (Togo). A UC faculty director is in residence at the University of Ghana. The Center is intended primarily for students with interests in various aspects of African studies. (Since the operation of the West African Center is unpredictable, interested students should contact the EAP Office in South Hall for the latest status reports.)

University of Ghana, Legon-Accra, Ghana. Open to undergraduate and graduate students. As in the British system, students take a year-long program of study in a single area. End-of-year examinations are given only once and are mandatory for credit to be awarded. Offerings include humanities and social sciences, and some science. Emphasis is on African studies.

There is a strong program in ethnobotany.

Fourah Bay College, Freetown, Sierra Leone. Fourah Bay College is a constituent college of the Federal University of Sierra Leone. Since the College follows the British system, students will take a program of year-long courses in a single area. End-of-year examinations are given only once and are mandatory for receiving credit. Intensive course offerings on African-related topics, social sciences, and the arts, and some science and engineering are available. There is an Institute of African Studies and an Institute of Marine Biology and Oceanography.

University of Benin, Lome, Togo. The University of Benin follows the French system. Two years of the equivalent of college-level French are required and participants must attend a compulsory intensive language and orientation program in Togo prior to the beginning of the academic year.

The School of Letters offers programs in African literature, geography, philosophy, and applied social sciences, all with emphasis on Africa.

Latin America

Brazil. Language requirements for admission to this program are: two years of college-level Portuguese or the equivalent, or one year of college Spanish or one year of college Portuguese, or two years of college Spanish and completion of an intensive course in Portuguese prior to departure. Since courses are taught in Portuguese, the equivalent of one year of college-level Portuguese is the absolute minimum. A compulsory intensive language course precedes the beginning of regular course work.

University of Sao Paulo. Brazilian literature, Portuguese language, arts, humanities, social sciences. (This is a cooperative program with the University of Indiana.)

Mexico. A compulsory intensive language program precedes the beginning of the academic year. Students usually enroll in courses offered by the School for Foreign Students. Those who are qualified may have access to the full curricular offerings of the host university.

Universidad Nacional Autonoma de Mexico (UNAM). Mexico City. Humanities, social sciences, arts, practice. The School for Foreign Students offers Latin American art, literature, and history.

Mexico and Central American studies; and Spanish language and literature.

Peru. A compulsory intensive language course precedes the beginning of the academic year. All courses are taught in Spanish.

Universidad Catioca, Lima. Humanities, social sciences. Anthropology, archaeology, and ethnology are of special interest. (This is a program of the Peru Consortium, which is composed of the University of Indiana and a number of California universities.)

Australia

The Australian program includes the Australian National University in Canberra, and three institutions located in the Melbourne area, University of Melbourne, Monash University, and La Trobe University. A full range of academic programs is available. The Study Center accommodates a limited number of students and does not provide a UC faculty member as resident director. The students follow the British system of higher education.

As is appropriate in the Southern Hemisphere, the academic year extends from the beginning of instruction in early March through the examination period, which starts in November. UC participants must leave for Australia in February, and will be unable to attend classes during the winter term preceding departure. Applications for participation in the Australian program are due in May 1984 for a February 1985 departure.

Endocrinology (A Graduate Group)

George H. Stabenfeldt, D.V.M., Ph.D., Chairperson of the Group

Group Office, 1122C Medical Sciences 1A
(Reproduction) (752-3064)

Graduate Study. The interdepartmental Graduate Group in Endocrinology offers programs of study leading to the M.A. and Ph.D. degrees. The M.A. degree is offered under Plan I (thesis) of the master's program. Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the Announcement of the Graduate Division.

Graduate Advisers. Contact the Program Office, or see the Class Schedule and Room Directory.

Engineering

(Coilege of Engineering)

Mohammed R. Ghasi, Ph.D., Dean of the College

Roy Bainer, M.S., Ph.D., Dean Emeritus of the College

Don D. Baschi, Ph.D., Associate Dean—Undergraduate Study

Zabrin A. Munir, Ph.D., Associate Dean—Graduate Study

Ray B. Knome, Ph.D., Associate Dean—Research

College Office, 2132 Bainer Hall

Faculty

Warden Waring, Ph.D., Professor (School of Medicine)

The Major Programs

Eighteen undergraduate engineering curricula, including five formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Agricultural, Chemical, Civil, Electrical, and Mechanical Engineering curricula are five programs which have been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc., the nationally recognized accrediting body for engineering curricula.

Major Advisers. For advice or change of adviser, contact the College Undergraduate Office.

Graduate Study

See pages 95 and 92. For additional information refer to the College of Engineering Bulletin, obtainable from the College Undergraduate Office.

B.S. Major Requirements:

Except for the individual major, the four-year undergraduate program is divided into two parts, namely the appropriate Lower Division Program and the Upper Division Program of your choice.

Lower Division Curricula

Students who enter the College of Engineering with fewer than 64 quarter units of credit follow one of the three Lower Division Programs shown below. The first program (I) is for students in all majors other than Chemical Engineering or Agricultural Engineering—Forest Engineering option, the
second (II) is for majors in Agricultural Engineering—Forest Engineering option, and the third (III) is for majors in Chemical Engineering and the double major. The Lower Division Program for students who enter the College with 64 or more quarter units of credit is listed under the section, Admission to Advanced Undergraduate Standing (page 75).

**Engineering — Lower Division Program I**

Requirements common to all Engineering majors except Agricultural Engineering—Forest Engineering option, Chemical Engineering, and the double major, Chemical Engineering/Materials Science and Engineering.

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<tr>
<td><strong>Required Courses</strong></td>
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</tr>
<tr>
<td>Calculus—Mathematics</td>
<td>12</td>
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<tr>
<td>Linear algebra—Mathematics</td>
<td>3</td>
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<tr>
<td>Differential equations—Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Vector analysis—Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>General physics—Chemistry</td>
<td>10</td>
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<tr>
<td>Introduction to engineering systems—Engineering</td>
<td>3 or 2 or 3</td>
</tr>
<tr>
<td>Introductory Survey—Botany</td>
<td>5</td>
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<tr>
<td>Introduction to electrical systems, Engineering</td>
<td>3 or 2 or 3</td>
</tr>
<tr>
<td>Engineering 3 (3 or 2 or 3)</td>
<td>3</td>
</tr>
<tr>
<td>Applications of computers—Engineering</td>
<td>3 or 2 or 3</td>
</tr>
<tr>
<td>Circuits—Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Statics—Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Properties of materials—Engineering</td>
<td>4 or 6</td>
</tr>
<tr>
<td>Introduction to surveying—Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Expository writing—English 1 or 3 or Comparative Literature</td>
<td>3 or 4</td>
</tr>
<tr>
<td>Humanities-social sciences</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Lower Division Units</strong></td>
<td>90</td>
</tr>
</tbody>
</table>

**Chemical Engineering — Lower Division Program III**

Requirements for major in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering only.

<table>
<thead>
<tr>
<th>COURSES</th>
<th>QUARTER TAKEN</th>
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<tbody>
<tr>
<td><strong>Required Courses</strong></td>
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<tr>
<td>Calculus—Mathematics</td>
<td>12</td>
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<tr>
<td>Linear algebra—Mathematics</td>
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<tr>
<td>Differential equations—Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Vector analysis—Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>General physics—Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>Introduction to engineering systems—Engineering</td>
<td>3 or 2 or 3</td>
</tr>
<tr>
<td>Introductory Survey—Botany</td>
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<tr>
<td>Introduction to electrical systems, Engineering</td>
<td>3 or 2 or 3</td>
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<tr>
<td>Engineering 3 (3 or 2 or 3)</td>
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<tr>
<td>Applications of computers—Engineering</td>
<td>3 or 2 or 3</td>
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<tr>
<td>Circuits—Engineering</td>
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<td>Statics—Engineering</td>
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<tr>
<td>Properties of materials—Engineering</td>
<td>4 or 6</td>
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<tr>
<td>Introduction to surveying—Civil Engineering</td>
<td>3</td>
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<tr>
<td>Expository writing—English 1 or 3 or Comparative Literature</td>
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<tr>
<td>Humanities-social sciences</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Lower Division Units</strong></td>
<td>90</td>
</tr>
</tbody>
</table>

**Agricultural Engineering (Forest Engineering option) — Lower Division Program II**

Requirements for major in Agricultural Engineering (Forest Engineering option) only.

<table>
<thead>
<tr>
<th>COURSES</th>
<th>QUARTER TAKEN</th>
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</thead>
<tbody>
<tr>
<td><strong>Required Courses</strong></td>
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<td>Calculus, Mathematics</td>
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<td>Linear algebra—Mathematics</td>
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<td>Differential equations—Mathematics</td>
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<td>Vector analysis—Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>General physics—Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>Principles of biology, Biological Sciences</td>
<td>5</td>
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<tr>
<td>Introductory Survey—Botany</td>
<td>5</td>
</tr>
<tr>
<td>Introduction to engineering systems, Engineering</td>
<td>3 or 2 or 3</td>
</tr>
<tr>
<td>Engineering 3 (3 or 2 or 3)</td>
<td>3</td>
</tr>
<tr>
<td>Applications of computers—Engineering</td>
<td>3 or 2 or 3</td>
</tr>
<tr>
<td>Circuits—Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Statics—Engineering</td>
<td>3</td>
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<tr>
<td>Properties of materials—Engineering</td>
<td>4 or 6</td>
</tr>
<tr>
<td>Introduction to surveying—Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Expository writing—English 1 or 3 or Comparative Literature</td>
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<td>Humanities-social sciences</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Lower Division Units</strong></td>
<td>90</td>
</tr>
</tbody>
</table>

**Upper Division Curricula**

If you have completed the requirements for the lower division program or have entered the College of Engineering with more than 64 quarter units of credit, you should follow the upper division requirements for the major you have selected from the programs that follow.

**Aeronautical Engineering**

Minimum units required for major: 188.

Aeronautical engineering is the application of scientific knowledge to the design, manufacture, and operation of aircraft. The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context aeronautical engineers are involved with automobiles, trains, ships and submarines, aircraft, rockets and missiles, sports equipment, and a variety of energy systems. The program leading to the Bachelor of Science degree in Aeronautical Engineering is designed to provide a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare the student to undertake employment in government or industry, while simultaneously establishing an excellent basis for graduate studies. Aeronautical engineering is usually intended to indicate confinement of the subject matter to aeronautical problems. This is the situation regarding the undergraduate curriculum at UCD. The fundamental engineering disciplines are supplemented with courses in aircraft design, aerodynamics, performance, stability and control, aircraft preliminary design, and aeronautical structures.

A broad range of technical elective courses is available. Some students choose these electives from one area of study in order to begin developing a specialty. Others choose courses from several areas in order to broaden their background in the sciences and engineering. Typical aeronautical engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, aeronautical structures, flight testing, or component and mechanism design. In any case, it is recommended that students consult with their adviser before selecting technical electives.

There are a number of technical electives which all students are urged to consider regardless of their chosen area of specialization.

**Suggested technical electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering 102L, 106L, 106B, 122, 123, 140, 142, 190</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering 110, 124, 150A, 150B</td>
<td></td>
</tr>
<tr>
<td>Electrical and Computer Engineering 150</td>
<td></td>
</tr>
<tr>
<td>Applied Science 115, Civil Engineering 131A</td>
<td></td>
</tr>
</tbody>
</table>

**Agricultural Engineering**

Agricultural engineers apply engineering principles to problems of food and fiber production, storage, and processing; animal and plant environments; agricultural waste management; irrigation and drainage; and other phases of agriculture and related industries. Agricultural engineering is unique in that it requires a general understanding and appreciation of the biological and agricultural sciences, plus a thorough knowledge of basic and applied engineering.
Engineering

The curriculum includes a substantial number of technical electives that make it possible for you to develop a broad program of study or specialization in one or more of the areas described below. The suggested technical electives listed for each area of specialization include courses that would enhance your knowledge in that particular area. The lists are not intended to be restrictive or all-inclusive.

Lower division students planning to follow the Agricultural Engineering curriculum are advised to select courses in basic science such as Biological Sciences 1, Bacteriology 2, Botany 2, Physiology 2, and Chemistry 8A and 8B in order to fulfill some of their restricted electives. Bacteriology 2 and Chemistry 8A are prerequisites to several of the suggested upper-division technical electives for the food engineering and agricultural processing area of specialization.

Food Engineering and Agricultural Processing is concerned with the conversion of agricultural products into food, feed, or fiber. The engineering sciences of fluid mechanics, heat and mass transfer, and an understanding of biological materials, are applied in the analysis, design, and development of operations and systems for food manufacturing and agricultural processing. The packaging of foods is studied in terms of interrelationships between properties of foods, environmental conditions, and packaging materials. Concepts of hard-line, warehousing, storage, refrigeration, drying, freezing, food manufacturing, and others are studied.

Suggested technical electives:

Agricultural Engineering 133, 134, 166
Applied Science 115
Biochemistry and Biophysics 101A, 101B
Chemistry 5, 8A, 8B, 107A, 107B
Chemical Engineering 151
Electrical and Computer Engineering 150
Engineering 103B, 105B, 111, 122, 140
Food Science and Technology 104, 108, 111, 137, 150
Mechanical Engineering 152, 155, 168, 166, 176

Irrigation and Drainage applies engineering and scientific principles in the design and operation of irrigation and drainage systems. Emphasis is placed on use of water in agriculture, water quality, on-farm irrigation and drainage system design, water law, hydrology, and hydraulics.

Suggested technical electives:

Agricultural Engineering 140, 141
Civil Engineering 140, 141L, 142, 144
Engineering 171
Water Science 103, 104, 110A, 110B, 141, 142, 150, 154, 160, 172

Power and Machinery involves the design, development, and application of field machines and power units for crop production. The economics and energy utilization aspects of mechanization and the effects of machines on soils, crops, and people are considered. Procedures for developing machine components and synthesizing them into engineering systems are studied.

Suggested technical electives:

Agricultural Economics 140
Agricultural Engineering 112, 114, 117, 119, 165
Agricultural Engineering Technology 233
Civil Engineering 131A, 132A
Engineering 103B, 104B, 111, 122, 140
Mechanical Engineering 150A, 150B, 151, 152, 171, 176

Structures and Environment emphasizes the design of agricultural structures. Various structures are analyzed for their functional effectiveness, efficiency of appliation, load utilization, and economic value to an overall enterprise. The structure is considered as a means of providing an optimum environment for animal production, product stor-
age and conditioning, or crop production in greenhouses. Environmental modification, micrometeorology, and agricultural waste management are studied.

Suggested technical electives:

Agricultural Engineering 125
Atmospheric Science 20, 105, 124, 125, 133, 142A.
Mechanical Engineering 110, 149

Agricultural Engineering (Excerpt from Forest Engineering Option)

(Accredited by the Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 150.

Subject Areas and Courses

Applied mechanics—Engineering 102A, 103A, 104A, 105A, and Civil Engineering 102B, 103B (or Civil Engineering 141), 104B, 105B

Electronic circuits—Engineering 106

Design—Agricultural Engineering 170A-170B/170C

Food science—Engineering 132A or 145 or Mechanical Engineering 130A

Mechanical engineering 132

Professional responsibilities—Engineering 192

Mathematics electives

Select from:

Applied Science 162, 168, 169, 180, Mathematics 128A, Statistics 120A

Agricultural engineering electives

Select from the following:

(a) Choose three courses from Agricultural Engineering 114, 125, 134; Water Science 160; and

(b) Choose two additional courses from Agricultural Engineering 112, 114, 115, 117, 119, 125, 133, 134, 140, 141, 146; Engineering 111; Water Science 160.

Agricultural and biological sciences electives

Select from:

Agricultural Science 2; Bacteriology 2; Biochemistry and Biophysics 101A, 101B; Biological Sciences 1; Botany 1; Entomology 112; Nutrition 1; Physics 110, 119; Plant Pathology 120; Plant Science 2; Soil Science 120; Vegetable Crops 1; Water Science 123; Wildlife and Fisheries Biology 120; Zoology 1

Total units for Upper Division Program

110

Agricultural Engineering (Forest Engineering Option)

Minimum units required for major: 212.

Subject Areas and Courses

Applied mechanics—Engineering 102A, 103A, 104A, 105A

Electronic circuits—Engineering 106


Professional responsibilities—Engineering 192

Total units for Upper Division Program

96

Forest Engineering Option

Forest Engineering is the application of engineering principles and silvicultural knowledge in the management of forests and forest land. Ecological, aesthetic, and recreational aspects of the renewable natural resource are integrated into systems for the production of wood products. Students study systems and equipment for timber harvesting, forest residue management, reforestation, forest recreational facilities, soil and water control and conservation, forest road development, materials handling, and other phases of forestry. This option is administered in cooperation with the Department of Forestry and Natural Resources Management at UC Berkeley. Your junior year is spent on the Berkeley campus, following a ten-week summer field course sequence at the UC Forestry Camp near Quincy.
Students who transfer to the University from another college to enter this program should apply for admission to the Davis campus even if they plan to attend the Berkeley campus before coming to Davis. These students, as well as those attending the Davis campus before going to Berkeley, obtain Intercampus Visitor status that authorizes them to register on the Berkeley campus for the semester to be spent on that campus. Application forms for Intercampus Visitor status are available from the Department of Agricultural Engineering.

Suggested technical electives:
- Atmospheric Science 105
- Geophysics 16
- Resource Sciences 100
- Water Science 141
- Forestry 105 (at Berkeley)

Any elective listed under Upper-Division Program for Forest Engineering Option and not used to fulfill a specific requirement.

Chemical Engineering

Chemical Engineering is concerned with application of the principles of chemistry and engineering to the production of useful products. The products of the process industries range from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals and foods to synthetic plastics. Chemists in this area are increasingly concerned with chemical processes that are related to the environment, food production, and medicine. 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 provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the junior year attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In the senior year these fundamentals are drawn together and applied in a study of mass transfer phenomena and processes, process design, and process dynamics. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 18 units of technical electives which allow you to strengthen specific areas in Chemical Engineering, to explore new areas, or to pursue areas of specialization. You are free to choose your own technical electives, but for those pursuing a normal Chemical Engineering program, Chemistry 111A and 128C are especially recommended and selections from the following list should be considered for the remaining units: Applied Science 115; Chemical Engineering 159B; Mathematics 118A, 118B, 120; and Statistics 130A, 130B. The most popular areas of specialization, together with lists of suggested technical electives, are identified and discussed in the following paragraphs.

The premedical and prebiomedical engineering areas of specialization have been specifically designed so that you may prepare for graduate work in biomedical engineering or meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and their application to fluid mechanics, mass transport, thermodynamics, reaction kinetics, and process dynamics, you are well-prepared to understand similar problems in living systems. Many biological phenomena such as blood flow, pulmonary transport, and energy exchange can be dealt with using the theoretical tools learned as an undergraduate.

Applied Chemistry: The Chemical Engineering curriculum includes an important core of chemistry courses. Students can take advantage of this background to build a strong program in chemistry by choosing electives from among advanced undergraduate chemistry courses.

Suggested technical electives:
- Chemistry 111A, 121, 124, 128C, 129B, 129C, 130, 131, 150

Applied Mathematics: The mathematics specialization is designed both to strengthen the student's understanding of the foundations of engineering science and to improve the ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:
- Applied Science 115
- Chemical Engineering 159
- Engineering 180
- Statistics 130A, 130B

Biochemical Engineering: This area of specialization prepares students to do graduate work in enzyme engineering or biochemical engineering and for employment in the fermentation, drug, and food industries.

Suggested technical electives:
- Bacteriology 2, 102
- Biochemistry and Biophysics 101A, 101B, 101L, 123, 123L
- Chemical Engineering 161

Electronics Processing: Because the manufacture of semiconductor devices, integrated circuits, and magnetic bubble memories, tapes, and disks involves the application of chemistry and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces the student to the analysis and design of modern circuits and devices and provides a strong background in layout and fabrication of such devices.

Suggested technical electives:
- Recommended: Electrical and Computer Engineering 111, 112, 114A-114B

Energy Engineering: This area of specialization is designed to introduce you to the various energy sources and energy conversion methods.

Suggested technical electives:
- Engineering 111, 160, 162
- Agricultural Engineering 112
- Mechanical Engineering 161, 162, 166

Environmental Engineering: The environmental engineering area of specialization prepares the student to deal with problems of environmental quality by developing knowledge of fundamental chemical and transport phenomena, that is, chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses, along with other courses involved specifically with environmental topics, prepares the student to seek employment with industry or government. For this specialization six courses should be selected from the following list:

Suggested technical electives:
- (Air Environment)
  - Atmospheric Science 121A, 121B, 149A, 158
  - Chemical Engineering 149A, 149B, 242B, 244
  - Environmental Toxicology 131

NOTE: For key to footnote symbols, see page 124.

Chemical Engineering

(Bacteriology 2)
Biochemistry and Biophysics 101A, 101B
Civil Engineering 147, 148A, 148B, 240, 243A, 243B, 246A, 246B
Water Science 41

Food Process Engineering: This area of specialization prepares students to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:
- Bacteriology 2
- Biochemistry and Biophysics 123, 123L
- Chemical Engineering 161
- Food Science and Technology 104, 104L, 111, 119A, 131, 150, 150L

Biomedical Engineering: This area of specialization is designed to prepare you for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Chemical Engineering adviser is important to provide space for Biological Sciences.

Suggested technical electives:
- Four to six courses from Anatomy 100; Biochemistry and Biophysics 101A, 101B, Biological Sciences 1; Physiological Sciences 101A, 101B
- Physiology 110, 111B, 111B, 112, 113, 114

Premedical: Inclusion of both organic and physical chemistry in the curriculum allows you to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. Those electing the premedical (including pre-veterinary) area of specialization should verify the specific preparation requirements with a pre-med advisor before making a final decision on electives. In order to ensure that room is provided in your program for the biology courses, it is important to prepare a course schedule (with a Chemical Engineering adviser) as early in your freshman year as possible.

Suggested technical electives:
- Chemistry 128C
- Three to five biology or biochemistry courses such as Biochemistry and Biophysics 101A, 101B, Biological Sciences 1, Genetics 100A, 116, Physiology 110, 112, 113, 114; Zoology 2-2L, 100

Chemical Engineering

(Accredited by the Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 187

Subject Areas and Courses
Engineering—Engineering 100, 106
Chemistry—Chemistry 120A, 120B, 120C, 120D, 120E, 120F
Environmental Engineering—Environmental Engineering 161, 162, 166

Total Units for Upper Division Program

Total Units for Upper Division Program

Chemical Engineering/Materials Science and Engineering

Minimum units required for major: 191

Subject Areas and Courses
Engineering—Engineering 100, 102A
Chemistry—Chemistry 110A, 110B, 110C
Materials science—Engineering 130, 132, 134, 138, 140, 142, 144, 146
Humanities and social sciences—110A, 110B, 110C, 110D, 110E, 110F

Total Units for Upper Division Program

Total Units for Upper Division Program
Civil Engineering

Civil engineering is devoted to the improvement of the human environment for the purposes of making our activities productive, safe, and enjoyable, and providing aesthetically pleasing surroundings. The profession contributes directly to humanity's continued health and well-being by the planning and design of systems that provide plentiful supplies of potable water; freedom from disease-carrying water, land, air, and transportation; housing; and other structures; flood control; and large recreational facilities.

Areas of specialization within civil engineering include (1) Civil Engineering Planning, (2) Environmental Engineering, (3) Structural Engineering, Structural Mechanic and Geotechnical Engineering, (4) Transportation Planning and Engineering, and (5) Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives; such specialization is not required. You are urged to consult a faculty adviser when you are ready to develop your program.

Because of the direct concern of professional civil engineers for the quality of human life, civil engineering students are encouraged to include among their technical electives courses such as Economics 130A, 130B, 135A, Environmental Studies 160 and 166, Political Science 108, 109, and 166, and Sociology 143. Also of possible interest to majors, in all five areas of specialization, are Applied Science 115 and Engineering 180. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

Civil Engineering Planning: Specialization in this area is directed toward planning of resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with the aid of a faculty adviser and to complement the suggested technical electives with courses in the humanities and social sciences.

Suggested technical electives:

- Agricultural Economics 147, 148, 176
- Civil Engineering 137, 143, 146, 152, 153, 180, 161, 162
- Economics 125A, 125B, 130, 131
- Engineering 106, 118
- Environmental Studies 160, 161, 166, 168A, 168B, 178
- Geography 106, 155, 162
- Geology 134
- Statistics 130A, 130B
- Political Science 181
- Water Science 150

Environmental Engineering: Specialization in this area is concerned with improving and maintaining the quality of the air, land, and water environments that affect our health and well-being in the face of increasing population and expanding industrial activity. The program is based on a firm basic science and civil engineering foundation and emphasizes the design of waterborne, solid, and airborne waste management systems; the design of potable water-supply systems, and environment monitoring.

Suggested technical electives:

- Applied Science 115
- Atmospheric Science 120, 121A, 121B, 125, 153
- Bacteriology 102, 130A
- Biochemistry and Biophysics 101A, 101B
- Chemical Engineering 154A, 154B, 156A, 156B
- Chemistry 115A, 117A, 117B, 110A
- Civil Engineering 143, 145, 146, 147, 148B, 149A, 149B, 152
- Engineering 118, 160
- Environmental Studies 150A, 150B, 155C, 151, 166
- Statistics 130A, 130B

Structural Engineering, Structural Mechanics, and Geotechnical Engineering: This area is concerned with the conception, design, analysis, economics, and construction of man-made structures such as buildings, bridges, highways, and dams. The principles of structural engineering are applicable to all types of structures and all sources of loading. Structural mechanics emphasizes the more analytical aspects of structural engineering. Geotechnical engineering emphasizes the application of the principles of soil mechanics to the design or prediction of performance of foundation and earth structures.

Suggested technical electives:

- Applied Science 115
- Applied Science 121A, 121B
- Civil Engineering 131B, 132A, 132C, 134, 135, 137, 138, 139, 162, 173, 175, 177
- Engineering 122, 123, 138, 160
- Mathematics 228A, 228B, 228C

Transportation Planning and Engineering: Specialization in this area is concerned with the development, coordination, and management of transportation systems for the movement of people and goods in a manner compatible with societal demands. Transportation planning blends knowledge of the basic concepts of engineering, economics, and planning in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities in the form of an integral system. You are urged to acquire an awareness of the social sciences and environmental sciences through courses in these areas.

Suggested technical electives:

- Agricultural Economics 148
- Civil Engineering 137, 149A, 149B, 152, 153, 160, 161, 162
- Engineering 118, 160
- Environmental Studies 168A, 168B, 173, 178

Water Resources Engineering: This area includes hydrology, hydraulics, and water resources systems planning and design. Hydraulics is concerned with flow in pipes and open-channel water-distribution systems and through hydraulic structures. Water resources systems planning and design is concerned with the comprehensive development of water resources for multiple uses. Emphasis is placed on principles of planning, analysis and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:

- Agricultural Economics 146, 176
- Atmospheric Science 120, 121A, 121B
- Civil Engineering 143, 144, 145, 146, 148B, 152, 153
- Electrical and Computer Engineering 112, 150, 151
- Environmental Studies 128, 150A, 151
- Geography 162
- Political Science 172
- Water Science 103, 110A, 150, 160

Civil Engineering

(Accredited by the Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180

Units

- Subject Areas and Courses
  - Electronic circuits—Engineering 100 or 111 .................. 3-4
  - Applied mechanics—Engineering 102A, 103A, 104A .................. 9
  - Applied thermodynamics or Chemistry 110A .................. 3
  - Structures—Engineering 104B, Civil Engineering 131A .................. 6
  - Soil mechanics—Civil Engineering 171, 172 .................. 5
  - Hydraulics and water resources—Civil Engineering 141, 141L, 142, 148A .................. 10

- Economics—Engineering 106 .................. 3
  - Transportation electives selected from Civil Engineering 160, 161, or 162 .................. 3

- Technical electives—see from Six of these units must be selected from engineering courses .................. 13
  - Humanities/social sciences electives ............... 15

Total units for upper division program .................. 90

Civil Engineering/Materials Science and Engineering

Minimum units required for major: 180

Units

- Subject Areas and Courses
  - Electronic circuits—Engineering 100 .................. 4
  - Applied mechanics—Engineering 102A, 103A, 104A .................. 9
  - Applied thermodynamics—Engineering 105A or Chemistry 110A, Engineering 130 .................. 6
  - Structures—Engineering 104B, Civil Engineering 131A .................. 6
  - Soil mechanics—Civil Engineering 171, 172 .................. 5
  - Hydraulics and water resources—Civil Engineering 141, 141L, 142, 148A .................. 10

- Economics—Engineering 106 .................. 3

- Materials science electives—see from Four courses from Engineering 132, 134, 136, 140, 142, 144, 146 .................. 12

- Technical electives—see from Six of these units must be selected from engineering courses .................. 6

- Civil Engineering 137 recommended, Humanities/social sciences electives ............... 15

Total units for upper division program .................. 90

Electrical and Computer Engineering

Present-day Electrical and Computer Engineering embraces a broad spectrum of disciplines based on the physical and quantitative sciences. Electrical and Computer Engineering encompasses diverse fields such as automation and control, instrumentation, communications, information processing, micro-miniaturization of integrated circuits, and microprocessors. One unit of Engineering 100 will be applied toward the Engineering electives. Students should be aware that Civil Engineering 10 is a required prerequisite to courses 160, 161, and 162. Units in excess of these 3 count toward civil engineering design above.

186
and solid-state electronic devices. Work in these fields is being applied in a variety of industries, communications, including transportation, medicine, education, and business.

The Department of Electrical and Computer Engineering offers five broad major programs: (1) General Electrical Engineering, (2) Electrical Engineering with emphasis on Computer Science and Engineering, (3) Electrical Engineering with emphasis on Computers, (4) Electrical Engineering with emphasis on Electronics, Circuits and Signal Processing, and (5) Electrical Engineering with emphasis on Solid-State Microdevices and Quantum Electronics. All five curricula share the same core of required courses in the fundamentals of Electrical and Computer Engineering. The General curriculum provides maximum flexibility for students who want to design their own package of upper-division technical elective courses. For example, a student can plan a program that provides depth in one or more areas of specialization, as an alternative, a program that provides breadth in the overall field of Electrical and Computer Engineering.

Curricula (3), (4), and (5) above are designed to guide students who specifically want emphasis in one particular general area. However, students who elect one from these three curricula still have considerable flexibility in the choice of upper-division technical electives. As in the General Electrical Engineering curriculum, this flexibility can be used to obtain either depth in these areas of specialization or breadth.

All five curricula enable students to prepare for careers as practicing engineers or for graduate study in Electrical and Computer Engineering (or both). Close coordination between theory and practice is emphasized in each curriculum, each requires a total of 180 units of credit, and each is described more fully below. The name of the particular curriculum selected will appear on the Student Record (academic transcript).

Computer Science and Engineering: This engineering curriculum has requirements and strengths in engineering and computer fundamentals and architecture. The curriculum provides background in programming, computer architecture, compilers and operating systems, database and file processing, switching theory, digital design, mathematics, physics, chemistry, engineering, and electives which will allow students to develop strong computer software applications, with the option of building in computer hardware, as well. It has been recognized by industry, by the professional societies and by academicians that development in computer hardware and software is very costly, time consuming and demanding activity requiring the analytical abilities and problem-solving skills and training common to other engineering disciplines.

Electrical Engineering (General): All upper-division, required courses for the General Electrical Engineering and Computer Engineering curriculum are listed beginning at the end of this section. These requirements include a core of eight courses: Engineering 100, Electrical and Computer Engineering 110, 111, 112, 130A-130B, 140 and 170; and 30 units of technical electives to be chosen by the student, subject to two constraints:

- at least three units must be from an upper-division Electrical and Computer Engineering course with a laboratory and
- at least 12 units must be from courses included in the area of design.

The core of eight courses, which is common to all five curricula, provides a foundation in electronics, physical electronics, electrical and electronic circuits, and computer structure and language.

A suggested group of technical electives that would provide maximum breadth of exposure to the overall field of electrical and computer engineering is:

- Engineering 118

Electrical Engineering (Computing): All upper-division required courses in the Electrical Engineering curriculum, with emphasis on Computers, are listed below. These requirements include the common core of eight courses described under the General Electrical Engineering curriculum above; computer courses (Electrical and Computer Engineering 171, 180 and three to be chosen by the student from the group of computer design electives, units of technical electives; and a 3-unit laboratory course selected from the group of laboratory electives. The specialization courses treat the the theory, design, and application of computer systems, and include a variety of areas of sub-specialization such as computer organization, digital systems design, software systems, automata theory, formal languages, and artificial intelligence.

Electrical Engineering (Electronics, Circuits and Signal Processing): All upper-division required courses in the Electrical Engineering curriculum, with emphasis on Electronics, Circuits and Signal Processing, are listed below. These requirements include the common core of eight courses described under the General Electrical Engineering curriculum; five specialization courses (Electrical and Computer Engineering 151, 160 and three to be chosen by the student from the group of design technical electives; 15 units of additional technical electives; and a 3-unit laboratory course selected from the group of laboratory electives. The specialization courses treat the the theory, design, and application of electronics, circuits, and signal processing systems. They include a variety of areas of sub-specialization, such as analog waveforms, circuits and systems, sampled data, digital circuits, and systems including solid-state and integrated circuits; control systems, automation, and instrumentation, and communications systems, data transmission, and information processing.

Electrical Engineering (Solid-State, Microdevices and Quantum Electronics): All upper-division required courses in the Electrical Engineering curriculum, with emphasis on Solid-State, Microdevices and Quantum Electronics, are listed below. These requirements include the common core of eight courses described under the General Electrical Engineering curriculum; six specialization courses (Electrical and Computer Engineering 131A, 145A, and four courses to be chosen by the student from the group of design technical electives; 12 units of additional electives; and a 3-unit laboratory course selected from the group of laboratory electives. The specialization courses treat the the theory, design and application of solid-state, microwave and quantum electronic devices and systems, including integrated circuit devices, magnetic devices, lasers and superconductivity.

Computer Science and Engineering:

Minimum units required for major: 180.

Subject Areas and Courses

Mathematics electives .......................... 6

One course from the following (1) or (2) below, or one course from one of (1) or (2) below and one other course for which one of these courses is a substantial prerequisite.

(1) Probability, Statistics 131A
(2) Algebraic structures, Electrical and Computer Engineering 191
Mathematics 139A or 151A

NOTE: For key to footnote symbols, see page 124.
Enginering

**Electrical Engineering: Electronics, Circuits and Signal Processing**

Minimum units required for major: 180.

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics, upper division mathematics or statistics course (except Mathematics 101 and Statistics 102)</td>
<td>3</td>
</tr>
<tr>
<td>Professional responsibilities—Engineering 190</td>
<td>3</td>
</tr>
<tr>
<td>Engineering sciences—Engineering 102, 103, 105A</td>
<td>10</td>
</tr>
<tr>
<td>Circuits, systems and electronics—Engineering 100, Electrical and Computer Engineering 110, 111, 112</td>
<td>6</td>
</tr>
<tr>
<td>Computers—Electrical and Computer Engineering 170</td>
<td>4</td>
</tr>
<tr>
<td>Electromagnetic fields and physical electronics—Engineering 130A, 130B, 140</td>
<td>10</td>
</tr>
<tr>
<td>Laboratory elective—one of the following: Electrical and Computer Engineering 100, 101, 111, 112</td>
<td>9</td>
</tr>
<tr>
<td>Circuits, systems and electronics (design) electives</td>
<td>15</td>
</tr>
<tr>
<td>Technical sciences electives</td>
<td>15</td>
</tr>
<tr>
<td>Humans—social sciences electives</td>
<td>15</td>
</tr>
<tr>
<td>Total Units for Upper Division Program</td>
<td>90</td>
</tr>
</tbody>
</table>

**Materials Science and Engineering**

Materials Engineering is directed towards an understanding of the structure, properties, and behavior of materials.

Modern society demands new and improved materials with capabilities far superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology. The development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria, and reaction rates, and physical and chemical behavior of engineering materials.

The undergraduate program in materials science and engineering provides you with the background for activities in research, processing, and the design of materials. The services of materials engineers are required in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames, from corrosion behavior in petrochemical refineries to radiation-induced damage in nuclear power plants, and from fabrication of steel to design of semiconductor materials.

Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes.

The Materials Science and Engineering curriculum is based on a common core of courses that is basic to engineering. These courses, taken during your first two years, provide you with a strong foundation in fundamental engineering concepts. Your third and fourth years are primarily devoted to studying subjects in the materials sciences. Recommended to be taken during the junior year is a set of "fundamentals" courses (Engineering 130, 132, 134, 138). With this background in hand, you are then ready for the "applications" courses (Engineering 140, 142, 144, 146) which are recommended for the senior year.

Technical electives, selected from various other engineering, physical, and natural science disciplines, give some degree of specialization at the bachelor's degree level. They also prepare you for research in a selected area at the graduate level. Twenty-seven technical elective units may be selected to complete the undergraduate Materials Science and Engineering program. By selecting the appropriate technical electives and humanities and social sciences electives, you may orient the undergraduate program to suit your interests and career objectives. Examples include production and development, applied research, basic research, teaching, and more.

Upper-division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives.

The following technical elective courses and the suggested areas of specialization are guidelines to assist you and your advisor in the preparation of study lists. You may elect to take courses from a number of these areas of specialization, or you may wish to concentrate on one or two areas.

Suggested technical electives:

- **Automatic Control and Systems Analysis:**
  - Mechanical Engineering 155, 171, 172
  - Electrical and Computer Engineering 150, 157A, 157B
  - Engineering 118

- **Biomedical Engineering:**
  - Chemistry 107A, 107B
  - Biological Sciences 1
  - Zoology 2
  - Physiology 111A, 111B, 112, 113
  - Physical Education 101, 102

- **Chemical Corrosion:**
  - Chemistry 110A, 110B, 110C or 107A, 107B
  - Chemical Engineering 151, 152A, 152B

- **Computers:**
  - Applied Science 115
  - Electrical and Computer Engineering 171, 172, 175, 176, 177, 180, 181, 182A, 182B
  - Statistics 130A, 130B

- **Electronic Materials:**
  - Physics 121
  - Geology 180

- **Environmental Engineering:**
  - Engineering 160
  - Atmospheric Science 120, 125
  - Biochemistry and Biophysics 101A, 101B
  - Water Science 41
  - Chemistry 8A, 8B
  - Civil Engineering 149A, 149B
  - Heat Transfer:
    - Engineering 105B
    - Mechanical Engineering 165
    - Mechanical Engineering 150A, 153

- **Materials Design and Processing:**
  - Engineering 104B, 106, 125
  - Mechanical Engineering 150A, 150B, 151, 152, 155
  - Civil Engineering 137

- **Physics of Solids:**
  - Physics 115A, 115B, 140A, 140B
  - Electrical and Computer Engineering 145A, 145B, 145C, 146
  - Geology 180
  - Suggested advisers:

**Materials Science and Engineering**

Minimum units required for major: 180.

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
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</tr>
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<tbody>
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<td>6</td>
</tr>
<tr>
<td>Computers—Electrical and Computer Engineering 170</td>
<td>4</td>
</tr>
<tr>
<td>Electromagnetic fields and physical electronics—Engineering 130A, 130B, 140</td>
<td>10</td>
</tr>
<tr>
<td>Design electives—Electrical and Computer Engineering 145A, 145B, 145C</td>
<td>9</td>
</tr>
<tr>
<td>Materials science—Engineering 138, 142, and three courses chosen from Engineering 132, 134, 140, 144, 146, and Electrical and Computer Engineering 148</td>
<td>15</td>
</tr>
<tr>
<td>Articulation design technical electives</td>
<td>2</td>
</tr>
<tr>
<td>Technical elective</td>
<td>15</td>
</tr>
<tr>
<td>Humans—social sciences electives</td>
<td>15</td>
</tr>
<tr>
<td>Total Units for Upper Division Program</td>
<td>90</td>
</tr>
</tbody>
</table>
Mechanical Engineering

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 you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can prepare either for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor's level.

A broad range of technical elective courses is available. Students are encouraged to select these courses from among the areas of specialization listed below.

Creative Design: The creation and improvement of products, processes, or systems which are mechanical in nature are the primary goals of a professional mechanical engineer. This is a challenge now more than ever before, because the solutions to such major social concerns as environmental pollution, mass transportation, raw material shortages, and energy concerns will depend heavily on the engineer's ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to organize and solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of the design and its possible impact on the environment, safety, reliability, and economics are other considerations.

Suggested technical electives:

- Mechanical Engineering 124, 130, 134, 150B, 151, 152, 155, 162, 166, 172
- Applied Science 115
- Civil Engineering 131A, 132A
- Agricultural Engineering 119, 133, 134, 170A, 170B
- Engineering 111, 118, 122, 140, 142, 160

Suggested advisors:

C. W. Beadle and D. T. Yang

Energy Systems: This area is specifically designed for those who would like to work in the fields of power generation, propulsion for transportation, and energy conversion. It is in these fields that the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to such diverse topics as combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators, solar energy systems, and others.

Suggested technical electives:

Engineering 160
Mechanical Engineering 110, 161, 162, 166

Suggested advisors:

J. W. Baugn, H. Brandt, G. A. Dwyer, M. A. Hoffman, W. Kolinn, A. A. McKillop

Systems Dynamics and Control: Modern engineers are increasingly concerned with the performance of large engineering systems in which it is not possible to optimize component parts without considering the overall system.

Systems Dynamics and Control is concerned with the modeling, analysis, and simulation of all types of engineering systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply equally well to social, economic, and other dynamic systems.

Suggested technical electives:

Mechanical Engineering 124, 128, 129, 134, 152, 157
Electrical and Computer Engineering 112, 151, 162

Suggested advisors:

J. W. Brewer, M. Hubbard, D. C. Kamoph, D. L. Margolis

Transportation Systems: An important aspect of Mechanical Engineering has traditionally involved the planning and design of transportation systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are transported. This will require competence in vehicle dynamics, propulsion, and control, and an understanding of the problems caused by present-day modes of transportation.

Suggested technical electives:

Engineering 122, 160
Mechanical Engineering 124, 127, 129, 134, 152, 161, 162, 172
Civil Engineering 131A, 149B, 149B, 160

Suggested advisors:

M. Hubbard, D. C. Kamoph, D. L. Margolis

Mechanical Engineering

(Reprinted with the permission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180

NOTE: For key to footnote symbols, see page 124.

189

Mechanical Engineering/ Materials Engineering/ Science and Engineering

Minimum units required for major: 180

- Subject Areas and Courses
  - Electrical circuits—Engineering 100
  - Applied mechanics—Engineering 102A, 102B
  - Applied thermodynamics—Engineering 105A, 105B
  - Fluid mechanics—Engineering 103, 108B
  - Mechanical design—Engineering 140
  - Mechanical Engineering 150A
  - Controls and systems analysis—Engineering 171
  - Materials science—Engineering 132, 134, 138, and one course from Engineering 142, 144, 146
  - Measurements and laboratory—Engineering 102L, 105L, 155L, Mechanical Engineering 176
  - Technical electives—Engineering 176

  Two courses must be chosen from:
  - Mechanical Engineering 124, 130, 134, 150B, 152, 155, 172 (Mechanical Engineering 124 is strongly recommended.)
  - Humanities and social sciences electives—Engineering 15
  - Unrestricted electives—Engineering 2

  Total Units for Upper Division Program 90

Individual (Engineering) Major

Minimum units required for major: 180

An engineering student who has a definite career objective that is not compatible with one of the named curricula may propose an individual engineering major. (See page 239.)

Courses in Engineering

Lower Division Courses

3. Introduction to Engineering Systems (3) [I, II, III. Schroeder Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A. Recommended (may be taken concurrently). An introduction to the engineering profession. A general view of the engineering process as obtained by participation in laboratory experiments illustrative of the solution of representative, but greatly simplified, engineering problems. (P/NP grading only.)

4. Engineering Graphics in Design (3) [I, II. The Staff (Beadle in charge)


5. Applications of Computers (3) [II, III. The Staff (Chairperson: J. A. Beadle)

Lecture—2 hours; laboratory—3 hours. Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization, and solution of engineering problems. Computer-aided graphics. Introduction to engineering design.

SATA. Self-Paced Introduction to Computer Programming:

FORTAN 77 (21) 1, II, III. The Staff Workshop—6 hours. Prerequisite: Mathematics 16A or 21A. First of a two-part self-paced introductory programming sequence teaching FORTAN 77 with emphasis on problem solving. Topics covered include algorithm design, programming techniques and program debugging. Students who have had Engineering 5, Mathematics 29A, Electrical and Computer Engineering 8, 80, or 88 may not receive credit for Engineering 5; and those who have had Mathematics 19 may receive only 1 unit of credit.

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FORTAN 77 (21) 1, II, III. The Staff Workshop—6 hours. Prerequisite: Mathematics 16A or 21A. First of a two-part self-paced introductory programming sequence teaching FORTAN 77 with emphasis on problem solving. Topics covered include algorithm design, programming techniques and program debugging. Students who have had Engineering 5, Mathematics 29A, Electrical and Computer Engineering 8, 80, or 88 may not receive credit for Engineering 5; and those who have had Mathematics 19 may receive only 1 unit of credit.

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Engineering: Agricultural

teaching FORTAN 77 with emphasis on problem solving. Topics include character and array data definition. Students who have had Engineering 5, Mathematics 29A, Electrical and Computer Engineering 8, 90, or 88 may not receive credit for this course.

17. Circuits (3) I, II, III. The Staff (Ford in charge).
 Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 8B. Basic circuit analysis, including: electrical quantities and elements, resistive circuits, transient and steady-state responses of RL circuits, sinusoidal excitation and phasors, and current and network functions.

35. Statics (3) I, II. The Staff (Chairperson in charge).
 Lecture—3 hours. Prerequisite: Mathematics 22C (may be taken concurrently); Physics 8A. Force systems and equilibrium conditions with emphasis on engineering problems.

 Lecture—3 hours; laboratory—3 hours. Prerequisite: statics. Laboratory course on the properties of engineering materials and their relation to the internal structure of materials.

Upper Division Courses

100. Electronic Circuits and Systems (4) I, II. The Staff (Chairperson in charge).
 Lecture—3 hours; laboratory—3 hours. Prerequisite: course 10A. Introduction to digital circuits and computer systems. Students who have taken course 10A may not enroll in this course.

102A. Dynamics (3) I, II, III. The Staff (Beadle in charge).
 Lecture—3 hours. Prerequisite: course 25B; Mathematics 22B, 22C. Kinematics and dynamics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

102B. Dynamics (3) I, II, III. The Staff (Beadle in charge).
 Lecture—3 hours. Prerequisite: course 25B. Dynamics of rigid bodies.

103. Fluid Mechanics Fluid Dynamics (3) I, II, III. The Staff (Byers in charge).
 Lecture—3 hours. Prerequisite: course 102B. Topics in fluid mechanics and fluid dynamics of rigid bodies.

103B. Fluid Mechanics (3) I, II. White.
 Lecture—3 hours. Prerequisite: course 123A. Incompressible viscous flow, boundary layer flow, dimensional analysis, dimensional measurements, applications.

103L. Fluid Mechanics Laboratory (3) I, II. The Staff (Beadle in charge).
 Laboratory—3 hours. Prerequisite: course 103B. Laboratory experiments in fluid mechanics and fluid dynamics.

104A. Mechanics of Materials (3) I, II. The Staff (Chairperson in charge).
 Lecture—3 hours. Prerequisite: course 104A. Deflections due to bending of beams, symmetrical bending, application of standard methods of analysis to curved beams, bending stresses, and bending of symmetrical beams.

104B. Mechanics of Materials (3) I, II. The Staff (Chairperson in charge).
 Lecture—3 hours. Prerequisite: course 104A. Deflections due to bending of beams, symmetrical bending, application of standard methods of analysis to curved beams, bending stresses, and bending of symmetrical beams.

105A. Thermodynamics (3) I, II, III. The Staff (Beadle in charge).
 Lecture—3 hours. Prerequisite: course 105A. Review of first and second laws, review of power cycles, thermodynamic relations, gases and mixtures, real gases, irreversible processes of change and chemical equilibrium, and thermodynamics and statistical mechanics.

105L. Thermodynamics Laboratory (3) I, II. Baughn Laboratory—3 hours. Prerequisite: course 105A. Introduction to the study of thermodynamics with emphasis on laboratory experiments illustrating the concepts of thermodynamics.

106. Engineering Economics (3) I, II, III. Lifelock, Jenkins Lecture—3 hours. Prerequisite: upper division standing in Engineering. An introduction to economics as an engineering tool, including the selection of alternatives, replacement decisions, compounding, tax, interest and cost of capital, economic life, and risk and uncertainty. Case studies include typical engineering problems.

 Lecture—3 hours; laboratory—3 hours. Prerequisite: course 105A. Electrical power equipment of practical importance in the design of electrical power systems.

118. Probabilistic Systems Analysis (3) I, II. Kitamura, Lam.
 Lecture—3 hours. Prerequisite: Mathematics 21C. Probabilistic models and random processes. Introduction to probability and statistics for engineers and scientists.

122. Introduction to Mechanical Vibrations (3) I, II. Henderson.
 Lecture—3 hours. Prerequisite: course 102B. Analysis of vibrations in lumped-parameter systems and with damping.

123. Advanced Mechanics of Materials (3) III. Hutchison.
 Lecture—3 hours. Prerequisite: course 140B. Selected topics focusing on stress analysis of plates, beams, shells, and thin-walled structures.

130. Thermodynamics of Materials Processes (3) I, II. Muñoz.
 Lecture—3 hours. Prerequisite: courses 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to the design and operation of engineering systems and devices.

 Lecture—3 hours; laboratory—1 hour. Prerequisite: course 123A. Structure and properties of engineering materials.

134. Fundamentals of Rate Processes in Materials Science (3) III. Howitt.

140. Materials Science and Engineering (3) III. Muharpea.
 Lecture—3 hours. Prerequisite: course 105A (or the equivalent); upper division standing in Engineering. An introduction to the structure and properties of common engineering materials. Discussion of design parameters of typical materials including metals, ceramics, glasses, polymers, and composites. Principles of heat treatment and fabrication as they affect design parameters and applications in engineering will be emphasized.

 Lecture—3 hours. Prerequisite: upper division standing in Engineering or consent of instructor. Basic principles of nondestructive testing; ultrasonic, magnetic, radiographic, and electrical methods; applications.

190. Engineering: Agricultural
(College of Engineering)

Roger E. Garrett, Ph.D., Chairperson of the Department
Department Office, 2000 Bainer Hall (752-1002)

Faculty
Norman B. Akeson, M.S., Professor
Jaime Amoroscho, Ph.D., Professor
Roy Bainer, M.S., LL.D., Professor Emeritus
Robert H. Burgs, M.S., Professor
William J. Chauvett, Ph.D., Professor
PiCtow (Paul) Chen, Ph.D., Professor

Engineering: Agricultural
Courses in Engineering: Agricultural

Lower Division Courses

1. The Agricultural Engineer in Tomorrow's World (1.0). Garrit
Discussion—2 hours. Exploration of opportunities in Agricultural Engineering as they relate to society, environment, and biological systems, including interdisciplinary approaches. Discussions and demonstrations of agricultural engineering projects illustrating design, development, testing, and evaluation methods. (P/NP grading only.)

2. Introduction to Forest Engineering (1.0). Mile Lecture—3 hours. Discussion—6 hours. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, log transport, milling and residue utilization. (P/NP grading only.)

3. Internship in Agricultural Engineering (1.0). Staff (Garrit in charge) Work-experience course. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

4. Directed Group Study (1.0). Staff (Garrit in charge) Prerequisite: consent of instructor. Group study of selected topics. Restricted to lower division students. (P/NP grading only.)

5. Special Study for Lower Division Students (1.0). Staff (Garrit in charge) (P/NP grading only.)

Upper Division Courses

6. Forest Engineering (3.0). Mile Lecture—4 hours. Laboratory—2 hours. Prerequisite: Civil Engineering 10, Engineering 20A, or equivalent. Prerequisite: Computer Programming. Principles and procedures for project design and execution; applications to agricultural and forestry projects. Project selection, data sources, agricultural and forestry factors, specifications, failure modes, budgeting, human factors, safety, design, and measurement techniques. Development of proposals for course 170B.

7. Engineering Design Projects for Agriculture and Forestry (3.0). Garrett Laboratory—2 hours. Prerequisite: 170A. Prerequisite: consent of instructor. Directed group study of selected topics. Topics include design of crop irrigation systems, design of irrigation systems, design of agricultural and forestry projects.

8. Seminar (1.0). Staff (Garrit in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of selected topics with separate sections. (A) Simulation of Food Processing Systems; (B) Thermal Process Design; (C) Fermentation Engineering; (D) Alternative Energy Systems.

9. Advanced in Food Engineering (1.0). Staff (Garrit in charge) Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in food engineering. Presentations by individual students. (SU grading only.)

10. Group Study (1.0). Staff (Garrit in charge) (P/NP grading only.)
Upper Division Courses
115. Introduction to Numerical Methods for Computers (3) I, II, III. The Staff (Wooten in charge)
Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 228. Lectures and laboratory work on electronic computers and their application to engineering problems.

135. Introductory Nuclear Science and Technology (3) I, Craig
Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introduction to aspects of nuclear phenomena, nuclear masses, size, energy, and decay modes; interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurement; neutron technology. Nuclear chemistry.

137. Science and Technology of Nuclear Arms Effects and Control (3) II. Jungeman
Lecture—3 hours. Prerequisite: upper division standing; one course in physics, 1YB, 20, 80, or 37 (may be taken concurrently). Scientific and technical aspects of nuclear arms effects and nuclear arms control including the nuclear weapons arms race and in non-nuclear operational processes.

165A. Quantum Optics I (3) II. Yeh

165B. Quantum Optics II (3) III. Yeh
Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter: photoelectric coupling statistics. Light distributions in scattering processes. Applications of quantum optics to other fields.

165A. Quantum Optics Laboratory (1) I, II, III. Yeh
Laboratory—3 hours. Prerequisite: course 165A concurrently. On hand experience in working with lasers, photon spectroscopy, and quantum optical experiments.

165B. Quantum Optics Laboratory (1) I, II, III. Yeh
Laboratory—3 hours. Prerequisite: course 165B concurrently. Continuation of course 165A.

188. Group Study (1-5) I, II, III. The Staff (Wooten in charge)
Prerequisite: consent of instructor. Group study of selected topics. Students may enroll in one or more separate sections. (P/NP grading only.)

189. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
210A-210B. Advanced Mathematical Methods of Computer Physics (3-3) II-III. Hooke
Lecture—3 hours. Prerequisite: course 209 or Mathematics 229A-229B or the equivalent. Computational methods in various fields in computer physics, e.g., magnetohydrodynamics, Vlasov and Fokker-Planck equations, particle codes, neutron and radiation transport, chemical kinetics, and atmospheric modeling.

224A-224B-224C. Properties of Matter (3-3-3) I-II-III. Hoover
Lecture—3 hours. Prerequisite: Mathematics 229 and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

224A-224B-224C. Structure of Matter (3-3-3) I-II-III. Yeh
Lecture—3 hours. Prerequisite: course 206C. Classical properties of matter; introduction of quantum mechanics; the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

224A-224B-234C. Electromagnetic Theory (3-3-3) I-II-III. DeGroot

224A-228B-289C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. DeGroot
Lecture—3 hours. Prerequisites: courses 260A, 254B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.

283A-283B-283C. Advanced Plasma Physics (3-3-3) I-II-III. Post

289A-J. Special Topics in Applied Sciences (1-5) I, II, III. The Staff (Wooten in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Computer Science; (E) Materials Science; (F) Nuclear Physics; (G) Plasma Physics; (H) Quantum Electronics; (J) Solid State. May be repeated up to a total of 5 units per quarter.

299A. Seminar (1-2) I, II, III. The Staff (Wooten in charge)
Seminar—7-2 hours. (SU grading only.)

299B. Group Study (1-5) I, II, III. The Staff (Wooten in charge)
Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics.

299C. Research (1-12) I, II, III. The Staff (Wooten in charge)
(SU grading only.)

LIVEMORE
Upper Division Courses
101. Data Structures (3) I. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to high level programming languages that are useful in all programming courses. Topics include programming language Pascal, lists, queues, trees, graphs, sorting and searching algorithms, and memory management algorithms.

102. Introduction to Computer Architecture (3) I. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Basic hardware knowledge for computer science students. Main elements of computer architecture and how they function. Covers topics like number systems, symbolic logic, assembly language, and logic implementation. Several assembly language programs.

103. Language Structures (3) I. The Staff
Lecture—3 hours. Prerequisite: course 101 or the equivalent. Fundamental structure of a programming language, and an introduction to language processing. Topics include types, objects, operations, block structure, parameter passing, linking and loaders, and lexical analysis.

120. Concurrent Programming (3) III. McCrow
Lecture—3 hours. Prerequisite: course 105 or 106 or the equivalent. Presentation of concepts surrounding concurrent programming, as an introduction to operating systems. Focus on concepts of processes and synchronization, emphasizing their use in solving classical problems. This material is then related to operating system design.

111. Introduction to Foundations of Computing (3) II. Betther
Lecture—3 hours. Prerequisite: course 101 electrical and Computer Engineering 191. Basic ideas in the theory of computing and the analysis of algorithms. Topics include finite automata, regular and context-free grammars, order of execution time and space, advanced programming techniques.

115. Introduction to Numerical Methods for Computers (3) I. Tailey
Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 228. Lectures and laboratory work on electronic computers and their application to engineering problems.

135. Introductory Nuclear Science and Technology (3) I. Bloom
Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductory aspects of nuclear phenomena, nuclear mass, size, energy, and decay modes. Interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurement: neutron technology. Nuclear chemistry.

189. Group Study (1-5) I, II, III. The Staff (Wooten in charge)
Prerequisite: consent of instructor. Group study of selected topics. Students may enroll in one or more separate sections. (P/NP grading only.)

190. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge)
Prerequisite: consent of instructor. (P/NP grading only.)
Graduate Courses

201. Software Engineering (3) I. McGraw Lecture—3 hours. Prerequisite: courses 101, 103, 106, or the equivalent. The process of writing production-quality software and the tools that have been designed to aid in this effort. Subject matter will include: requirements specification, design methodologies, programming style, program testing, and performance evaluation.

202. Data Base Management (3) III. Blatter Lecture—3 hours. Prerequisite courses 101, 103, 106. Discussion of databases and database implementations. Course roughly divided into thirds: physical organization, logical organization, and distributed systems.

203A. Computer Architecture (3) I. Anderson Lecture—3 hours. Project performed. Prerequisite: courses 112A-112B or the equivalent. Hardware knowledge for software designers. Students learn how hardware functions, what elements compose it, how to read prints and logic diagrams. Course considers simple machine architecture in detail, hardware design alternatives, input-output methods and computer peripherals.

203B. Computer Architecture (3) II. Anderson Lecture—3 hours. Research paper and programming project. Prerequisite: course 203A. Topics in computer communication, hardware features to enhance operating systems, and advanced architectures.

205A. Mathematical Methods (3) I, Newcomb Lecture—3 hours. Prerequisite: introductory courses in ordinary differential equations, vector analysis, infinite series, and functions of a complex variable. Calculus of finite and infinite dimensional vector spaces; orthogonal functions; line, surface, and volume integrations of these analytical techniques to physical systems.

205B. Mathematical Methods (3) II. Newcomb Lecture—3 hours. Prerequisite: course 205A or the equivalent. Mathematical methods. A second course of a twocourse sequence on computational techniques for solving numerical problems. Emphasis is on solutions applicable to computers. Topics covered: optimization, integration, differentiation, and random differential equations.

216A-S. Special Topics in Computer Science (1-5) I, II, III. Laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Architecture; (B) Software Systems; (C) Language Translations; (D) Language Design; (E) Operating Systems; (F) Foundations of Computing; (G) Computational Mathe- matics.

224. Microprogramming and Microprogrammable Architecture (3) III. Anderson Lecture—3 hours. Prerequisite: course 205B or the equivalent. Analysis of the internal logic and interface circuits to form the computer's primitive instructions. Survey of the architecture of commercially available, user-programmable computer systems. Course includes a programming project on a department computer.

228A-228B. 228C. Properties of Matter (3-3-3) III-I-II. Hoover Lecture—5 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

229. Materials Science (3) I. Guinan Lecture—3 hours. Prerequisite: course 205C. Facts and theories of crystal defect physics and their application to such problems as the mechanical properties of solids, radiation damage, phase transformations, etc. Covers the thermodynamics of point defects, diffusion, elasticity, dislocation theory.

230A-230B. Structure of Matter (3-3-3) II-I-I. Goldberg Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter: introduction of quantum mechanics by the correspondence principle; perturbation theory; electronic theory of atoms, molecules and solids; quantum theory of cooperative effects.

230C-230D. Theory and Applications of Solid-State Physics (3-3-3) I-II. Goldberg Lecture—3 hours. Prerequisite: course 230C or the equivalent. Structure and properties of crystals; theory of electrons, holes and phonons; magnetism, superconductivity, and semiconductors. Applications to various solid-state devices.


235A-235B. Nuclear Physics (3-3-3) II-I-II. Bloom Lecture—3 hours. Prerequisite: course 230C. Basic properties of nuclei: radioactive decay; nuclear models; low energy nuclear reactions, nuclear physics. Interaction of particles and radiation with matter.

236. Theory of Particle Reactions (3) I. Bloom Lecture—3 hours. Prerequisites: courses 230C, 230D. General theory of atomic and nuclear reactions; cross sections for the collision of electrons, photons, and nuclear particles with atoms and nuclei. Decay properties of particles emission of unstable atoms or nuclei.

235C. Classical Mechanics (3) I. Newcomb Lecture—3 hours. Prerequisite: course 205C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic Instability; viscous hydrodynamic stability theory.

237. Magnetohydrodynamics (3) III. Newcomb Lecture—3 hours. Prerequisite: course 234B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation, theory of stability, gyroscopic effects, finite-resistivity effects.


268A-268B-268C. Plasma Physics and Controlled Fusion (3-3-3) I-I-I. Post Lecture—3 hours. Prerequisite: courses 268A-268B-268C or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov equation; fluid solutions, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.


289-A. Special Topics in Applied Science (1-5) I, II, III. The Staff (Wooten in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electronics; (J) Solid State. May be repeated up to a total of 5 units per semester.

290. Seminar (1-2) I, II, III. The Staff (Wooten in charge) Seminar—1-2 hours. (SU grading only.)

290C. Graduate Research Group Conference (11) I, II, III. The Staff Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Wooten in charge) Such topics as computer science, plasma physics, medical physics, laser applications, bio-medicine.

299. Research (1-12) I, II, III. The Staff (SU grading only).
Courses in Engineering: Chemical

Lower Division Courses

1. The Scope of Chemical Engineering (1) II. Carbonell Lecture—1 hour; discussion—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, and service to society. (P/NP grading only.)

96. Directed Group Study (1-3) I, II, III. The Staff (McKay in charge) Prerequisite: consent of instructor; restricted to lower div-ision students. Group study of selected topics. Students may enroll in more than one section. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) II, III. The Staff (McKay in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses


150B. Chemical Engineering Fluid Mechanics (3) III. Whittaker Lecture—3 hours. Prerequisites: course 150A. Turbulent flows and time averaging. Application of Bernoulli’s equa-tion and the macroscopic mass, momentum, and mechanichal energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and choke flow. Students who have taken Engineering 102B or Civil En-gineering 114 may not receive credit for this course.

151. Material Balances (3) I. Jackman Lecture—3 hours. Prerequisite: Chemistry 110A and 128B. Elementary principles of mass and energy balances. (May be taken concurrently; a working knowledge of FORTRAN. Application of principles of conservation of mass for single and multi-component systems in chemical process calculations. Studies of batch, semi-batch and continuous processes involving mass transfer, change of phase and chemical reaction.

152A. Chemical Engineering Thermodynamics (3) I. Bell Lecture—3 hours. Prerequisite: course 151; Chemistry 110A. Principles of thermodynamics to chemical processes. Students who have had Engineering 105A may not receive credit for this course.

152B. Chemical Engineering Thermodynamics (3) III. Bell Lecture—3 hours. Prerequisites: course 152A and course 152A. Continuation of course 152A. Students who have had Engineering 105B may not receive credit for this course.


154A. Mass Transfer (3) I. Bell Lecture—3 hours. Prerequisite: course 153, Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

154B. Applications of Mass Transfer (3) III. Bell Lecture—3 hours. Prerequisite: course 154A. Application of the principles of thermodynamic equilibrium to absorption, extraction, distillation and other separation processes.

155A. Chemical Engineering Laboratory (4) II. Oliva Laboratory—12 hours. Prerequisite: course 154A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

155B. Chemical Engineering Laboratory (4) III. Jackman Laboratory—12 hours. Prerequisite: courses 154B, 155A. Continuation of 155A.

156A. Chemical Engineering Kinetics (3) II. Smith Lecture—3 hours.Prerequisites: courses 152B, 154A, and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reaction design.

156B. Chemical Engineering Kinetics (3) III. Smith Lecture—3 hours. Prerequisite: course 156A. Continuation of course 156A.


161. Biochemical Engineering Fundamentals (3) II, III. Oliva and Ruy Lecture—3 hours. Prerequisites: Chemistry 128A and Mathematics 228B. Enzyme and microbial kinetics, reactor design for single and mixed cultures with examples drawn from the full range of applications: medical analysis, food processing, pharmaceutical and biochemicals production, single-cell protein production, biological waste treatment, and environmental modeling.


190C. Research Project Groups (1) I, II, III. The Staff (McCoy in charge) Discussion—1 hour. Prerequisite: upper division standing in Chemical Engineering. Prerequisites: Instructor’s consent. Research group conferences. May be repeated for credit. (P/NP grading only.)

198. Group Study (1-5) I, II, III. The Staff (McCoy in charge) Prerequisite: consent of instructor. Group study of selected topics. Students may be organized in instrumentation and design problems. Students may enroll in one or more separate study groups.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (McCoy in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

228. Enzyme Engineering (3) II. Ryu Lecture—3 hours. Prerequisite: Biochemistry 123 or consent of instructor. Biochemistry and Science Technology 110A-100B, Chemical Engineering 151, Bacteriology 102 recommended. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme reactor design and process optimization. Application of enzymes in genetic engineering related biotechnology. Offered in even-numbered years.

252. Advanced Thermodynamics (3) I. Smith 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 ther-modynamics.


253C. Advanced Mass Transfer (3) I. Carboneal Lecture—3 hours. Prerequisites: courses 154A, 154B, and 254 (may be taken concurrently) or the equivalent. Kinematics and basic conservative principles for multicomponent systems. Constitutive equations for heat, momentum and mass transfer. Applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentra-tion.

254. Colloid and Surface Phenomena (3) I. Stroove Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Colloid phenomena occur in a wide spectrum of problems encountered in engineering and science. Introduction to the behavior of surfaces and dispersed systems. Fundamentals will be applied to the solution of practical problems.

255. Catalysis in Chemical Engineering (3) II. Oliva Lecture—3 hours. Prerequisite: graduate student standing in Chemical Engineering or Chemistry. Principles of surface chemistry and heterogeneous catalysis followed by treatment of reaction systems of industrial importance. Applications include (ammonia synthesis, fuel production, cracking, reforming, hydrocarbon synthesis, hydrodesulfurization, hydrodearomatization, polymerization, partial oxidation, exhaust catalysis and fuel cell operations.

255. Applied Kinetics and Reactor Design (3) III. Whittaker Lecture—3 hours. Prerequisites: courses 253B, 253C. Application of kinetics and reactor design to the design of chemical reactors with emphasis on hetero-geneous systems.

277. Reactor Design (3) III. Smith Lecture—3 hours. Prerequisite: course 156B. Application of concepts of chemical reaction engineering to the two-stage process of reactor design: (1) interpretation of laboratory-scale data, and (2) utilization of the interpretation for the design of commercial-scale reactors for real chemical systems.

289. Advanced Chemical Engineering Analysis (3) I. Carboneal Lecture—4 hours. Prerequisite: course 156B. Application of concepts of chemical reaction engineering to the two-stage process of reactor design: (1) interpretation of laboratory-scale data, and (2) utilization of the interpretation for the design of commercial-scale reactors for real chemical systems.

290. Separation Processes: Particulate Systems (3) I. McCoy Lecture—3 hours. Prerequisite: course 154A. Analysis of particle systems in pollution abatement and chemical process equipment, Micronozzles, aerosols, hydrods, colloids. Distribution functions, population balances, rarefied gas phenomena, concentration polarization in reverse osmosis and membranes.

291. Separation Processes: Column Operations (3) III. McCoy Lecture—3 hours. Prerequisite: course 154B. Analysis and design of chemical separation processes: distillation, extraction, chromatography, adsorption. Finite difference
Courses in Engineering: Civil

Lower Division Courses

1. The Civil Engineer in Society (1). The Staff (Chairperson in charge)
   Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (Not graded.)

2. Kinetics of Catalytic Systems Seminar (1) I, II, III. Oils Seminar—1 hour. Prerequisite: graduate student standing in Chemical Engineering. A discussion of the theoretical and practical applications of kinetic analysis of heterogeneous or homogeneous catalytic systems. Subjects may include metals, semiconductors, insulators, enzymes and microbial catalysts as well as transition metal complexes and other heterogeneous examples. (Su grading only.)

3. Group Study (1-5) I, II, III. The Staff (McCoy in charge)

4. Research (1-12) I, II, III. The Staff (McCoy in charge) (Su grading only.)

5. Division Courses

131A. Structural Analysis (3) II. Romstad Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Calculation of displacements. Methods of virtual work, moment area, superposition, slope deflection, moment distribution.

131B. Matrix Structural Analysis and Introduction to Finite Element (3) II. Romstad Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B. Matrix formulation and computer analysis of statically determinate structures. Introduction to finite element methods for elasticity and bending problems.

132A. Structural Design: Metallic Elements (3) II. Ramey Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metal design for beams, columns, members; and analysis and design of riveted, bolted, and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

132B. Structural Design: Concrete Elements (3) II, III. Taylor Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Elastic and ultimate strength design procedures for columns and rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond.

132C. Structural Design: Timber Elements (3) II, III. Ramey Lecture—3 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.


135. Aerospace Structures (3) II. Cherry Lecture—3 hours. Prerequisite: Engineering 140B (may be taken concurrently). Analysis of thin shell and plate structures. Finite element methods. (Not graded.)

137. Construction Principles (3) II. The Staff (Chairperson in charge)
   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.


139. Prestressed Concrete (3) II. Taylor Lecture—3 hours. Prerequisite: course 132B. Principles and methods, analysis and design of sections for bending, interactive computer analysis, ultimate strength of sections. Loads of prestress, shear design. Applications to bridges, buildings, and tanks. Special materials properties needed for effective prestressing.


141L. Engineering Hydraulics Laboratory (1) I, III. Lodwick Laboratory—4 hours. Prerequisite: course 141 (may be taken concurrently). Laboratory experiments and demonstration on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.


143. Water Resources Engineering and Management (3) II. Scott Lecture—3 hours. Prerequisite: course 142. Engineering and management concepts affecting the planning, development, design and operation of multipurpose projects. Consideration of water resources, data, quality, and uses; policies, legislation; institutions; laws, economics, environmental concerns; and public participation.


145. Hydraulic Systems Design (3) III. Amorcoho Lecture—3 hours. Prerequisite: courses 141, 141L, 142. Principles of planning design. Methods of analysis and hydraulic design of storage systems; diversion structures; conveyance and regulation systems; structures for irrigation, power, and flood control projects; pipeline networks; water connection systems.

146. Water Resources Systems Engineering (3) III. Helweg Lecture—3 hours. Prerequisite: course 145. Prerequisite: course 144 or 145 recommended. Application of systems analysis techniques in the development of water resource projects. Introduction to simulation and computer modeling. Applications of simulation models (computer models), introduction to various state-of-the-art water resource models.

147. Solid Waste Management (3) I. Tchobanoglous Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems, introduction to waste treatment processes and removal of treated wastes to the environment.

Engineering: Electrical and Computer

(College of Engineering)

Chairperson of the Department

Vice Chairperson of the Department

Department Office, 3116 Bainer Hall (752-0583)

Faculty

V. Ralph Aigazi, Ph.D., Professor
George R. Bramer, Ph.D., Associate Professor
John N. Churchill, Ph.D., Professor
Wayne Current, Ph.D., Associate Professor
Andrew J. Dienes, Ph.D., Professor
Richard G. Dond, Ph.D., Professor
(P) Electrical and Computer Engineering, Mathematics

Joel J. Faietta, Ph.D., Professor
Gene L. Fisher, Ph.D., Assistant Professor
Gary E. Ford, Ph.D., Associate Professor
William A. Gardner, Ph.D., Professor
Tien-Ho Hsi, Ph.D., Professor
K. Jain, Ph.D., Professor
Kenneth I. Joy, Ph.D., Assistant Professor
(P) Electrical and Computer Engineering, Computer Engineering

Lawrence T. Kim, Ph.D., Professor
Wen C. Lin, Ph.D., Professor
Charles U. Martel, Ph.D., Assistant Professor
Norman Matloff, Ph.D., Associate Professor
Peter A. Millard, Ph.D., Associate Professor
Manfred Ruschitzka, Ph.D., Associate Professor
Michael A. Soderstrand, Ph.D., Associate Professor
Ronald F. Soochoo, Ph.D., Professor
Jerome J. Suran, Senior Lecturer
(Electrical and Computer Engineering, Computer Engineering, Mathematics)

Richard F. Walters, Ph.D., Professor
(P) Electrical and Computer Engineering, Computer Engineering

Courses in Engineering: Electrical and Computer

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (1)
   III. The Staff (Chairperson in charge)
   Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. Presentation of basic ideas and their applications. Examination of some case studies. (P) (PHN grading only)

2. Introduction to Computer Programming: PASCAL (3) I, II, III
   Lecture—3 hours. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to digital computation and computer programming. Algorithms, their design and efficiency. Basic programming design, running, debugging, and use of well-structured programs. Programming language PASCAL will be used to solve simple problems. Students who have had courses 80, 88. Engineering 5, 5A, and Mathematics 29A may not receive credit for course 80 and those who have had Mathematics 19 may receive only 2 units of credit.

3. Introduction to Software Development (3) I, II, III
   Lecture—3 hours. Prerequisite: course B. Elements of program design;programming style, documentation, efficiency, debugging, verification, advanced features of PASCAL, and introduction to FORTRAN. Students who take courses 80, 88. Engineering 5, 5ATA and/or 5ATB may receive up to 7 units, and those who have had course 88 or Mathematics 29A may not receive credit for course 80.

88. Computer Programming: PASCAL (3) I, II, III
   Computer workshop—9 hours. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Self-paced computer programming course teaching PASCAL for graduate and transfer students with Engineering 3 or the equivalent background, or, consent of instructor. Problem solving skills, as well as PASCAL syntax emphasized. Students who have had course 8 or Mathematics 29A may not receive credit for course 88.

99A-O. Special Topics in Electrical and Computer Engineering (1-5) I, II, III
   The Staff (Chairperson in charge)

92. Internship in Electrical and Computer Engineering (1-5) I, II, III
   The Staff (Chairperson in charge)
   Work–learning experience—3-15 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work–study experience in Electrical and Computer Engineering. May be repeated for credit. (P) (PHN grading only)

95. Directed Group Study (1-5) I, II, III
   The Staff (Chairperson in charge)
   Prerequisite: consent of instructor restricted to lower division students. Group study of selected topics. (P) (PHN grading only)

99. Special Study for Lower Division Students (1-5) I, II, III
   The Staff (Chairperson in charge)
   (P) (PHN grading only)

Upper Division Courses

105AT. Self-Paced Advanced Course in Computer Programming in PASCAL (3) I, II, III
   The Staff (Chairperson in charge)
   Workshop—3 hours. Prerequisite: Engineering 5 (or the equivalent). Upper–division standing. Course covers advanced and practical implementation of a substantial programming project. Projects may be selected from student's own field of application.

110. Electronic Circuits (4) III, Churchill
   Current Laboratory—4 hours. Prerequisite: course 110 (concurrently). 112, 140 and Engineering 100. Large and small signal device models; analysis and design of linear circuits. Both discrete and integrated forms. Analysis and design of non–linear, digital and pulse circuits.

111. Electronic Circuits Laboratory (3) III, Churchill
   Current Laboratory—4 hours. Prerequisite: courses 110 (concurrent). 140. Propagation of the design, analysis and evaluation of elementary transistor circuits, amplifiers, operational amplifiers, feedback circuits and digital circuits.

112. Linear Systems and Circuits (4) II, Ford, Aigazi
   Lecture—4 hours. Prerequisite: Engineering 117. Characterization and analysis of linear systems and circuits. Time domain analysis by convolution techniques. Emphasis on frequency domain techniques, including Laplace transform, Fourier transform and Fourier series, with applications to electrical circuits.

114A. Bipolar Integrated Circuit Applications (3) I, Churchill
   Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110, 111. Analysis and design of bipolar monolithic integrated circuits emphasizing circuit and system aspects rather than fabrication.

114B. MOS Integrated Circuit Applications (3) II, Churchill
   Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110, 111, 114. Metal–oxide–semiconductor (MOS) integrated circuits and applications, dynamic and static memory and logic circuits, large–scale integrated random logic, read–only memory (ROM), programmable read–only memory (PROM), random–access memory (RAM), and shift registers.

115A. Integrated Circuits Design Technology (3) I, Churchill
   Current Laboratory—1 hour; discussion—1 hour; laboratory—3 hours. Design of digital and analog integrated circuits and fabrication and design are covered. Laboratory projects are used to develop skills in the most important techniques of integrated circuit fabrication.

115B. Bipolar Integrated Circuits Design and Fabrication Laboratory (3) Churchill
   Discussion—1 hour; laboratory—6 hours. Prerequisite: courses 140 and 115A. Design fabrication and testing of bipolar and/or metal–oxide–semiconductor devices and integrated circuits. Typical projects might include operational amplifier, digital logic system, or simple feedback control systems.

130A. Introductory Electromagnetics (3) I, Dienes
   Fink Lecture—3 hours. Prerequisite: Mathematics 228 and 22C, Physics 88 strongly recommended. Static and electric and magnetic fields; time–varying electromagnetics.

130B. Introductory Electromagnetics (3) I, Fink
   Dienes Lecture—3 hours. Prerequisite: course 130A and Engineering 17. Plane electromagnetic waves, transmission, reflection, transmission lines.

131A. Electromagnetic Fields and Waves (3) I, Fink
   Dienes Lecture—3 hours. Prerequisite: course 130E or the equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular wave guides.

131B. Electromagnetic Fields and Waves (3) II, Fink
   Dienes Lecture—3 hours. Prerequisite: course 131A or the equivalent. Dielectric guides, helix and slow–wave structures. Wave propagation in media with anisotropic permittivity and permeability.

131C. Electromagnetic Fields and Waves (3) III, Fink
   Dienes Lecture—3 hours. Prerequisite: course 131B or the equivalent. Resonant cavity components: antennas; moving systems and space–time (special relativity).

132A. High–Frequency Systems, Circuits and Devices (4) I, Bramer
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132A. Class of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

132B. High–Frequency Systems, Circuits and Devices (4) II, Bramer
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132A. Passive high–frequency device, analysis, design. Microwave circuit and filter design. Analysis and design of microwave transistor and tunnel diode amplifiers, antenna analysis and design to include thin line, loop, cylindrical, waveguide and horn, and phased array antennas.

134A. Radar Systems and Signals (3) I, Bramer
   Lecture—3 hours. Prerequisite: course 112; course 160 strongly recommended. Introductory course on radar systems and signals. Emphasis on radar system configurations and signals. The prediction of radar range performance, accuracy and resolution is discussed for a number of radar classes including: pulse, cw and pulse doppler.

140. Fundamental Principles of Device Physics (4) II, Churchill
   Lecture—4 hours. Prerequisite: Physics 88B and 88D. Semiconduct device fundamentals: equilibrium and non–equilibrium statistical mechanics, conductivity, diffusion, density of states, electrons and holes p–n junctions and bipolar transistors, magnetic device fundamentals: origin of magnetism, magnetic materials, devices.

140A. Solid–State Electronics (3) I, Churchill, Soochoo
   Lecture—3 hours. Prerequisite: course 140. Electrical properties and design of various semiconductor devices. Devices to be discussed include metal–semiconductor diodes, PN junction diodes, and bipolar transistors.

140B. Solid–State Electronics (3) I, Churchill, Soochoo
   Lecture—3 hours. Prerequisite: course 145A. Electrical properties and design of various semiconductor devices. Devices to be discussed include field–effect transistors, and bulk negative resistance devices.

145C. Solid–State Electronics (3) I, Churchill, Soochoo
   Lecture—3 hours. Prerequisite: course 145A. Design of devices and their associated circuits utilizing the magnetic properties of solids. Devices studied include the ferrite core, ferrite isolator, magnetic media used in disk, tape and bubble memories, magnetic cores.

148A. Superconductivity (1) I, Fink
   Lecture—3 hours. Prerequisite: course 130B or course 140 or the equivalent. Fundamental properties of superconductors of the first and second kind, London and Ginzburg–Landau theories. Josephson effects, applications and devices.
150. Instrumentation Systems (I) - Current Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 100. Application and design of equipment common to all instrumentation systems; dynamic response; transducers; signal conditioning.


157A. Control Systems (II) - III. Haar, Dorf Lecture—3 hours. Prerequisite: course 112. Design and analysis of closed loop automatic control systems. Examples are drawn from all engineering fields. The mathematical representation of systems; frequency, s-plane and state space representations; stability and controllability.

157B. Control Systems (III) - III. Haar, Dorf Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Control system optimization and compensation techniques, digital control theory. Laboratory includes servo system experiments and computer simulation studies.

160. Fourier Analysis and Modulation (II) - Gardner, Ford Lecture—3 hours. Prerequisite: course 112. Fourier analysis of signals. Applications to analysis and design of linear time invariant systems, and nonlinear and time varying circuits for film and sound modulation.

161. Signal Processing (II) - Ford Lecture—1 hour; laboratory—6 hours. Prerequisite: course 151; Engineering 100. Design and implementation of analog and digital signal processing systems. Topics include: analog and digital filtering, spectral analysis, function circuits, A/D and D/A conversion, and digital communication systems.

165. Data Communication (II) - Gardner, Ford Lecture—3 hours. Prerequisite: Engineering 118. Introduction to data communication systems. Analysis of effect of modulation on signal corruption by noise. Techniques for high speed digital data transmission. Introduction to information theory.

170. Computer Structure and Assembly Language (II) - III. Lin, Souk Lecture—3 hours; computer workshop—3 hours. Prerequisite: proficiency in at least one higher-level programming language. Introduction to computer architecture; machine language; assembly and conditional assembly; input/output programming; absolute and relocatable code; re-entrant code; assemblers and loaders.

171. Introduction to Computer Architecture (II) - III. Lin, Souk Lecture—3 hours; discussion—1 hour. Prerequisite: course 170. Study of architectural features of several representative computers, large, medium and micro, including instruction format, addressing, details of instruction operation, input/output and interrupts. Study of microprogrammed machines.

172. Microcomputer-Based Systems Design (II) - III. Lin, Souk Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 170, 176. Course 177 (concurrently) recommended. Studies of different types of microcomputers; comparison and optimization of microcomputer goals for goal-oriented applications; systems design procedures; peripheral chips; interface design; microcomputer software; typical application-oriented design projects.

175. Computer Devices and Systems (III) - III. Soochoo Lecture—3 hours. Prerequisite: course 140. Essential elements of the computer and their interconnection. Characteristics of input and output devices, memories and CPU (central processing unit) including discussion of discs, cores, magnetic bubbles, CCI's (charge-coupled devices) and microprocessors.

178. Digital Systems (I) - II. Ford Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Introduction to digital design system, including computer arithmetic, combinational circuit design, sequential and asynchronous circuits and memory system design.

177. Digital Systems (II) - II. Ford Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 170, 178. Introduction to design of digital system controllers, use of MSI/LSI in controller design, design of programmable system controllers, use of A/D and D/A and common problems in system design such as noise and power issues.

180. Data Structures and Programming Techniques (II) - III. Martel Lecture—3 hours; programming practice workshop—3 hours. Prerequisite: course 117. Introduction to data structures and program design. Concept of data type, arrays, records, set structures and their representation. Sequential file structures. Dynamic information structures. Linear lists, tree structures. Hash techniques, recursive algorithms, sorting, and searching. Students who have had Mathematics 129A may not receive credit for this course.

181. Compiler Design (II) - III. Jacobs Lecture—3 hours. Course may be arranged. Prerequisite: course 160. Survey of various programming language features and translators. Emphasis on formal language specifications, lexical analysis, syntax analysis and syntax directed translation.

182A. Operating System Design (II) - I. Ruschitzka Programming workshop—3 hours. Prerequisite: courses 171, 181. Architectural support of operating system concepts; systems programming; major components of an operating system, their functions, and their interactions. Lecture with laboratory project that involves a machine simulator and the implementation of matching multiprogramming systems.

182B. Operating System Design (II) - I. Ruschitzka Lecture—3 hours; laboratory—3 hours. Prerequisite: course 182A. Introductory probability theory course. Contemporary architectures: virtual memory and operating system support functions. Current problems and problems of determinacy, mutual exclusion, deadlocks, and synchronization; management of physical and virtual resources. Protection mechanisms. User interface and easy-to-use considerations.

185. Database Systems (II) - II. Koo Lecture—3 hours; laboratory—3 hours. Prerequisite: course 180. Storage and retrieval of information: file organization; file utilization; efficiency, security, integrity; file oriented languages. Introduction to database systems.

186. Modeling and Simulation of Computer Systems (II) - III. Matloff Lecture—3 hours. Prerequisite: course 180 or Mathematics 298B; course 170; a calculus-based probability course. Introduction to queueing theory. Techniques for developing simulation software. Applications to the design of computer systems, such as processor scheduling, memory management and file systems.

188A-C. Special Topics in Electrical and Computer Engineering (I-5) - I, II, III. In charge: Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Biomedical Engineering; (B) Computer Science; (C) Programming Systems; (D) Digital Systems; (E) Communications; (F) Control Systems; (G) Signal Processing; (H) High-Frequency Phenomena and Devices; (I) Solid-State Devices and Physical Electronics; (J) Systems; (K) Circuits; (L) Computer Software; (M) Computer Hardware; (N) Microprocessing; (O) Electronics. May be repeated for credit when the topics differ.

190. Research Group Conferences in Electrical and Computer Engineering (I) - I, II, III. The Staff Discussion—1 hour. Prerequisite: upper division standing in Electrical or Computer Engineering. Application of principles of instruction. May be repeated for credit. (P/NP grading only.)

191. Discrete Structures and their Applications (I) - I, II, III. The Staff Lecture—3 hours. Prerequisite: three-semester sequence of a lower division mathematics requirement and course 170. Discrete structures and applications to various areas of computer science; mathematical models and mathematical reasoning; sets, relations, functions, application to data structures; simper analysis; monoids; groups; lattices; Boolean algebra. Their use in coding theory, computer design, automatic theory and formal languages.

192. Internship in Electrical and Computer Engineering (I-5) - I, II, III, The Staff (Chairperson in charge) Work-experience experience—3.15 hours. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work-study experience in electrical and computer engineering. May be repeated for credit. (P/NP grading only.)

196. Directed Group Study (I-5) - I, II, III, The Staff (Chairperson in charge) Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.)

197. Special Study for Advanced Undergraduates (I-5) - I, II, III, The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Optimization Techniques with Applications (II) - III. Haar, Buehr Lecture—3 hours. Prerequisite: knowledge of FORTRAN programming and graduate status. Computer-aided optimization techniques and algorithms, with special emphasis on constrained and unconstrained optimization algorithms and algorithms with and without constraints. Preplanned and sequential search methods. Gradient methods. Linear and nonlinear programming techniques and algorithms. Offered in odd-numbered years.


206. Digital Image Processing (III) - I. Jain Lecture—3 hours; laboratory—3 hours. Prerequisite: knowledge of FORTRAN with experience in numerical analysis. Fundamentals developed in course 206 are applied to problems in image processing. Topics discussed include stochastic image representation, Image restoration, Image reconstruction for projection, image analysis and image data compression. Offered in even-numbered years.

219A. Advanced Electronic Circuits Linear Amplifiers (II) - II. Current, Churchill Lecture—4 hours; laboratory—4 hours. Prerequisite: course 110, 111. In-depth analysis of linear amplifiers. Designs are undertaken using Bode analysis, compensation, and root locus techniques. Computer-aided analysis.

219B. Introduction to VLSI Circuits (III) - III. Current, Churchill Lecture—3 hours. Prerequisite: courses 110, 111. Theory and practice of VLSI circuit system design. Extensive use of VLSI computer-aided design tools allows students to undertake a VLSI design example.

212. System Analysis (I) - I. Haar Lecture—4 hours. Prerequisite: courses 112, 151. Analysis of continuous time and discrete time linear systems; state space techniques introduced as the major methodology for system analysis.

214. Computer-Aided Circuit Analysis and Design (III) - III. Current Lecture—3 hours. Prerequisite: course 110. Network equation formulations; numerical techniques for ac, dc, and transient solutions for linear and nonlinear networks; sensitivities and automated design; device models; and practical design problems using SPICE.

215. Advanced Projects in IC Fabrication (III) - III. Churchill, Current Lecture—3 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course 115. Individualized projects in the fabrication of advanced integrated circuits. Internal device-level integrated elements and test structures.

220. Network Synthesis (II) - III. Soderstrand, Current Lecture—3 hours. Prerequisite: course 112. An introduction to modern active and passive network synthesis techniques. Topics include one- and two-port networks, network analysis, projection and filter theory. Emphasis is on modern techniques which lead to doubly-tuned resonant two-port synthesis.

221. Passive Filter Design (II) - II. Soderstrand, Current Lecture—3 hours. Prerequisite: course 220 or the equivalent. An introduction to the design of passive filters with lumped and distributed elements. Filter design process, reactance transformations, approximation theory, passive filters with lumped elements, crystal and ceramic filters, microwave filters.

222. Active Filter Design (II) - II. Soderstrand, Current Lecture—3 hours. Prerequisite: course 220 or the equivalent. An introduction to the design of active filters with lumped or distributed elements. Filter design process, reactance transformations, approximation theory, passive filters with lumped elements, crystal and ceramic filters, microwave filters.

224A. Quantum Electronics (I) - I. Dienes, Fink Lecture—3 hours. Prerequisite: course 110 and 140 or the equivalent. Some basic concepts of quantum theory, density operator, Hamiltonian, and parity. Electric dipole transition equation of motion of magnetic dipole; resonance processes, absorption, dispersion and saturation; transient behavior of electric dipole transitions, coupled amplitude equations and rate equations. Offered in even-numbered years.
Engineering: Mechanical

226B. Quantum Electronics (3) I. Dienes, Fink Lecture—3 hours. Prerequisite: course 226A. Lasers, masers, threshold requirements, steady-state and transient behavior, Q-switching. Interaction between radiation and phonons. Offered in odd-numbered years.

227A. Microwave Electronics (3) I, Soohoo Lecture—3 hours. Prerequisite: courses 130B and 140 or the equivalent. Theory of microwave devices, waveguides and cavities, electromagnetic theory of electron gun, electron gun efficiency, electron energy in matter and field relations. Comparison between conventional and microwave tubes. Antenna design and analysis of microwave circuits. Offered in odd-numbered years.

227B. Microwave Electronics (3) II. Soohoo Lecture—3 hours. Prerequisite: course 227A or the equivalent. Microwave devices and circuits, design and fabrication of high-frequency circuits and devices. Antenna design and analysis of microwave antennas. Parametric amplifiers, tunnel and IMPATT diodes, Gunn oscillators. Offered in even-numbered years.

228. Advanced Microwave and Antenna Design Techniques (3) III. Brenner Lecture—1 hour; laboratory—6 hours. Prerequisite: course 132A and 132B. Design, fabrication and analysis of advanced microwave devices and antennas. Includes GaAs FET amplifiers, broadband microstrip and stripline filters, magnetrons, reflectors and lens-antennas. Antenna design and analysis of microstrip antennas. Parametric amplifiers, tunnel and IMPATT diodes, Gunn oscillators. Offered in even-numbered years.

230. Advanced Electromagnetic Theory (3) III. Dienes, Branner Lecture—3 hours. Prerequisite: course 132A or 132B. The application of vector potentials to electromagnetic problems by use of Green’s functions. Applications of these techniques to radiation and transmission problems.

230A. Advanced Electromagnetic Theory (3) III. Dienes, Branner Lecture—3 hours. Prerequisite: course 229B. Advanced topics in propagation such as propagation through anisotropic media, theory of propagation of over-the-horizon propagation, and scattering by conducting objects. Offered in even-numbered years.

234A. Applied Solid-State Physics (3) I, III. Fink, Soohoo, Churchill Lecture—3 hours. Prerequisite: course 145C or the 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.

245B. Applied Solid-State Physics (3) II. Fink, Churchill Lecture—3 hours. Prerequisite: course 224B. Theory of semiconductors with application to transistors. Topics include electrons, holes, mobility, and transit-time effects. Broad-band devices and two-dimensional, high-conductivity semiconductors. Offered in odd-numbered years.

245C. Applied Solid-State Physics (3) III. Fink, Soohoo Lecture—3 hours. Prerequisite: course 242A. Theory of magnetic applications to ferromagnetic devices and circuits. Topics include paramagnetism, ferromagnetism, magnetic resonance, and switching properties of individual magnetic elements and magnetic arrays. Offered in even-numbered years.

248. Advanced Semiconductor Devices (3) III. Churchill Lecture—3 hours. Prerequisite: course 157B and 212. Theory of semiconductor devices such as: junction field effect transistor, silicon controlled rectifier, and integrated semiconductor circuits. Intrinsic gate effects and transistors, thin film devices, optoelectronic devices, and change-coupled devices.

251. Nonlinear Control Systems (3) III. The Staff Chairperson in charge Lecture—3 hours. Prerequisite: courses 157B and 212. Techniques for solving nonlinear control problems; state space methods, stability theorems. Lyapunov’s methods; sinusoidal describing function and off-axis systems. Offered in even-numbered years.


254. Digital and Sampled-Data Control System (3) II. Hia Lecture—3 hours. Prerequisite: courses 157A, 212, or the equivalent. Digital design and sampled-data control theory with applications to computer control systems analysis and design. Frequency domain (z-transform) methods, state space methods and statistical design methods. Offered in even-numbered years.

271. Finite-State Machines (3) III. Kou Lecture—3 hours. Prerequisite: course 191. A study of finite-state sequential machine models and behavior; experiments; the original algolgber; algebraic structure theory of finite-state machines; completeness of sets of primitives. Offered in odd-numbered years.

271A. Advanced Digital System Design (4) I. Lin Lecture—3 hours; laboratory—3 hours. Prerequisite: course 177. Topics in advanced design of digital systems. Design of digital systems. Floating point processors. Pipeline processors. Laboratory involving design and construction of several example systems.

272. Advanced Switching Theory (3) III. The Staff (Kou in charge) Lecture—3 hours. Prerequisite: courses 171, 191. Topics in switching theory. Synchronous and asynchronous sequential circuits. Theoretical study of Boolean functions and their transforms. Special realization techniques for combination and sequential circuits. Introduction to the design of large scale systems.


274. Advanced Computer Architecture (3) I. Ruschitzka Lecture—3 hours. Prerequisite: course 272 or consent of instructor. A study of computer architectures of advanced scientific computers. CDC 6000, 7000 series architecture. DEC System-IV architecture and processor architecture. Processor architecture. Offered in even-numbered years.

275. Computer Graphics (3) II. Joy Lecture—3 hours. Prerequisite: course 180. Study of hardware and software implementation of interactive computer graphics systems. Display devices, display files and transformations. Interactive graphics, devices, and techniques. Problems in three-dimensional graphics. Examples of current systems; applications project required. Offered in even-numbered years.

278A. Introduction to Fault-Tolerant Computing (3) II. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 176. Examination of current issues in design and analysis of fault-tolerant digital systems. Course covers basic fault-tolerant architectures such as: NMR, Hybrid, and Fail-Safe as well as reliability analysis, system design and analysis, and software fault-tolerance.

278B. Introduction to Digital Fault Diagnosis (3) III. The Staff Chairperson in charge Lecture—3 hours. Prerequisite: course 176; Engineering 118. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, and the analysis of the effects of intermittent faults.

278C. Advanced Programming and Data Structures (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 180; course 181 or 182 recommended. Formal specification of data structures and algorithms. Development and representation of data structures; elements of graph theory; general list structures; manipulation of list structures in LISP, memory management.

278A. Formal Languages and Related Automata (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 191 or consent of instructor. Classes of formal languages and their grammars, important classes of finite and infinite automata and their properties. Correspondence between these classes and types of formal grammars. Emphasis on context-free languages.

278B. Translation of Programming Languages (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: courses 180, 181 and 278A. Compiler compilation. Storage allocation. Object code generation. Top-down and bottom-up design techniques. Table-driven compilers. Optimization techniques.


280. Database Systems (3) III. Kou Lecture—3 hours. Prerequisite: course 185. Survey and discussion of major issues in data base systems. Topics include: data models, storage management and access methods, query languages and query optimizations. Also offered in odd-numbered years.

282. Operating System Models (3) III. Ruschitzka Lecture—3 hours. Prerequisite: course 182B. Intruduction to computer science models for the evaluation of system performance measures.

283. Random Signals and Noise I (4) II. Gardner Lecture—3 hours; discussion—1 hour. Prerequisite: course 177A or 131E or the equivalent. Introduction to random processes with applications to optimum and adaptive filtering of signals in noise. Second order stochastic calculus, correlation function, power spectral density, mean-ergodicity, Linear minimum-mean-squared error estimation, and stochastic approximation for smoothing, filtering, prediction, cancellation.


289-A. Special Topics in Electrical and Computer Engineering I (1-5), I, II, III. The Staff (Chairperson in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Biomedical Engineering; (B) Computer Science; (C) Programming Systems; (D) Digital Systems; (E) Communications; (F) Control Systems; (G) Signal Processing; (H) High-Frequency Phenomena and Devices; (I) Solid-State Devices and Physical Electronics; (J) Systems; (K) Circuits; (L) Computer Software; (M) Computer Hardware; (N) Microprogramming; (O) Electronics. May be taken for credit. Three hours lecture, two hours laboratory. Pass-fail grading.

290. Seminar I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Discussion and presentation of current research and development. (SU grading only.)

290C. Research Group Conferences in Electrical and Computer Engineering I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Discussion—1 hour. Prerequisite: consent of instructor; graduate standing. May be repeated for credit. (SU grading only.)

290D. Research Group Conferences in Electrical and Computer Engineering I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Discussion—1 hour. Prerequisite: consent of instructor; graduate standing. May be repeated for credit. (SU grading only.)

290E. Guest Lecturers I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Discussion—1 hour. Prerequisite: consent of instructor; graduate standing. May be repeated for credit. (SU grading only.)

Engineering: Mechanical

200
Faculty
James W. Baughn, Ph.D., Associate Professor
Charles W. Beadle, Ph.D., Professor
Harry Brandt, Ph.D., Professor
J. W. B. Dreyer, Ph.D., Professor
Stanley A. Brown, D.Eng., Associate Professor
(Orthopaedics, Surgery)
Harry A. Dwyer, Ph.D., Professor
Clyne F. Gallo, M.S., Professor Emeritus
Warren H. Giedt, Ph.D., Professor Emeritus
John F. Gisela, J.D., Visiting Lecturer
William A. Hancock, Ph.D., Visiting Lecturer
Jerald M. Handerson, D.Eng., Professor (Mechanical Engineering, Food Science and Technology)
Ronald A. Hess, Ph.D., Associate Professor
P. Myron A. Hounslow, Ph.D., Professor Emeritus
Mont Hubbard, Ph.D., Associate Professor
Maury L. Hull, Ph.D., Associate Professor
Alfred T. Jones, Ph.D., Associate Professor
Devin C. Kamm, Ph.D., Professor
John D. Kemper, Ph.D., Professor
Wolfgang Kolman, D-Ing, Associate Professor
Arthur S. Leonard, M.S., Lecturer
Donald L. Margolis, Ph.D., Professor
Allan A. McMillan, M.S., Professor
Paul G. Migliore, Ph.D., Assistant Professor
Howard L. Needles, Ph.D., Professor (Textiles and Clothing)
John B. Sheets, Ph.D., Visiting Lecturer
Bruce R. White, Ph.D., Associate Professor
An Tsu Yang, D. E. Sc., Professor
S. Haig Zeronian, Ph.D., D.Sc., Professor (Textiles and Clothing)

Division of Materials Science and Engineering

Faculty
David G. Howitt, Ph.D., Associate Professor
Ariya K. Munherge, Ph.D., Professor
Zuhair A. Mustafa, Ph.D., Professor
James F. Shackelford, Ph.D., Associate Professor

Courses in Mechanical Engineering

Lower Division Courses

1. Mechanical Engineering (1) II. The Staff (Beadle in charge)
   Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics, and credits earned. (P/NP grading only.)

92. Internship in Mechanical Engineering (1-5) II, III, The Staff (Beadle in charge)
   Work-learning experience. Prerequisite: lower division standing; approval of project prior to period of internship; supervised work-study experience in engineering. May be repeated for credit. (P/NP grading only.)

Special Study for Undergraduates (1-5) II, III.

The Staff (Beadle in charge)
   Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

110. Fluid Mechanics (3) I, White
   Lecture—3 hours. Prerequisite: Engineering 103B. Development of general equations of motion for viscous fluids; inviscid flow theory; viscous flow; thin shear flows; turbulence; simple mixing theories of turbulence. Applications to turbomachinery, and aerelastic.

124. Mechanical Engineering Project (2) I, II, III. The Staff (Beadle in charge)
   Laboratory—6 hours. Prerequisite: consent of instructor. Performance of projects which include design, development, and evaluation of a mechanical engineering system or related experiments which give the student experience in theoretical modeling and experimental evaluation. May be repeated once for credit.

Aeronautical Engineering Fundamentals (3) I, Hess
   Lecture—3 hours. Prerequisite: Engineering 103A (may be taken concurrently). Aircraft subsystems and nomenclature.

NOTE: For key to footnote symbols, see page 124.

128. Theoretical Aerodynamics (4) II, White

127. Applied Aircraft Aerodynamics (4) I, Misoglu

126. Aircraft Performance (4) II, White

139. Aircraft Stability and Control (4) II, Hess

135. Aircraft Preliminary Design (4) II, Misoglu
   Lecture—3 hours. Prerequisite: course 126. Aircraft preliminary design practices including estimation of weight and volume, aerodynamics, performance, stability and control. Design iteration and trade-off studies. (P/NP grading only.) Limited enrollment with preference to Mechanical and Aerospace Engineering majors.

134. Vehicle Stability (4) III, Kamper
   Lecture—3 hours. Prerequisite: Engineering 126. Introduction to the static and dynamic stability characteristics of motor vehicles with examples drawn from aircraft landing gear, aircraft landing gears, and waterborne vehicles including hovercraft. Laboratory experiments illustrate response to various inputs such as gusts, surface roughness, and control dynamics.

150A. Mechanical Design and Manufacturing Processes (4) I, III, Hull, Jones
   Lecture—2 hours; discussion—1 hour. Prerequisite: course 150A. Principles of mechanical engineering, machinery failures and fatigue theory applied to the selection of mechanical components. Design projects which concentrate on conceptual design, engineering analysis, engineering drawings, methods of manufacture, material selection and cost.

150B. Mechanical Design and Manufacturing Processes (3) I, II, Davis, Jones
   Lecture—2 hours. Discussion—1 hour. Prerequisite: course 150A. Different methods of analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.

152. Machine Design (3) I, Yang
   Lecture—3 hours. Prerequisite: course 150A. Principles of mechanical engineering, machinery failures and fatigue theory applied to the selection of mechanical components. Design projects which concentrate on conceptual design, engineering analysis, engineering drawings, methods of manufacture, material selection and cost.

151. Statistical Methods in Design (3) II, Hull
   Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.

152. Machine Design (3) I, Yang
   Lecture—3 hours. Prerequisite: course 150A. Principles of mechanical engineering, machinery failures and fatigue theory applied to the selection of mechanical components. Design projects which concentrate on conceptual design, engineering analysis, engineering drawings, methods of manufacture, material selection and cost.

152. Machine Design (3) I, Yang
   Lecture—3 hours. Prerequisite: course 150A. Principles of mechanical engineering, machinery failures and fatigue theory applied to the selection of mechanical components. Design projects which concentrate on conceptual design, engineering analysis, engineering drawings, methods of manufacture, material selection and cost.

155. Engineering Systems Design (3) III, Handerson
   Lecture—2 hours; discussion—1 hour. The engineering design process and its use; design projects; engineering case studies.

151. Gas Dynamics of Energy Systems (4) I, Dwyer
   Lecture—3 hours. Discussion—1 hour. Prerequisite: Engineering 126. Gas dynamics of energy systems, including the Navier-Stokes and energy equations for steady, two-dimensional flows. Numerical techniques in solving fluid flow problems; transient-transport modeling; boundary layers and flow stability. Other selected topics.

182. Gas Turbines for Propulsion and Power Generation (4) II, Hoffman
   Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 130B, 130B. Study of gas turbine power plants for electric power generation and aircraft propulsion. Gas turbine fundamentals. Turbokinematics, aerodynamics, and thermodynamics of compressors, turbines, and gas turbine cycles. Design studies of specific engines and powerplants.

165. Fundamentals of Heat Transfer (3), II, Baughn, Dwyer

   Lecture—3 hours; discussion—1 hour. Prerequisite: course 126. Analysis of mechanical systems. Design of control systems to improve linearity, accuracy and speed of response. Design of feedback systems which maintain quality of performance in spite of parameter variations. Analog and digital computer simulation.

   Lecture—3 hours; discussion—1 hour. Prerequisite: course 126. Analysis of mechanical systems. Design of control systems to improve linearity, accuracy and speed of response. Design of feedback systems which maintain quality of performance in spite of parameter variations. Analog and digital computer simulation.

176. Measurement Systems (3) III, Beadle, Hull
   Lecture—3 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 102A. Theory of measurement: measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitalization.

192. Internship in Engineering (1-5) I, II, III. The Staff (Beadle in charge)
   Work-learning experience. Prerequisite: upper division standing, approval of project prior to period of internship. Supervised work-study experience in mechanical engineering. May be repeated for credit. (P/NP grading only.)

193. Directed Group Study (1-5) I, II, III. The Staff (Beadle in charge)
   Lecture—1 to 5 hours. Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.)

Special Study for Undergraduates (1-5) I, II, III.

The Staff (Beadle in charge)
   Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

205. Thermal Radiation (3) II, Brandt
   Lecture—3 hours. Prerequisite: course 165 or consent of instructor. The transfer of radiant energy and the spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems.

208A. Experimental Methods in Fluid Mechanics and Heat Transfer (2) II, Baughn
   Laboratory—3 hours. Prerequisite: course 165 or the equivalent. Uncertainty analysis; steady-state and transient temperature measurement; steady-state flow and pressure measurements.

208B. Measurements of Turbulent Flow Properties (3) II, McMillon
   Lecture—1 hour; laboratory—3 hours. Prerequisite: course 208A. Introduction to measurement of turbulent flow properties by use of hot-wire and laser Doppler anemometry.

210A. Fundamentals of Fluid Mechanics and Heat Transfer (4) I, Dwyer
   Lecture—4 hours. Prerequisite: graduate standing or consent of instructor. Study of Navier-Stokes and energy equations for steady, two-dimensional flows. Numerical techniques in solving fluid flow problems; transient-transverse flow modeling; boundary layers and fluid stability. Other selected topics.

210B. Advanced Fluid Mechanics and Heat Transfer (4) II, Dwyer
   Lecture—4 hours. Prerequisite: course 210A. Analytical and numerical analysis of the Navier-Stokes and energy equations for steady, two-dimensional flows. Numerical techniques in solving fluid flow problems: turbulent-transitional flow modeling; boundary layers and fluid stability. Other selected topics.
Engineering: Mechanical

211. Fluid Flow and Heat Transfer Design (4) I. Baughn Lecture—3 hours; discussion—1 hour. Prerequisite: course 210B. Design of industrial systems. Review of design aspects of selected topics from: heat conduction, thermal stresses, fires, heat transfer in ducts, boundary layers and separated flows; impingement: heat exchange. Flow in diffusers, over airfoils and blades. Other selected topics.

212. Advanced Heat Transfer with Phase Change (4) II. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: course 210B. Study of complex phenomena occurring in two-phase flow, boiling and condensation. Development of fundamental relationships for the design of phase change systems. Use of these relations with new experimental data to develop semi-empirical working relations; application to various energy systems and power-plant problems. Offered in odd-numbered years.

213. Advanced Turbulence Modeling (4) III. Kolmann Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbulence: kinematics and dynamics of homogeneous and inhomogeneous flows; wall boundary layers; eddies; scale analysis; second order closures and simplifications: numerical methods: application to boundary-layer and turbulence flows: two-dimensional and three-dimensional hydrodynamic and environmental flows. Offered in even-numbered years.


216. Advanced Thermodynamics (4) I. Brandt Lecture—4 hours; discussion—1 hour. Prerequisite: Engineering 105B. Study of topics important to energy conver- sion systems, propulsion and other systems using high temperature heat sources. Thermodynamic and transport properties of fluids, superheated steam, water vapor, and carbon dioxide. Offered in odd-numbered years.

217. Analysis of Reacting Flows (3) I. White Lecture—3 hours. Prerequisite: course 210A and 216. Derivation and analysis of basic equations for chemically reacting flow systems. Calculation of high temperature gas properties and use of reaction rate models. Selected applications to both laminar and turbulent flame propagation in both steady and unsteady situations. Offered in odd-numbered years.

218. Advanced Energy Systems (4) I. Hoffman Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, or the equivalent. Review of options available for advanced power generation. Detailed study of basic power system balances, efficiency coefficients, and overall powerplant performance for one advanced concept such as nuclear, magnetohydrodynamic, or solar electric power-plant.

220A-220B. Mechanical Vibrations (3-3) II, III. Margolis Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

222. Advanced Dynamics (3) I. Jones Lecture—3 hours. Prerequisite: Engineering 102B. Dynamics of particles and of rigid bodies with advanced engi neering applications; generalized coordinates; Hamilton's Principle; Lagrange's Equation; Hamilton-Jacobi Theory.

224. Kinematic Design of Mechanisms (3) I. Yang Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Bernsmt theory of the national design of mechanisms. Geometric design of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order path curves, analysis; circles and center-point curves. Graphic and computer meth- ods for kinematic design.

225. Acoustics and Noise Control (3) I. Kamnopp Lecture—3 hours. Prerequisite: Engineering 122. Descrip- tion of sound and noise. Normal modes and waves, interference between vibrating solids and sound fields: sound absorption in enclosed spaces; sound transmission through barriers: sound amplification in design of mufflers, acoustic enclo- sure, room acoustics, design of quiet machinery.

225A. Engineering Case Studies (2) II. Henderson Discussion—2 hours. Studies of selected problems which illustrate various methods of the design process and man- agement in advanced mechanical engineering systems.

255. Computer-Aided Mechanical Design (3) II. Jones Lecture—2 hours: discussion—1 hour. Prerequisite: course 150B. Discussion of computer-aided numerical methods including optimization techniques in mechanical design analysis and synthesis. Interactive computer-aided design.

270. Modeling and Simulation of Engineering Systems (3) I. Kamnopp Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Introduction to numerical methods such as finite element and equivalent dynamic feedback. Stress on practical ap- plication of theory to engineering systems in various energy domains.


272B. Multivariable Feedback Control and Estimation Theory (4) II. Hubbard Lecture—4 hours. Prerequisite: courses 270, 272A. Emphasis on multiinput, multioutput systems: Distributed and continuous time control and estimation problems. Frequency domain methods: classical optimum control: Kalman filters; frequency domain methods; multivariable poles, zeros.


274. Analysis and Design of Digital Control Systems (4) III. Hess Lecture—3 hours; discussion—1 hour. Prerequisite: course 127 or consent of instructor. Discrete systems analysis, digital filtering, sample data systems, state space and transform descriptions, quantization effects, specific applications to aircraft.

275. Advanced Topics in Aircraft Stability (4) III. Hess Lecture—3 hours; discussion—1 hour. Prerequisites: courses 129 or 134, and 172. Analysis of aircraft modes of motion; response to control action; time and frequency domain descriptions; response to random inputs—turbin- e description; statistical analysis in digital control system design; stochastic analysis and handling quality. Offered in even-numbered years.

276. Data Acquisition and Analysis (3) II. Hull Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Principles of data acquisition with emphasis on digital techniques. Use of micro and minicomputers to control data acquisition; methods of data analysis including probability distributions, correlations, regression, and Fourier analysis. Special attention to digital spectral analysis.

276A. Advanced Engineering Analysis (3) I. Brandt Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering or advanced analytical and numerical techniques. Topics in- clude probability theory; calculus of variations; classification of differential equations, and advanced numerical methods.

276B. Computer Control and Simulation (3) I, II. Beadle, Yang Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current computer engineering topics. Offered in odd-numbered years.

287. Dynamic Systems and Control Theory Seminar (3) I, II. The Staff (Mergel in charge) Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in systems theory and automatic control with presentations by individual students. (F, W meeting only.)

288. Group Study (1-5) I, II, III. The Staff (Beadle in charge) SU grading only.

299. Research (1-12) I, II, III. The Staff (Beadle in charge)

Courses in Materials Science and Engineering

Undergraduate courses in Materials Science and Engineering are listed beginning on page 190 under Engineering core courses as Engineering 130 through 147, inclusively.

Graduate Course

240. Transport Phenomena in Materials Processors (4) III. Shadelkoller Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering. Phenomenological and aca- demic mechanisms in transport processes in condensed and non-condensed phase treatment of high temperature chemical and physical vapor deposition, crystal growth, bonding, sintering and joining of metals. Offered in even- numbered years.

241. Principles and Applications of Dislocation Mechanics (3) III. Muthukarar Lecture—3 hours. Prerequisite: graduate standing in Eng- ineering. Concepts of dislocation theory are applied to explain plasticity of crystalline solids: Glide and climb of dislocations, strain hardening, recrystall- ization. Influence of microstructure in optimizing the mechanical strength properties. Offered in odd-numbered years.


245. Advanced Topics in Structure of Materials (4) III. Muthukarar Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 132 and graduate standing in Engineering or consent of instructor. Advanced aspects of microstructural analysis of homogeneous and heterogeneous transformation, trans- formation by shear, order-disorder reactions. Offered in even-numbered years.

244. Interaction of Materials and their Environment (4) I, Muthukarar Lecture—3 hours; discussion—1 hour. Prerequisite: E- ngineering 45, 104A, or intermediate course in kinetics and kinetic mechanisms of the cooling and oxidation processes. Practical aspects of corrosion control and pre- vention. Stress-corrosion cracking, environment, corrosion, phe- nomenon. Special topics in corrosion, microstructural and atmospheric corrosion. Offered in even-numbered years.

248A. Fundamentals of Transmission Electron Microscopy (3) I. Howitt Lecture—2 hours; discussion—1 hour. Prerequisite: con- sent of instructor. Principles and techniques of transmission electron microscopy used in study of materials will be described. Emphasis upon practical applications of the required laboratory section. Offered in odd-numbered years.

249L. Laboratory for Electron Microscopy (2) I, II. Howitt Lecture—4 hours; discussion—1 hour. Prerequisite: course 248A (may be taken concurrently). Students: Application of techniques of electron microscopy, Preparation and observation of crystalline specimens, photographic re- cording techniques, and instrument alignment. Offered in odd-numbered years.
Faculty-student interaction is encouraged by participation in the English Club, which meets once a quarter, often in a faculty home. Qualified creative writing students may gain valuable experience for academic credit by helping to edit the Department's nationally known California Quarterly.

English

A.B. Degree Requirements:

Preparatory Subject Matter

One course from English 1, 2, 3 ........................ 4
English 48 ............................................. 4
English 30A, 30B, 46A, 46B, .......................... 16

Depth Subject Matter (for each emphasis, see below) ........................................ 40
Core requirement .................................... 20
One course from each of the following five groups:

(a) British Literature to 1500: English

English 111, 112, 113A, 113B, 150A, ...........................
(b) Renaissance (1500-1600): English

English 116, 117A, 117B, 117C, ...........................
(c) British Literature (1660-1800): English

English 125, 127, 155A. American Literature

(1620-1800): English ............................ 140, 141.
(d) Nineteenth Century (British or American): English

130, 132, 133, 134, 140, 144, 155B, 155C, ...........................
(e) Twentieth Century (British or American): English

136, 137, 138, 147, 155D, 155E, ...........................

The above five courses must be selected so that three of the following categories are represented:

(a) Historical Period:

English 111, 112, 116, 120, 125, ............................
(b) British:

English 113A, 113B, 122, ............................
(c) American:

English 117A, 117B, 117C, 150A, ............................

The following courses—English 107, 110A, 110B, 117A, 117B, 173, 174, 175, 179, 180, 181, 183, 185, 187, 188, 189, 190, 192, and 194 are designed for studying a special subject, one that may be fairly constant in format (as with English 110, 117A, 173, 174, 175, 179, 180, 181, 183, 185) or if one may vary each time the course is offered (as with English 107, 187, 189, 189, 198, 199). These special subjects may satisfy core requirements and/or emphasis core requirements; in order to ascertain the applicability of one of these courses to the major, you should consult with an adviser.

 Eigntig Requirements:

Teaching Emphasis

Depth Subject Matter: ................................. 40
Core requirement, same as for (General) major above, but must include one course from English 117A, 117B, or 117C .................................................... 20
Seminar in British or American literature

English 187, 188, or 189 ............................... 4

English 103A-G, 105A, 105B ............................. 12
One of the following: English 179, 181, or an

ethnic literature course from outside the English department ............................... 4

Total Units (Teaching Emphasis) .................. 64

Writing Emphasis

Depth Subject Matter: ................................. 40
Core requirement, same as for (General) major above, but must include one course from English 117A, 117B, or 117C .................................................... 20
One course from the language/linguistics group: English 105A, 105B, 105C, 105D, 106, 107, 196 ............................... 4
Twelve units in English 100F, 100P and/or

100NF .................................................. 12
English 198 (seminar in writing technique) or

199 (writing) ........................................... 4

Total Units (Writing Emphasis) .................. 64

Minor Program Requirements:

English Majors

Up to four upper-division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

Campus Writing Center

The Campus Writing Center, an affiliate of the English Department, is a program designed to provide writing instruction across the curriculum. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course are related to the subject matter of the companion course. These credit-bearing courses offered in conjunction with both lower and upper division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should contact the Campus Writing Center, telephone 752-8024, for the current schedule of courses.

Subject A. Students must have passed the Subject A requirement before taking any course in English.

Prerequisites. One course from 1, 2, 3 is required for admission into courses 30A, 30B, 30C, 45, 46A, 46B, 46C, and all upper division courses. Course 45 is recommended as preparation for the 30 and 46 series.

Meeting for Majors. All English majors are required to attend a general meeting at the beginning of each year; all new and transfer English majors are required to attend a general meeting for majors at the beginning of their first quarter in residence; all English majors must see their advisors, individually, in the spring quarters of their sophomore and junior years.


Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees, and should consult with the graduate advisor.

Honors and Honors Program. See page 63 and 93.
Courses in English

Lower Division Courses

A. Language Skills (2) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Course will focus on the nature and mechanics of written English and the relationship between writing mechanics and coherent thought. Grade of C— or better will satisfy the Subject A requirement. (Counts as 4 units toward minimum progress.)

R. Communications Skills Workshop (no credit) I, II, III. The Staff (Zender in charge)
Lecture—5 hours discussion—3 hours; laboratory—2 hours. Workshop in language skills for students from non-standard-English backgrounds who do not qualify for English for Foreign Students. Course worth 6 units toward minimum study list requirement. (Deferred grading only, pending passing of course.)

1. Expository Writing (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made.

2. Language and Style (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. Introduction to modern inquires into the nature and forms of the English language. Frequent writing assignments will be made.

3. Introduction to Literature (4) I, II, III. The Staff (Zender in charge)
Lecture—2 hours: Discussion—2 hours. Prerequisite: completion of Subject A requirement. Subpoena 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.

5F. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Zender in charge)
Lecture—3 hours discussion—3 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write in prescribed forms and in experimental forms of their own choosing. No final examination.

5P. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write in prescribed forms and in experimental forms of their own choosing. No final examination.

6. Intermediate Composition (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: one course from 1, 2, or 3. Emphasis on the grammatical patterns of standard English prose and poetry, study of coherent paragraphs, and the formal properties of the expository essay.

Lecture—4 hours discussion—2 hours; laboratory—1 hour. For foreign students only; required of those who do not pass the examination in English. May be repeated for credit.

Lecture—4 hours discussion—2 hours; laboratory—1 hour. Continuation of course 25.

29. Introduction to Library Research and Bibliography (3) I, II. Library staff (Chairperson in charge)
Lecture-discussion—4 hours. Methodology of research in academic libraries including catalogues, indexes and abstracts, bibliographies, indexes of specialized sources of information, the preparation of detailed bibliographies and term paper research; offered in conjunction with the library.

30A. Survey of American Literature (4) I, II. Wiggins
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3, American literature from the seventeenth century to 1830.

30B. Survey of American Literature (4) I, II. Morris
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3, American literature from 1830 to 1900.

30C. Survey of American Literature (4) I, II. Robertson
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. American literature of the twentieth century.

45. Critical Reading of Poetry (4) I, II. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Close reading of selections from English and American poetry. Frequent written exercises.

46A. Masterpieces of English Literature (4) I, II. Silvia, Schleiner
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3, Selected works of principal writers in 1640. The history of literary conventions and backgrounds in English, intellectual and social history, and related art forms.

46B. Masterpieces of English Literature (4) I, II. Hayden, III. Levin
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3, Selected works of principal writers from 1640 to 1830. The history of literary conventions and backgrounds in English, intellectual and social history, and related art forms.

46C. Masterpieces of English Literature (4) I, II. Gilbert (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3, Selected works of principal writers from 1830 to present. The history of literary conventions and backgrounds in English, intellectual and social history, and related art forms.

92. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Lecture-discussion—3 hours. Prerequisite: one course from English 1-12. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

99. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3, Directed group study of a special topic. Primarily for lower-division students. (P/NP grading only.)

99S. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only)

Upper Division Courses

100F. Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)
Lecture-discussion—4 hours: development and evaluation of written materials, and conferences with individual students. Prerequisite: course SF or SP, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.

100N. Creative Writing: Non-Fiction (4) I, II. H.wikson
Discussion—4 hours: development and evaluation of written materials, and conferences with individual students. Prerequisite: one course from courses 1, 2, 3, or consent of instructor; priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination.

100P. Creative Writing: Poetry (4) I, II. Shapiro, S. Gilbert, Williamson
Lecture-discussion—4 hours: development and evaluation of written materials, and conferences with individual students. Prerequisite: course SP or SF, or consent of instructor; priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

122. Adjunct Writing (3) I, II, III. The Staff (Morris in charge)
Discussions—2 hours; laboratory—1 hour. Meetings will be held in conjunction with a different subject-matter course. (P/NP grading only.)

123A. Advanced Composition (4) I, II, III. The Staff (Chair-
Lecture-discussion—3 hours: individual evaluations and conferences—1 hour. Prerequisite: one course from courses 1, 2, 3. Course recommended for students who have completed an upper division course in English. May be repeated for credit in different areas of emphasis.

124. Critical Reading of Literature (4) I, II. Osborn
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. Present-day English literature and pronunciation according to the standards of traditional grammar and contemporary linguistics. Preparation for stylistic analysis and historical study of English language and literature. Required of teaching credential candidates.

128. Language (4) I, II. Schleiner
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. History of the English language. Examination of the development of Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of teaching credential candidates.

1225. Language Change Reflected in Literature (4) I, II. Osborn
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. Study of literary texts from the various historical periods in the English language, considering, in addition to other criteria, those characteristics particularly connected with development and change in the respective linguistic periods.

1350. Linguistics, Literature, and Composition (4) I, II. Hark
Lecture-discussion—3 hours: term paper. Prerequisite: courses 125A and 125B. Linguistic methodology and its application in literary analysis and composition. Course considers structural linguistics and transformational grammatical theory in analysis, criticism, and content of bibliographic and nonbibliographic written materials.

107. Special Topics in English Language (4) I, II. Schleiner
Seminar—3 hours: special project. Prerequisite: one course from courses 1, 2, 3. Investigation of varied subjects in contemporary and historical English language studies. May be repeated for credit when a different topic is studied. (Same course as language 107.)

110A. Introduction to Principles of Criticism (4) I, II. Hayden
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. The essentials of literary criticism and its history by century to the modern era, with emphasis on the major critics.

110B. Introduction to Principles of Criticism (4) I, II. Hayden
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. The historical development of literary criticism in the modern era, with emphasis on the ties with the past and the special problems presented by modern literary theory.

111. Medieval Literature (4) I. Murphy
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. Major types, traditions, and conventions of literature in Europe from the time of Beowulf to the latest medieval romances, with special emphasis on the heroic strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation.

12. The Age of Chaucer (4) I. Murphy
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. The literary, religious, and social movements of the late fourteenth century in England as they are reflected in the writings of Chaucer, Langland, Gower, and the Gawain poet, and their contemporaries of the fifteenth-century Chaucerians.

133. Chaucer: Troubadour and the Minor Poems (4) I. Osborn
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. Development of the poet's artistry and the evolution of the poet's ideas from his first work to his culminating masterpiece, The Canterbury Tales. Courses 133A and 133B need not be taken in sequence.

133B. Chaucer: The Canterbury Tales (4) I. Silvia
Lecture-discussion—3 hours: term paper. Prerequisite: one course from courses 1, 2, 3. The Canterbury Tales as a work of art. Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer. Courses 133A and 133B need not be taken in sequence.
116. Sixteenth-Century Poetry and Prose (4) II. Levin Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A survey of the later sixteenth century, with emphasis on English and Irish themes.

117A. Shakespeare: The Early Works (4) II. Levin Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of Shakespeare's early works, with emphasis on the development of his craft as a dramatist.

118. Shakespeare: The Middle Period (4) I, III. Schiff Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of Shakespeare's works from the middle period, focusing on his most mature works.

117C. Shakespeare: The Later Works (4) I, I. Zender, III. Schiff Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of Shakespeare's later works, with emphasis on the development of his later style and themes.

119. Shakespeare (4) II. Waddington Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A thorough study of Shakespeare's works, with emphasis on the historical context of his time.

120. Earlier Seventeenth-Century Poetry and Prose (4) II. Levin Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the poetry and prose of the early seventeenth century, with emphasis on the development of the English language.

121. Milton (4) II. Levin Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of John Milton, with emphasis on his major works and their historical context.

122. The Age of Swift and Pope: Prose and Poetry (4) I, II. Byrd Lecture-discussion—3 hours; term paper or the equivalent. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the works of Jonathan Swift and Alexander Pope, with emphasis on their contributions to the development of English literature.

123. Prose and Poetry of the Later Eighteenth Century (4) I, II. Byrd Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of the late eighteenth century, with emphasis on their historical context.

124. Early Romantic Literature (4) II. Hayden Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the early Romantic period, with emphasis on the development of new literary forms.

125. Later Romantic Literature (4) II. Hayden Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the later Romantic period, with emphasis on the development of new literary forms.

126. Victorian Literature (4) I, II. Gilbert Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of the Victorian period, with emphasis on their historical context.

127. Modern Anglo-Irish Writers (4) II. McGuinness Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of Irish literature, with emphasis on the development of new literary forms.

128. Modern American Literature (4) II. Weiber Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of American literature, with emphasis on the development of new literary forms.

129. American Modernism (4) II. Woodress Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of American modernism, with emphasis on the development of new literary forms.

130. American Romanticism (4) II. Dashi Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of American romanticism, with emphasis on the development of new literary forms.

131. English Drama to Marlowe (4) Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of English drama, with emphasis on the development of new literary forms.

132. English Drama from Marlowe to 1642 (4) Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of English drama, with emphasis on the development of new literary forms.

133. English Drama from 1642 to 1890 (4) Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of English drama, with emphasis on the development of new literary forms.

134. American Drama from its Beginnings to the Present (4) III. Hayes Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of American drama, with emphasis on the development of new literary forms.

135. The English Novel: 1900 to the Present (4) II. Hanco Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of American drama, with emphasis on the development of new literary forms.

136. The English Lyric (4) Lecture-discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3, 4, 5, 7, 10. A study of the major works of American drama, with emphasis on the development of new literary forms.
Entomology

(College of Agricultural and Environmental Sciences)

Robert K. Washino, Ph.D., Chairperson of the Department
Department Office, 367 Briggs Hall (752-0475)

Faculty
Cecil O. Bacon, Ph.D., Professor
Richard M. Bohart, Ph.D., Professor Emeritus
James R. Carey, Ph.D., Assistant Professor
Hugh Dingle, Ph.D., Professor
Sean S. Duffey, Ph.D., Associate Professor
Lester E. Euler, Ph.D., Associate Professor
Norman E. Gary, Ph.D., Associate Professor
Jeffrey Granett, Ph.D., Associate Professor
Albert A. Grigarick, Jr., Ph.D., Professor
Bruce D. Hammock, Ph.D., Professor
Charles L. Judson, Ph.D., Professor
Richard Karban, Ph.D., Assistant Professor
Harry K. Katy, Ph.D., Associate Professor
Harry H. L. Jachow, Jr., Ph.D., Associate Professor
W. Harry Lange, Jr., Ph.D., Professor Emeritus
Thomas F. Leigh, Ph.D., Lecturer
Ewen C. F. Love, Ph.D., Professor Emeritus
Armand R. Maggenti, Ph.D., Lecturer
Thea A. McClanahan, Ph.D., Professor
Donald L. McLean, Ph.D., Professor
Christine V. Peng, Ph.D., Associate Professor
Timothy Prout, Ph.D., Professor (Entomology, Genetics)
Dewey R. Raski, Ph.D., Professor (Nematology)
Richard E. Rice, Ph.D., Adjunct Lecturer
Francis M. Summers, Ph.D., Professor Emeritus
Robin W. Thorp, Ph.D., Professor
David R. Viggiani, Ph.D., Lecturer (Nematology)
Philip S. Ward, Ph.D., Assistant Professor
Robert K. Washino, Ph.D., Professor
Lloyd T. Wilson, Ph.D., Associate Professor

The Major Program

The Entomology major provides students an opportunity for extensive study of insects—their behavior, classification, structure, physiology, and ecology. Some of the areas of emphasis in entomology are: biosystematics, management of pest insects with natural enemies and chemicals, management of honeybees for pollination of agricultural crops and honey production, nematology and transmission of plant and animal pathogens. Employment opportunities are available in managerial and technical positions with state and federal agencies and agricultural production or chemical companies. Some entomology graduates prepare to teach entomology and other biological sciences in high schools and junior colleges. Other graduates participate in graduate programs leading to a higher degree.

B.S. Major Requirements:

For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. (Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
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<tbody>
<tr>
<td>Biology (Science 1)</td>
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<tr>
<td>Botany (Botany 2)</td>
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<td>Zoology (Zoology 2, 3)</td>
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<td>Entomology (Entomology 2, 106)</td>
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<tr>
<td>Genetics (Genetics 120)</td>
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<td>Plant or animal pathology, or plant or animal physiology</td>
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<td>Physiological chemistry (Physiological Sciences 101A, 101B)</td>
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<tr>
<td>Chemistry (Chemistry 1A, 1B, 6A, 8B)</td>
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<td>Mathematics (Mathematics 16A)</td>
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<td>Statistics</td>
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<td>Computer science</td>
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<tr>
<td>Physics (Physics 2A, 2B, 2C)</td>
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<tr>
<td>Environmental Toxicology</td>
<td>3</td>
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<tr>
<td>Upper division electives</td>
<td></td>
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</tbody>
</table>

At least one course from the following categories:

- (a) Plant Sciences: Botany 101, 102, 121, Entomology 101, 102, 125, 140, 153, 156, 159, Soil Science 111, Zoology 112A, 142
- (b) Entomology: Entomology 103, 105, 107, Botany 120, 121, one upper division Entomology course, Plant Science 125, Soil Science 130, 111, Zoology 112A, 142

Minor Adviser: C. L. Judson.

Minor Program Requirements:

The Department of Entomology has seven minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology or nematology.

Entomology

- Entomology 101
- Entomology 102
- Entomology 103
- Entomology 104
- Entomology 105
- Entomology 106
- Entomology 107
- Entomology 108

Nematology

- Nematology 109
- Nematology 110
- Nematology 111
- Nematology 112
- Nematology 113

Medical Vibration Entomology

- Entomology 109
- Entomology 110
- Entomology 111
- Entomology 112
- Entomology 113

All units counted in the minor program must be in addition to the student's major program.

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Entomology

Graduate Study. The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See page 105 and the Announcement of the Graduate Division for further details.

Graduate Advisers. See Class Schedule and Room Directory.

Related Courses. See courses in nematology.

Courses in Entomology

Lower Division Courses

10. Natural History of Insects (3) II. Bacon
   Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had coursework in entomology. Students who have taken this course may take course 100 for credit. An introduction to the insects detailing their great variety, structure and functions, habits, and their significance in relation to plants and animals including man.

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

100. General Entomology (5) I, Thorp
   Lecture—2 hours; laboratory—6 hours; optional Saturday field trips to be arranged. Prerequisite: Biological Sciences 1 or the equivalent. Biology of insects including: morphology, development, ecology, classification of orders and common families, and relation to human welfare.

   Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100; Chemistry 88 recommended; (course 101A recommended prior to 101B.) Principles of evolutionary, functional and comparative aspects of insect morphology, and study of the mechanisms and processes by which insects maintain themselves and adapt to the environment. Laboratory work covering basic insect structure and introduce research principles and techniques.

103. Systematic Entomology (4) III. Ward
   Lecture—2 hours; laboratory—6 hours. Prerequisite: Introductory course in zoology or entomology. The principles of animal taxonomy, specialization, introduction to classification and nomenclature.

104. Insect Ecology (4) II. Karban
   Lecture—3 hours; discussion—1 hour. Prerequisite: a general biology course. Principles of animal ecology with emphasis on insect population dynamics; analysis of factors influencing distribution and abundance. Application of basic theory to management of pest insect populations with focus on biological control and related approaches. Concepts, structure and dynamics.

105. Insect Classification (3) II. Thorp, Girgarcik, Ward
   Lecture—1 hour; laboratory—6 hours. Prerequisite: course 100. Principles and methods of classification of insects to the family level with emphasis on identification.

106. Field Entomology (3) III. Thorp
   Laboratory—6 hours; weekend field trips—8 to 10 days. Prerequisite: course 105 or consent of instructor. Collection and comparative analysis of insect faunas from selected ecological zones in California. Offered in odd-numbered years.

108. Chemical Control of Insects (4) II. Garret
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or 112, Chemistry 88. Biochemistry or Animal Physiology recommended. Study of chemicals used to control insects and mites with regard to mode of action; chemistry, metabolism and applied uses, particularly within an integrated pest control framework. Chemical-insect and chemical-environment interactions. Practical aspects of chemical use.

   Lecture—2 hours; laboratory—36 hours; five-week course. Prerequisite: an introductory course in entomology or consent of instructor. Study of insects in their natural habitats. Study of taxonomy and ecology. Offered in even-numbered years.

110. Economic Entomology (4) I. Girgarcik
   Lecture—2 hours; laboratory—6 hours. An introductory course dealing with the identification, biology, and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage, and ornamental pest problems.

112. Agricultural Crop Pest Management (4) II. Wilson
   Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division in biological sciences; course 100 or 110. Comprehensive overview of principles of crop pest management with a focus on processes involved with the development of resistance and tactical crop pest management decision criteria. Representative crops, including alfalfa, cotton, grapes, and tomatoes covered in detail.

116. Biology of Arthropods (4) II. Geifman
   Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: consent of instructor. Study of the life history, ecology, and identification of Insects associated with streams, ponds, and lakes.

119. Crop Resistance to Arthropod Pests (4) III. Leigh
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110 or the equivalent; upper division standing; additional entomology, genetics and plant science courses recommended. An introduction to host plant resistance as a durable and effective tool in pest management systems. Procedures and methods. Designed for students in agricultural entomology and crop production. Offered in odd-numbered years.

121. Agriculture (3) II. Gary
   Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey pollen activities.

121L. Apiculture Laboratory (2) III. Gary
   Discussion—1 hour; laboratory—3 hours; field trips taken primarily during laboratory time. Prerequisite: course 110 or consent of instructor. Specific behavior of honey bees: fundamentals of culture, management, and use of colonies for agricultural, recreational, teaching, and research purposes. Field trips.

120. Insect Host-Plant Interactions (4) I. Duffey
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 101A-101B; Biochemistry 101A or the equivalent; general introductory course in botany and/or plant physiology will be helpful. Morphological and physiological and biochemical bases of host-plant selection by insects; consideration of bases of host-plant resistance to insects. Emphasis on comparative defensive biochemical interaction between various organisms particularly plants and insects.

121. Insect Behavior (4) II. Dingle
   Lecture—3 hours; laboratory—2 hours. Prerequisite: upper division standing in one of the biological sciences and one course in entomology or consent of instructor. Mechanisms of insect behavior; includes physiological basis for behavior, specific patterns and types of behavior, comparative studies, learning and evolution of behavior.

123. Classification of Immature Insects (4) III. Lewis
   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.

125. Insect Vectors of Plant Pathogens (4) III. McLean
   Lecture—3 hours; discussion—1 hour. Prerequisite: one course in entomology or plant pathology, or consent of instructor. Biological, physiological and biochemical interactions between insects and vectors of plant pathogens they transmit. Emphasis is placed on the insect vector interaction. Emphasis on vector behavior and mycotoxins. Offered in odd-numbered years.

130. Biological Control (4) I, Ehrer
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Theory and practice of biological control of arthropod pests; biology of entomopathogenic arthropods, role of insects in weed control, microbial control of insects and mites, pollination activities.

140. Insect Pathology (4) III. Kay
   Lecture—3 hours; laboratory—3 hours. Prerequisite: introductory course in entomology and at least one course in a microbe-related class. Mechanism of insect pathology and insect microbiology; noninfectious and infectious diseases of insects, diagnosis, epizootiology, therapy, and microbial control.

153. Medical Entomology (4) I. McColland
   Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. Introduction to the relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on arthropod-borne human diseases and principles of their control.

155. Management of Medically Important Arthropods (3) I, Washino
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 150 or consent of instructor. Laboratory sessions to consider the practical aspects of arthropod vector control practices within the framework of a human-dominant animal disease management program. Offered in odd-numbered years.

156. Biology of Parasitism (3) III. Washino
   Lecture—3 hours. Prerequisite: Biological Sciences 1 or consent of instructor. Lectures on the biology and ecological aspects of parasitoid and parasitic relationships using selected examples from protozoan and metazoan fauna.

157. Biology of Parasitism Laboratory (3) III. Washino
   Laboratory—3 hours. Prerequisite: course 156 (concurrently) or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms with various techniques used in parasitology to examine parasitoid-prey relationships in the lab.

170. Insect Pest Management (6) Extra-session summer. Leish, Rice
   Lecture—60 hours total; laboratory and field trips—100 hours. Prerequisite: course 101 or consent of instructor. Laboratory grading and at least one course in agricultural entomology or insect ecology. Field course in pest management principles and practices. Course is designed to provide a base for pest and beneficial species and evaluation of damage; and also plan and conduct experiments utilizing biological, chemical, and cultural methods.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Lecture—36 hours. Prerequisite: completion of 84 units or consent of instructor. Senior or graduate students are off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.)

196. Directed Group Study (1-5) I, II, III, summer. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (P/NP grading only.)

Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Quantitative Insect Ecology (4) I, III. Carey
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 168 or equivalent; electives. Mathematical methods and analytical techniques in insect ecology. Use of mathematical demography, analytical modeling, numerical methods, and elementary population genetics in evaluating natural and economically important arthropod populations. Offered in even-numbered years.

202. Advanced Insect Physiology (2) II. Judson
   Lecture—3 hours. Prerequisite: Biological Science 101A or the equivalent or consent of instructor; Biochemistry 101 or 101B recommended. Selected topics of insect physiology. Intensive study of topics of current interest which will vary from year to year. Course may be repeated for credit. Offered in odd-numbered years.

207. Genetic Control of Insect Pests (3) I. Pratt
   Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110 or consent of instructor. Current topics in biotechnology with special consideration of morphology, caste determination, queen rearing, nutrition, physiology, pathology, and products of honey bees.

227. Acarology (4) I. Ehrer
   Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110 or consent of instructor. Current topics in bee biology with special consideration of morphology, caste determination, queen rearing, nutrition, physiology, pathology, and products of honey bees.

240. Pollination Ecology (4) II. Thorp, Webser (Botany)
   Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: consent of instructors. Theory of ecological relationships between plants and their pollinators with emphasis on insect pollination. Review of adaptations of both flowers and
Environmental Design; Environmental Horticulture

Environmental Design
(College of Agricultural and Environmental Sciences)
Hege B. Olsen, Chairperson of the Department
Department Office, 144 Walker Hall (752-6223)

Faculty
Richard Berteaux, B.Arch., M.S., Associate Professor
Frances Butler, M.A., Assistant Professor
Kerry J. Dawson, M.L.A., Assistant Professor
Paul Dearing, M.L.A., Visiting Lecturer
Mark Francis, M.L.A., Associate Professor
Dolph Gotell, M.A., Associate Professor
Gyongy Laky, M.A., Associate Professor
E. Byron McCully, B.S.L.A., Visiting Lecturer
Hege B. Olsen, Senior Lecturer
Victoria Z. Rivera, M.A.C.T., S.C.T., Associate Professor
Katherine W. Rossbach, M.A., Professor Emeritus
Barbara Shawcroft, M.F.A., Professor
JoAnn C. Stabb, M.A., Lecturer
Robert L. Thayer, Jr., M.A. Associate Professor

Programs of Study. See the majors in Design (page 169) and Landscape Architecture (page 244).

Related Courses. See Design and Landscape Architecture.

Environmental Horticulture
(College of Agricultural and Environmental Sciences)
Roy M. Sachs, Ph.D., Chairperson of the Department
Department Office, 140 Environmental Horticulture Building (752-0130)

Faculty
Thomas G. Byrne, M.S., Adjunct Lecturer
William E. Davis, M.S., Adjunct Lecturer
Seymour M. Gold, Ph.D., Professor
(Remaining staff included.

Courses in Environmental Horticulture

Lower Division Courses
6. Introduction to Environmental Plants (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Botany 2 or Plant Science 2. Growth, form, and origin of plants used in landscape and home discussed in relation to their uses and climatic and cultural requirements. Students learn to identify environmental plants.

9. Landscape Horticulture for the Home and Community (3)
Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influence of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

12. Internship (1-12)
Lecture—2 hours; discussion—1 hour. The Staff (Department Chairperson in charge).
Laboratory—36 hours. Prerequisite: lower division standing. Botany 2 or Plant Science 2 or 12, and consent of instructor. 60-120 work-experience hours and on campus in flower and nursery crop production, and marketing; landscape horticulture and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

98. Special Study for Lower Division Students (1-5)
Lecture—2 hours. The Staff (Sacks in charge). (P/NP grading only.)

Upper Division Courses
105. Taxonomy and Ecology of Environmental Plants (4)
Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 6 or one course in taxonomy. Taxonomy of the important plants used in the western landscape. Emphasis will be placed on the identification, nomenclature, characteristics, and uses of woody plants in man's environment.

107. Herbaceous Environmental Plants (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 6 or one course in taxonomy. Identification, ecology, and use of herbaceous environmental plants, with emphasis on forniculural and foliage plants, garden annuals, and perennials.

115. Advanced Taxonomy and Ecology of Environmental Plants (4)
Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 105 or consent of instructor. Identification, nomenclature and classification of plants for man's environment are studied in relation to extant and ecological modification. Emphasis is placed on the use of plants in western climatic zones. Nomenclatural codes are discussed. Offered in odd-numbered years.

120. Management of Container Soils (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 100. Appropriate use of sand, mineral soil and amendments to formulate container soils. Management of container soils emphasizing irrigation, salinity control and fertilization practices.

125. Flower Crop Production and Marketing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 120. Plant Science 2. The technology and management of flower crops, particularly greenhouse crops, as an application of principles. Major flower crops are considered in detail.

126. Nursery Management (2)
Lecture—2 hours; field trip. Prerequisite: Plant Science 100. Senior standing in plant science. The management of woody ornamental plants in relation to propagation, other cultural practices and marketing. Emphasis on planning and scheduling nursery production. One Saturday field trip required.

130. Turfgrass Culture (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2 and Soil Science 100. Professional turfgrass culture and management emphasizing turf species and cultivars, physiological differences between turfgrass species, the interactions between turfgrass and the environment, and management practices.

133. Arboriculture (4)
Lecture—3 hours; discussion—4 hours. Prerequisite: Plant Science 2 or Botany 2. Principles and practices of selecting, planting and maintaining trees, shrubs and vines in urban and natural landscapes. Course given in a hands-on laboratory system of instruction format. Students should enroll when juniors if they wish to assist with the course next year.

NOTE: For key to footnote symbols, see page 124.
Environmental Planning and Management

(Recall of Agricultural and Environmental Sciences)

The Major Program
The Environmental Planning and Management major provides opportunities to study the relationships between people and the environment through the Park Administration and Interpretation option. Employment opportunities in the public or private sector that may be available to graduates are illustrated below. Graduate study or experience may be essential for some occupations.

The Park Administration and Interpretation option emphasizes the techniques used to provide, develop, and manage public parks, recreation and open spaces. Graduates in the Park Administration and Interpretation option can expect career opportunities such as directors of park systems, park managers, museum directors, park naturalists, outdoor education specialists, recreation supervisors and planners, and environmental planners and consultants with government agencies and private industry.

The Environmental Planning and Management advisories recommend career experience through work-experience internships, summer jobs, or planned educational leave for a quarter or more to work with appropriate public agencies or private firms.

Environmental Planning and Management

B.S. Major Requirements:

(For convenience in program planning the usual course taken to satisfy the requirements are shown in parentheses. Equivalent or more advanced courses may be taken with the advisor's approval. Courses shown without parentheses are required.)

Core Courses (Lower Division) .......................... 60
Chemistry (Chemistry 1A or 10) .......................... 4†
Physics (Physics 1A, 2A or 10) .......................... 3†
Earth sciences (Geology 1, Geology 1, Soil Science 100) .......................... 6†
Biology (Biology Sciences 1 or 10) .......................... 4†
Mathematics (Mathematics 16A, 16B, 19, 20A, 36, Statistics 13, or Agricultural Science and Management 150) .......................... 6†
Environmental issues (Environmental Issues 10, Environmental Toxicology 10 or Resources Sciences 100) .......................... 3†
Landscape architecture, 40, 111 .......................... 5
economics (Economics 1A or 1B) .......................... 5

Environmental Planning and Management

155. Plant Selection for Environmental Design (3) II. Lecture—hour—3 hours. Prerequisite: course 26 and Landscape Architecture 40. Ability, characteristics, and limitations of landscape plants and plantings to modify the environment, control traffic, create amenity, etc., with emphasis on specific species.

156. Landscape Planning Design (4) III.
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 105, 155, and Landscape Architecture 111. Application of aesthetic, functional, and horticultural principles to the composition of the planted landscape and the development of planting plans. Limited enrollment.

175. Biomass Feedstocks for Fuels (2) I, Sachs
Lecture—2 hours; field trips. Prerequisite: Plant Science 101 or Agronomy 100 or Botany 111A; senior or graduate standing and consent of instructor. Detailed account of silvicultural, agricultural and urban biomass resources for fuel production.

192. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)
Laboratory—3 to 36 hours. Prerequisite: completion of 64 units, two upper-division courses in Environmental Horticulture appropriate for the internship and consent of instructor. Work-experience off and on campus in flower production and marketing, nursery crop production and marketing, landscape horticulture, and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

197.7. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff
Hours and duties will vary depending on course tutored. Prerequisite: upper division standing, completed course or the equivalent being tutored, consent of instructor. Leading discussion, grading, conducting laboratory exercises or procuring in-personized-system-of-instruction format classes under faculty guidance. Weekly conferences on substance of instructional techniques. May be repeated once for credit if different course is tutored.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. Selected problems in foriculture, nursery management, and landscape horticulture. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only.)

Graduate Courses

241. Analysis of Horticultural Problems (3) III, Paul
Lecture—1 hour; laboratory—6 hours. Prerequisite: a B.S. degree (or equivalent) in Plant Science or consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, air, light, chemical agents, climatic conditions and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory tests for confirmation.

251. Modeling Productivity of Greenhouse Flower Crops (3) II, Kohl
Lecture—2 hours; discussion—1 hour. Prerequisite: course 125. Plant Science 101. Course will introduce students to system modeling using the DYNAMO computer program. Economically important production parameters of greenhouse flower crops will be studied and experience will be gained in using computer models to maximize economic flower crop production.

290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Selected topics in foriculture, nursery management, and environmental horticulture.

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)
Prerequisite: 10 students in a plant science graduate program. Research conference conducted by Departmental faculty to discuss design, philosophy and interpretation of ongoing specific research areas which includes plant morphogenesis, foriculture, greenhouse production, landscape plant ecology, arboriculture, turf culture, post harvest, and plant breeding related to environmental horticulture. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Sachs in charge)
Group study on advanced topics in foriculture, nursery management, and environmental horticulture.

299. Research (1-12) I, II, III. The Staff (Sachs in charge)
Prerequisite: graduate standing. Research in foriculture, nursery management, and environmental horticulture. (S/U grading only.)

Other social sciences, introductory courses in at least two of the following subject areas: cultural anthropology (Anthropology 2), American history (Geography 2, 5), psychology (Psychology 1, 16), sociology (Sociology 1). 11†

Expository writing (English 1) .......................... 4
Public speaking (Rhetoric 1 or 3) .......................... 4
Humanities elective .......................... 4

Core Courses (Upper Division) .......................... 12
Urban and regional planning (Environmental Planning and Management 110) .......................... 4
Outdoor recreation, Environmental Planning and Management 116 or 127 .......................... 4
General ecology, Environmental Studies 100 or 110 .......................... 4

Park Administration and Interpretation Option .......................... 79
Biology science (Botany 2) .......................... 5
Botany, plant science, wildlife and fisheries biology, zoology .......................... 3†

Environmental plants, Environmental Horticulture 6 .......................... 3
Resource management, at least five courses chosen from Environmental Horticulture 105, 130A-130B, 133, 150, Environmental Planning and Management 129, 144, or courses in geology, meteorology, range management, water science or soil science .......................... 16†

Economics, Agricultural Economics 147, 148, Economics 125A or 125B .......................... 4
Communications, Environmental Planning and Management 110 .......................... 4

Environmental Planning and Management 190A or upper division course in applied behavioral sciences .......................... 4†

Public administration, Agricultural Economics 112, Political Science 160-168 or 169 .......................... 4
Park administration, Environmental Planning and Management 122 .......................... 4

Recreation planning, Environmental Planning and Management 134 or Landscape Architecture 112 .......................... 4†

Individual requirements .......................... 29†

Unrestricted Electives .......................... 29†

Total Units for the Major 180

Major Adviser: R.A. Johnston (Environmental Studies).

Courses in Environmental Planning and Management

Questions pertaining to the following courses should be directed to the instructor or to the Environmental Planning and Management advising office, 2132 Wickson Hall.

Lower Division Courses

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. For lower division students. (P/NP grading only.)

Upper Division Courses

110. Urban and Regional Planning (4) II, Gold (Environmental Planning and Management 120)
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: upper division standing. The history, nature, scope and significance of planning in America with emphasis on basic definitions and concepts, the planning process and comprehensive plan, significant problems and potentials, design alternatives, the future, innovation and the profession.

Minimum units are indicated. If more units are taken in order to meet this unit requirement, the extra units may be counted as individual requirements if approved by an adviser. Additional courses in the same subject to be used as Individual requirements must be approved by an adviser.

Courses are selected to complement each student’s program in this major. The list of courses to be used as individual requirements must have the adviser’s approval no later than Winter quarter of the Junior year.

210
Environmental Policy Analysis and Planning

The Major Program

Environmental Policy Analysis and Planning seeks to develop an understanding of both techniques for evaluating, and the factors affecting, governmental policy-making in a variety of fields related to environmental quality. This major is designed to produce students with (1) a general background in the natural sciences relevant to environmental policy; (2) sufficient training in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options; (3) a strong background in the field of policy analysis, including both the evaluation of policy alternatives and an understanding of the factors affecting policy formulation and implementation by governmental institutions. In addition, students will be encouraged to develop (4) substantive knowledge in a specific field of environmental policy such as air pollution control, water quality planning, urban and regional planning, or energy development. The major is oriented toward both (1) students who will acquire the analytical skills and broad background in the social and natural sciences needed for employment in public agencies, consulting firms, and businesses concerned with environmental affairs, and (2) professionals who will go on to graduate work in law, environmental policy, or environmental science having both a wide background in the social and natural sciences and a fairly extensive background in a functional policy area. It is anticipated, however, that most career-oriented graduates will eventually seek an advanced degree.

The course requirements are designed to provide both the substantive knowledge and analytical skills necessary for a quality program in environmental policy analysis and planning. Although certain courses are stipulated for all students involved in the program, the emphasis is on required units within categories of courses. This recognizes the wide variety of students' interests and the changing content and quality of specific courses from year to year. It is very important, however, that students develop a close relationship with their own advisors in order that the preparatory and dependent courses selected be appropriate to each student's interests and area of specialization.

Environmental Policy Analysis and Planning

B.S. Major Requirements:

(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your advisor. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Units</th>
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<tbody>
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<td>Mathematics (Mathematics 16A, 16B, 21A, 21B)</td>
<td>5-58</td>
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<tr>
<td>Statistics (Statistics 13, 32)</td>
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<td>Physics (Physics 1A, 2A)</td>
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<td>Chemistry (Chemistry 1A, 1B)</td>
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<tr>
<td>Biology (Biological Sciences 1)</td>
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<tr>
<td>Environmental science and agriculture (Soil Science 100; Water Science 100; Botany 2; Zoology 2; Agronomy 21; Agricultural Economics 1; Geology 1; Plant Science 10; Animal Science 1; Water Science 104)</td>
<td>3-5</td>
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<tr>
<td>American politics (Political Science 1)</td>
<td>4</td>
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<tr>
<td>Micro- and macro-economics (Economics 1A, 1B)</td>
<td>10</td>
</tr>
<tr>
<td>Computation (Engineering 8, Electrical Engineering 8, Mathematics 19)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Environmental Studies</td>
<td>4</td>
</tr>
<tr>
<td>Environmental Studies 1</td>
<td>4</td>
</tr>
<tr>
<td>Adjunct writing course (English 102—concurrently with Environmental Studies 1)</td>
<td>2</td>
</tr>
<tr>
<td>Breadth Subject Matter</td>
<td>16</td>
</tr>
<tr>
<td>Communication skills, English 1 (see College requirement, page 71)</td>
<td>8</td>
</tr>
<tr>
<td>Social sciences and the environment (Sociology 102, Environmental Studies 101, 141, Psychology 144, Comparative Literature 20, History 200, Applied Behavioral Sciences 162)</td>
<td>4</td>
</tr>
<tr>
<td>Social sciences and humanities electives</td>
<td>4</td>
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</tbody>
</table>

Environmental Policy Analysis and Planning

(Revised 3/15/70 by Faculty Committee on Curriculum)

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy analysis, Environmental Studies 160</td>
<td>4</td>
</tr>
<tr>
<td>Law, Environmental Studies 161 or 172</td>
<td>4</td>
</tr>
<tr>
<td>Bureaucratic policymaking, Environmental Studies 166</td>
<td>4</td>
</tr>
<tr>
<td>Political institutions, Environmental Analysis 168A</td>
<td>4</td>
</tr>
<tr>
<td>Environmental planning and impact assessment, Environmental Studies 171 or 179</td>
<td>3-4</td>
</tr>
<tr>
<td>Environmental science, Environmental Studies 110</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research Methods</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethics and normative reasoning, Philosophy 114 or 117</td>
<td>4</td>
</tr>
<tr>
<td>Research design, Environmental Studies 178 or Sociology 103 or Environmental Planning and Management 129</td>
<td>4-5</td>
</tr>
<tr>
<td>Statistics, Sociology 120 or Political Science 114 or Statistics 102</td>
<td>4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Economic Analysis</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microeconomics, Economics 100</td>
<td>5</td>
</tr>
<tr>
<td>Urban and regional economics, Economics 125A or 125B or 125</td>
<td>3-4</td>
</tr>
<tr>
<td>Resource economics, Agricultural Economics 1</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Areas of Specialization</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental policy analysis and planning</td>
<td>16-21</td>
</tr>
</tbody>
</table>

1 These are minimum requirements. Additional courses may be necessary to meet prerequisites for upper division courses in some areas of specialization.

2 Units earned in satisfaction of American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

3 Courses in Depth Subject Matter may not be taken on the PNP grading basis.
Environmental Studies

City and Regional Planning Option
Urban design (ART 168, 184, 188); Landscape (184, 188) 4
Urban geography (Geography 159) 4
Transportation and urban planning (Civil Engineering 152, 160) 3
Environmental impact assessment (Civil Engineering 152, 160) 3
Environmental impact assessment (Soil Science 118, Geology 134) 3
Civil Engineering (152, 175) 4
Environmental Studies 179) 3
Urban politics (Political Science 102, 104) 3
Environmental Studies 173 for law requirement under Depth Subject Matter above.)

Water Quality Planning Option
Environmental health (Environmental Studies 136) 3
Water pollution (Water Science 41, 103, 187) 3
Hydrology (Water Science 141) 3
Water law (Water Science 150) 3
Wastewater treatment (Civil Engineering 149A) 3
Project evaluation (Agricultural Economics 143) 3

Air Pollution Control Policy Option
Environmental health (Environmental Studies 136) 4
Environmental toxicology (Environmental Studies 136) 3
Pollution control (Civil Engineering 149A) 3
Meteorology (Meteorology 131) 3
Fluid mechanics (Engineering 103) 3

Energy Policy Option
Environmental health (Environmental Studies 136; Environmental Toxicology 131) 3
Nuclear hazards (Environmental Studies 119) 3
Energy policy (Environmental Studies 167) 4
Economics of energy (Environmental Studies 169) 3
Energy technology (Engineering 160, 160) 3
Solar energy (Resource Sciences 103) 3

Environmental Science Option
Environmental health (Environmental Studies 136; Environmental Toxicology 101) 3
Soils and land use (Soil Science 118, Geology 134) 3
Aquatic systems (Environmental Studies 119; Civil Engineering 153) 3
Meteorology and air pollution (Meteorology 131; Civil Engineering 149A) 3
Science policy (Environmental Studies 169) 4

Advanced Policy Analysis Option
Political institutions (Political Science 102, 105, 108, 159) 4
Political behavior (Political Science 164, 165, 170) 3
Science policy (Environmental Studies 165) 4
Policy evaluation research (Environmental Studies 165) 4
Policy evaluation (Civil Engineering 153, 160) 3
Agricultural Economics 140, Economics 130) 3

Unrestricted Electives
36-48 Students will be urged to take internships, when appropriate to their educational needs.

Total Units for the Major 180

Major Adviser, S. I. Schwartz (Environmental Studies)

Minor Program Requirements
The faculty for environmental policy analysis and planning offers the following two minors: The Energy Policy minor is for students from any major seeking basic training in energy technology, impacts and policy analysis methods applied to energy systems. The second minor is intended for natural and social science students desiring basic training in policy analysis theory and methods.

Energy Policy
Preparation: Economics 1A; basic course in political science
UNITS 16-18

Environmental Studies 20 or Engineering 160 4
Environmental Studies 126 or Environmental Toxicology 101 4
Resource Sciences 103 or Environmental Studies 115 4
Environmental Studies 129 3
Environmental Studies 167 or Political Science 171 4

Environmental Policy Analysis
Preparation: Economics 1A; basic course in political science
UNITS 22-24

Environmental Studies 110, 160, 161, 166, 169A 20
Environmental Studies 171 or 179 4

Minor Adviser, S. I. Schwartz.

Environmental Studies
(Intercollege Division)
Paul A. Sabatier, Ph.D., Chairperson of the Division, and Acting Associate Dean of Environmental Studies
Division Office, 2132 Wickson Hall (752-3026)

Faculty
Francisco J. Ayala, Ph.D., Professor (Genetics)
Richard Cowen, Ph.D., Professor (Ecology)
Paul P. Craig, Ph.D., Professor (Economics; Applied Science)
James C. Cramer, Ph.D., Associate Professor (Sociology)
William G. Davis, Ph.D., Associate Professor (Anthropology)
Theodore C. Fink, Jr., Ph.D., Associate Professor (Geology)
Charles R. Goldman, Ph.D., Professor (Radiological Sciences)
Marvin Goldman, Ph.D., Professor (Radiological Sciences)
J. William Hamill, Ph.D., Professor (Environmental Science)
James A. Harding, Ph.D., Professor (Environmental Horticulture)
Robert A. Johnston, Jr., M.S., Associate Professor (Geology)
Susan J. Lips, Ph.D., Professor (Sociology)
Benjamin S. Orlove, Ph.D., Associate Professor (Ecology)
Robert T. Powell, Ph.D., Associate Professor (Ecology)
James F. Quinn, Ph.D., Assistant Professor (Environment Studies; Zoology)
Peter J. Richardson, Ph.D., Associate Professor (Environmental Studies, Zoology)
Paul A. Sabatier, Ph.D., Associate Professor (Environmental Studies, Civil Engineering)
Thomas W. Schoener, Ph.D., Professor (Environmental Studies, Zoology)

Environmental Studies 20 or Engineering 160 4
Environmental Studies 126 or Environmental Toxicology 101 4
Resource Sciences 103 or Environmental Studies 115 3
Environmental Studies 129 3
Environmental Studies 167 or Political Science 171 4

Environmental Policy Analysis
Preparation: Economics 1A; basic course in political science
UNITS 22-24

Environmental Studies 110, 160, 161, 166, 169A 20
Environmental Studies 171 or 179 4

Minor Adviser, S. I. Schwartz.

Environmental Studies
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Environmental Studies 20 or Engineering 160 4
Environmental Studies 126 or Environmental Toxicology 101 4
Resource Sciences 103 or Environmental Studies 115 3
Environmental Studies 129 3
Environmental Studies 167 or Political Science 171 4

Environmental Policy Analysis
Preparation: Economics 1A; basic course in political science
UNITS 22-24

Environmental Studies 110, 160, 161, 166, 169A 20
Environmental Studies 171 or 179 4

Minor Adviser, S. I. Schwartz.

The Program of Study
The intercollege Division of Environmental Studies is a teaching and research unit offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The Division offers a Bachelor of Science degree in Environmental Policy Analysis and Planning (see page 211). Courses in Environmental Studies also supplement major programs in a wide variety of established disciplines, although highly motivated undergraduates who find existing majors unsuited to their educational objectives are encouraged to contact the Chairperson and faculty of the Division regarding individual majors in the College of Letters and Science and the College of Agricultural and Environmental Sciences (see page 239).

Current Information. Through its continuing contacts with many other departments and teaching divisions on the campus, the Division develops each year a variety of special courses and workshops that cannot be listed here. Students are advised to check with the Division Office and with the expanded course description handbook of the College of Agricultural and Environmental Sciences for up-to-date information about courses.

Elective Programs in Environmental Studies. Students from a variety of majors may wish to focus their elective credits in Environmental Studies. To aid students in identifying coherent groups of courses that build theory and research skills and complement their disciplinary major, three suggested elective programs appropriate for natural scientists, social scientists, and environmental professionals are listed below. These example programs are merely indicative, in order to increase the effectiveness of your program and to get the most out of your elective units, you should consult with appropriate Environmental Studies faculty before taking courses.

Ecological Analysis
This study program is intended for natural science students desiring a focus on ecology and its application in resource analysis. These courses develop theoretical and analytical skills, including laboratory or field work.

Environmental Studies 100 (general ecology)
Environmental Studies 121 (population ecology)
Environmental Studies 122 (analysis of ecological communities)
Zoology 149 (evolution of ecological systems)
Environmental Studies 123 (introduction to field and laboratory methods in ecology)
151L (environmental studies laboratory), or Zoology 228 (experimental animal ecology)

Subspecializations are as follows:
(a) Behavioral Biology
Environmental Studies 125 (social systems of plants and animals); Psychology 159 (comparative psychology); Anthropology 154A, 154B (ecology and sociobiology of primates)
(b) Aquatic Ecology
Environmental Studies 151 (environmental studies; Geology 116 (the oceans), 150A (physical and chemical oceanography), 150B (geological oceanography), 150C (biological oceanography); Water Science 41 (ecology of polluted waters)
(c) Ecology of Taxa
Botany 117 (plant ecology); Zoology 125 (animal ecology); and others.
(d) Simulation and Modeling
Environmental Studies 128 (analysis and simulation of complex systems); Wildlife and Fisheries Biometry 129 (dynamics of exploited animal populations)

212
Environmental Policy Analysis

This program is suitable for both natural science and social science students, as well as professionals such as those in environmental planning and management or engineering who do not wish to take the major in Environmental Policy Analysis and Planning. This set of courses develops theoretical and analytical skills in political, economic, and legal analysis of public policies, plans, and programs that affect the environment. Intermediate microeconomics should be taken before Environmental Studies 188A and Agricultural Economics 176.

Environmental Studies 160 (environmental decision making), Political Science 107 (environmental politics and administration), 108 (policy making in the public sector), or 109 (public policy and the governmental process)

Environmental Studies 166 (case studies in administrative failure and reform), Political Science 181 (the American administrative system), or 182 (administrative decision making and policy public)

Environmental Studies 161 (environmental law), 173 (public mechanisms for controlling land use), or Water Science 150 (water law and water institutions)

Environmental Studies 171 (environmental planning), 178 (environmental assessment and reporting), or Environmental Studies 110 (principles of environmental science)

Agricultural Economics 147 (natural resource economics), or 176 (economic analysis in resource use)

Environmental Studies 168A (methods of environmental policy evaluation) and 168B (methods of environmental policy analysis)

Environmental Studies 165 (science, ethics, and public policy) for natural science and engineering students

Cultural Ecology

This program in social science and natural science students interested in the interactions between human populations and their environments and in cross-cultural comparisons. Students seeking future work in rural development, public health, overseas environmental management, and graduate work in human ecology, anthropology, economics, or sociology will find this program useful. Several disciplines are synthesized here.

Environmental Studies 100 (general ecology) or Zoology 125 (animal ecology)

Environmental Studies/Anthropology 101 (principles of human ecology)

Environmental Studies/Anthropology 141 (cultural anthropology)

Economics 100 (intermediate micro theory) or Anthropology 122 (economic anthropology)

Environmental Studies/Community Health 126 (introduction to environmental health)

Environmental Studies 125 (social systems of animals and humans) or Anthropology 154A (ecology and sociology of primates)

Environmental Studies 178 (applied research methods)

Graduate Study. The faculty of the Division offers graduate instruction through the M.S. and Ph.D. degree programs of the Graduate Group in Ecology, as well as through the graduate programs of the departments with which they are associated, such as zoology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecology should be obtained from the Chairperson of the Graduate Group in Ecology.

Graduate Adviser. R. M. Love (Ecology).

Courses in Environmental Studies

Lower Division Courses

1. Environmental Analysis (4) I. Foin, Schwartz Lecture—3 hours; discussion—1 hour. Prerequisite: sophomores standing; introductory courses in biology, chemistry, political science, and economics recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems, such as food production, energy development and conservation, pollution, and the conservation of natural environments. Emphasis on analysis of problems and the consequences of proposed solutions. Students who have had course 10 receive only 3 units of credit for course 1.

2. Introduction to Environmental Studies (4) II. Ill. Ill. Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems. Not open for credit to those who have had course 1.

20. Energy: Options and issues (3) I. Walker Lecture—3 hours. A comparison of energy conversion principles for nuclear, geothermal, hydro, fossil fuel, and solar generating units. Discussion of energy reserves, potential resources, environmental consequences of use, siting, demand forecasts, transmission, energy-social-GNP relationships. (Upper division students should refer to Engineering 146.)

20L. Energy: Options and Issues Laboratory (2) I. Walker Discussion—1 hour, laboratory—2 hours. Prerequisite: course 20 (may be taken concurrently). One-day study programs and representative types of energy conversion units, includes hydroelectric, geothermal, fossil fuel, and nuclear facilities. Saturdays, trips.

25. Environmental Policy (3) Ill. Wien Lecture—3 hours. Prerequisite: introductory courses in microeconomics, American politics, and ecology recommended. An introduction to the economic and political analysis of environmental policy issues dealing with pollution control, renewable resources, land use, and energy. Focus on California and the U.S., with some attention to international problems.

30. The Global Ecosystem (3) Ill. Richardson Lecture—3 hours. Prerequisite: Biological Sciences 1 or Geography 1 or consent of instructor. The course will focus upon how the interaction of climate and biotic adaptation produces ecological systems. It will then examine the limits and opportunities for human use of different natural environments as well as more general questions of human utilization for the earth's biotic resources.

92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge) Laboratory—36 hours. Prerequisite: lower division standing and consent of instructor. Work experience offered on and off campus in all subjects areas offered in the College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.)

99. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primary for lower division students. (P/NP grading only.)

Upper Division Courses

100. General Ecology (4) J. Quinn Lecture—3 hours: discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus. Ecological principles of biological systems, emphasizing populations and ecosystems. Principles of growth, regulation, distribution, structure, energetics, and mineral cycles related to the evolution of biological systems and applications to selected human ecological problems.

101. Principles of Human Ecology (4) II. Davis, Foin Lecture—4 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 or 104 (may be taken concurrently). Examination of the critical variables in the processes that relate man to his environment. Emphasis on the biological, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.)

108. Philosophy of the Biological Sciences (4) II. Ayala Lecture—discussion—4 hours. Prerequisite: a major in a biological science or any philosophy course. Scientific method in biology, nature of biological theories, explanation and models. Problems of evolutionary theory, ecology, and sociobiology. Bio-engineering and environmental ethics. (Same course as Genetics 108 and Philosophy 108.)

110. Principles of Environmental Science (4) II. Powell Lecture—4 hours; discussion—1 hour. Prerequisite: one course in the biological sciences and one course in the physical sciences. Principles basic to biological ecology, human ecology, and planning.

114A-114B. Integrative Environmental Systems Analysis (5-5) I, II. Lecture; Discussion—1 hour, individual or group project—1 hour. Prerequisite: Biological Sciences 1 or Economics 15B; sophomore standing. Explanation of complex environmental problems in terms of scientific principles and systems theory, and provides training in computer modeling of systems performance. (Same course as Zoology 111B.)

115. Bioenvironmental Consequences of Nuclear Technology (3) Ill. M. Goldman Lecture—2 hours; discussion—1 hour. Field trip to nuclear power station. Prerequisites: consent of instructor; Physics 2A and Biological Sciences 1 or the equivalent. Discussion of biophysical implications of radionuclide and thermal effluents generated by nuclear reactors. Hazard evaluation based on the prediction of the response of the most sensitive physiological systems will be emphasized. (Same course as Radiological Sciences 115.)

116. The Oceans (3) II. Ward (Geology) Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Marine biology, physical phenomena, chemical constituents, geological history, and the sea's role; man's utilization of marine resources. (Same course as Geology 116.)

(b) Ecological Analysis

121. Population Ecology (4) I. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: Botany 2, Zoology 2-21, Mathematics 16A & 16B. Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and on solving problems.

122. Analysis of Community Dynamics (4) II. Foin Lecture—4 hours; discussion—1 hour. Prerequisite: one course in elementary ecology (course 100, Zoology 125, Entomology 114, Botany 117 or the equivalent); elementary statistics and calculus strongly recommended. Course examines the theory of community ecology from an analytical point of view. Topics covered include energy and material flows, community organization, homeoestasis, and evolution. Emphasis is placed on systems ecology and the impact of man on ecological systems.

123. Introduction to Field and Laboratory Methods in Ecology (4) I. Richardson Lecture—2 hours: laboratory—6 hours; two weekend field trips. Prerequisite: Statistics 13 or course 100 (may be taken concurrently), or the equivalent. Course will introduce students to methods used for collecting ecological data in field and laboratory situations. Emphasis will be on understanding the ecology and community ecology are included and emphasized will be placed on experimental design, scientific writing, and data analysis.

125. Social Systems of Animals and Humans (4) III. Hamilton Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or the equivalent recommended. The nature and interpretation of social systems and the significance of their diversity are considered from an evolutionary perspective.

126. Introduction to Environmental Health (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Community health 101 or basic course in biological science. Problems in environmentally dependent aspects of individual and public health. Diseases associated with pollution of water, soil, and air. Contaminants such as malaria, plague, rabies, and hazards of certain occupational environments. (Same course as Community Health 126.)
Environmental Toxicology

127. Contemporary Problems in Environmental Health (3) II. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: Environmental Studies/Community Health 126 or consent of instructor. Examination of theoretical and interdisciplinary issues related to environmental health. Prerequisite: computer programming (FORTRAN or ALGOL), calculus, and statistics. Techniques of analysis, model-building, and simulation of ecological and socioeconomic systems will be explored, with emphasis on applications to environmental problem-solving. Students will be introduced to simulation languages and will apply their training in individual or team projects.

141. Cultural Ecology (4) III. Orlove Lecture—3 hours; discussion—1 hour. A comparative survey of the interaction between people and cultural systems and the environment of the people who practice them. Primary emphasis is given to people living in rural and relatively undisturbed environments as a basis for interpreting more complex environments. (Same course as Anthropology 141.)

143. Culture and Environmental Perception (4) II. The Staff Lecture—3 hours, radiation, consumer production project. Examination of man's relationship to the environment through the study of culture. The nature of subjective models and their impact upon environmentally oriented behavior. Focuses upon classification and decision making.

150A. Physical and Chemical Oceanography (4) I. Powell Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 2C, Mathematics 2C, Chemistry 1C, or upper-division standing in a related natural science and consents of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (Same course as Geology 150A.)

150B. Geologic Oceanography (3) II. Cowen (Geology), Lopis (Geology) Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of ocean crust; marine volcanics and sedimentation of marine sediments. Interpretation of geologic history of the ocean floor in terms of tectonic spreading theory. (Same course as Geology 150B.)

150C. Biological Oceanography (3) III. Powell, Quinn Lecture—3 hours. Prerequisite: Biological Sciences 1 and a course in general ecology, or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea and planktonic communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use and impact on the ocean. (Same course as Geology 150C.)

151. Limnology (4) I. I. Goldman Lecture—3 hours; discussion—1 hour. Special project. Prerequisite: Biological Sciences 1 and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3) III. I. I. Goldman Laboratory. Contemporaneous weekend field trips. Prerequisite: course 151 (may be taken concurrently); junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

(e) Environmental Policy Analysis

160. Environmental Decision Making (4) I. Sabatier Lecture—3 hours; discussion—1 hour. A study and examination of approaches and concepts in decision making relevant to environmental problems. Discussion of collective action, problems of institutional design, the implications of public sector entrepreneurship, and the effects of technology on alternative decision structures.

161. Environmental Law (4) II. Wandsford-Smith Lecture—4 hours; discussion—1 hour. Introduction for non-law school students to some of the basic concepts of environmental law and the judicial interpretation of some important environmental statutes e.g., NEPA.

165. Science, Experts and Public Policy (4) II. Sabatier, Craig Lecture—4 hours. Factors affecting the influence of scientists, planners, and other experts in policy-making. Several cases and controversies will be examined.

166. Case Studies in Institutional Failure and Reform (4) II. Sabatier Lecture—discussion—4 hours. Prerequisite: course 160, Political Science 107, or a course in American politics recommended. Discusses selected cases of failed policy by national agencies dealing with environmental problems. Emphasis will be on numbers and alternative policy forms. Course also explicitly seeks to improve the ability of students to critically examine written materials.

167. Energy Policy (4) III. Johnston Lecture—3 hours, course 20 or Engineering 160; course 160 or Political Science 101, 107, or 109. Overview of U.S. energy policy; policy analysis, philosophy and methods; major policy issues, such as renewable vs. non-renewable; and applied studies of power plants, solar residential, and state policy options.

168A. Methods of Environmental Policy Evaluation (4) II. Schwartz Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 13 (or the equivalent), Economics 1A or Agricultural Economics 147. Examination of methods and concepts and methods applicable to environmental policy evaluation. Topics include analysis of information needs, data availability, and accessibility, and cost-effectiveness of policy evaluation methods. (corequisites include policy evaluation models; benefit-cost analysis, policy impact assessment, multi-objective evaluation, and policy implementation analysis).

168B. Methods of Environmental Policy Analysis (4) III. Schwartz Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on the application of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use and energy policy. Student will apply the methods and concepts by means of a major project.

169. Economics of Energy (3) III. Wilen Lecture—3 hours. Prerequisite: Agricultural Economics 108 or Economics 100 or consent of instructor. Course designed to familiarize students with economic concepts necessary for studying energy issues. Topics covered include: petroleum economics, cartel behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, environmental and social issues, and technology of the future. (Same course as Agricultural Economics 169.)

(f) Environmental Planning

171. Environmental Planning (4) II. Spering Lecture—4 hours. Prerequisite: course 10, one course each in biology, earth science, economics, social science, and humanities. Laws, institutions, procedures, design and analyses of methods, and means of implementation of planning for land use, air and water quality and energy are examined. Theoretical and practical readings are used.

172. Public Mechanisms for Controlling Land Use (4) I. Johnston Lecture—discussion—3 hours, laboratory—4 hours. Prerequisite: an introductory course in planning. Politics and administration of zoning, subdivision and building regulation, and open space preservation, constitutional and legal bases for controls; community and political factors influencing legislation and strategies to develop controls; and the relative effectiveness of specific controls in channeling urban growth.

178. Applied Social Research Methods (4) I. Spering Lecture—4 hours. Prerequisite: Statistics 13, Sociology 148B and 40 or the equivalent. Survey of social research methods used in urban, regional, and environmental planning. Topics include social impact assessment and evaluation research, sources and quality of demographic data, demographic analysis (vital rates, estimates, projections, population discrimination); and technique of research methods.

179. Environmental Impact Reporting (3) II. Johnston Lecture—2 hours. Prerequisite: upper division standing. Methods of analysis useful in environmental impact reporting. Emphasis on effective writing, review and management of impact reports in the context of rational democratic planning systems.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Directed study of a topic selected by the student and the instructor. (P/N grading only.)

Graduate Courses

212A. Environmental Policy Analysis (4) III. Sabatier Lecture—3 hours; discussion—1 hour, seminar-paper. Prerequisite: course 160 or Political Science 107 or 108, course in bureaucratic policy making (e.g. course 168 or Political Science 118) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs, and plans. Exams and ex post evaluation will be studied. Offered in odd-numbered years. (Same course as Ecology 212A)

212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz Lecture—1 hour; discussion—1 hour; seminar; 2 hours, independent evaluation project. Prerequisite: Economics 100 (or the equivalent), course 168A (or the equivalent course in policy analysis or resource economics), intermediate-level statistics (e.g., Sociology 106 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs and plans. Exams and ex post evaluation will be studied. Offered in odd-numbered years. (Same course as Ecology 212B)

290. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. (S/U grading only.)

Environmental Toxicology

(Course of Agricultural and Environmental Sciences)

Dennis P. H. Hsieh, Sc.D., Chairperson of the Department

Department Office, 109 Environmental Toxicology (752-1142)

Faculty

Thomas E. Archer, B.A., Adjunct Lecturer
Richard G. Burau, Ph.D., Professor
James L. Byard, Ph.D., Associate Professor
Donald G. Crosby, Ph.D., Professor
Bruce D. Harnack, Ph.D., Associate Professor
(Environental Toxicology, Entomology)
Gary L. Henderson, Ph.D., Associate Professor
Dennis P. H. Hsieh, Sc.D., Professor
Weaver, W. Kigowski, Ph.D., Professor
James B. Knaski, Ph.D., Visiting Lecturer
Min-yu Li, Ph.D., Adjunct Lecturer
Terry J. Mast, M.S., Visiting Lecturer

214
Environmental Toxicology

Majors

Environmental Toxicology deals with the properties, fate, biological effects, detection and regulation of natural and man-made toxins present in the environment. Toxicities studied in the major include pesticides, pollutants, industrial chemicals, and poisons produced by microbes, plants, and animals. The objective of the major is to provide training which will enable students to apply the principles of the chemical and biological sciences to the study of toxicants as a basis for solving problems occasioned by the presence of toxicants in the environment. Through the appropriate choice of electives, students have the opportunity to specialize in any one of several areas of environmental toxicology. Students electing to emphasize the application of the physical sciences to the study of toxicants would qualify for positions in residue analysis, environmental forking and forensic toxicology. Those electing to emphasize the application of the biological sciences to the study of toxicants would qualify for positions in animal toxicology, environmental health and safety, and pest control. The major can also serve as preparation for graduate or professional school.

Prospective majors are advised to contact the major adviser before April 1 of their sophomore year. Enrollment in this major may be limited. Applicants for this major will be admitted to the Exploratory Program.

Environmental Toxicology

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>69-63</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Biological sciences (Biological Sciences)</td>
<td>5</td>
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<td></td>
<td>Other biological sciences (anatomy, zoology, physiology)</td>
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<td></td>
<td>General chemistry (General Chemistry BC)</td>
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<td></td>
<td>Organic chemistry (128A or 128B-128B)</td>
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<td></td>
<td>Environmental science (Environmental Toxicology 10 or Environmental Studies 10)</td>
<td>4</td>
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<tr>
<td></td>
<td>Mathematics (Mathematics 16A-16B or 21A-21B)</td>
<td>15-16</td>
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<tr>
<td></td>
<td>Physics (14A-1B or 2A-2B)</td>
<td>15</td>
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<tr>
<td>Depth Subject Matter</td>
<td>56</td>
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</tr>
<tr>
<td>Biochemistry (Biochemistry 101A, 101B)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Organic chemistry (Chemistry 128A, 128B or 128C)</td>
<td>3-4</td>
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<tr>
<td>Electives selected for area of specialization with adviser's approval</td>
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<tr>
<td>Breadth Subject Matter</td>
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<tr>
<td>English (excluding requirements)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Social sciences and humanities electives</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Electives selected with adviser's approval to complement program options: courses in agricultural economics, environmental studies, social, political, science, and psychology are particularly recommended</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Unrestricted Electives | 21-26 |
Total Units for the Major | 180 |

Major Adviser: J.L. Byard

Environmental Toxicology

128. Food Toxicology (3) (JL. Shibamoto, Russell and Gruenwald (Food Science and Technology)) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of foods and food processing, with emphasis on the biological properties of food components and their interaction with the environment.

130A-E. Selected Topics in Environmental Toxicology (3-5) (JL. Shibamoto, Byard) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of environmental contaminants, with emphasis on the biological properties of contaminants and their interaction with the environment.

131. Air Pollution and Inhalation Toxicology (3) (JL. Hsieh, (Environmental Studies 10) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of air pollutants, with emphasis on the biological properties of air pollutants and their interaction with the environment.

132. Chromatography for Analytical Toxicology (3) (JL. Archer) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of chromatographic techniques, with emphasis on the biological properties of chromatographic techniques and their interaction with the environment.

133. Legal Aspects of Environmental Toxicology (3) (JL. Shibamoto) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of legal aspects of environmental toxicology, with emphasis on the biological properties of legal aspects of environmental toxicology and their interaction with the environment.

134. Special Study for Undergraduates (1-5) (JL. Shibamoto, Byard) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of special study for undergraduates, with emphasis on the biological properties of special study for undergraduates and their interaction with the environment.

Graduate Courses

200. Mammalian Toxicology (3) (JL. Shibamoto) Lecture—3 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of mammalian toxicology, with emphasis on the biological properties of mammalian toxicology and their interaction with the environment.

233. Environmental Toxicants (6) (JL. Byard) Lecture—6 hours. Prerequisite: consent of instructor. This course introduces the student to the chemistry, biology, and toxicology of environmental toxicants, with emphasis on the biological properties of environmental toxicants and their interaction with the environment.
Epidemiology and Preventive Medicine


220. Analysis of Toxicants (3) I. Seiber Lecture—2 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

220L. Analysis of Toxicants Laboratory (2) I. Seiber Laboratory—6 hours. Prerequisite: course 220 may be taken concurrently and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

234. Neurophysiological Basis of Neurotoxicology (3) I. Woolley Lecture—2 1/2 hours; discussion—1 hour. Prerequisite: Physiology 110 (or the equivalent) and basic understanding of neuropsychology; consent of instructor. Mechanisms of action of a number of different neurotoxins, including marine toxins, insects and heavy metals. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. Offered in odd-numbered years. (Same course as Physiology 234.)

290. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Emphasis on environmental toxicology. (SU grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge) Lecture-discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (SU grading only.)

297T. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge) Hourly and daily duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience, and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxins, and new pesticides.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Research—1 to 12 hours. Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxins, and new pesticides. (SU grading only.)

Courses in Epidemiology and Preventive Medicine

Upper Division Courses

104. History of Veterinary Medicine (3) III. Schwabe Lecture—2 hours; discussion—1 hour. Veterinary medicine's role (from man's first domestication of animals to the decline of Rome) in building a foundation for rational healing; and its contributions during the eighteenth and twentieth centuries to the creation of modern medicine.

111. Animal Hygiene (3) II. Howarth Lecture—2 hours. Prerequisites: Biological Sciences 1 or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

112. Animal Health Management (3) III. Glenn Lecture—3 hours. Prerequisites: Biological Sciences 1; course 111 and at least one course in animal science are highly recommended. The basis, design, implementation, and monitoring of animal health management programs to maximize production and minimize disease losses in livestock enterprises.

150. Food-borne Infections and Intoxications (4) II. Genigeorgis, York, Riemann 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 these agents; prevention of food-borne diseases.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). (P/NP grading only.)

Graduate Courses

202. Sampling in Health Related Research (3) I. Farver Lecture—3 hours. Prerequisite: course 403 or the equivalent; consent of instructor. Thorough coverage of simple random sampling, stratified sampling, cluster sampling, and special techniques with emphasis is on applied sampling techniques but includes measurement and survey execution. Offered in even-numbered years.

253. Selected Topics in Medical Statistics (3) I. Farver Lecture—2 hours. Prerequisite: course 404 or the equivalent; consent of instructor. Selected topics in medical statistics as applied to the design and data analysis used in epidemiological research. Possible topics (chosen to suit interests and needs of each class) include: regression analysis, cross-categorical techniques, reliability, survivorship functions. Offered in odd-numbered years.

292. Epidemiology of the Zoonoses (3) II. Meyer, Lavoipierre Lecture—1 hour; discussion—2 hours. Prerequisite: course 405 or consent of instructor. Biological and ecological features of infections shared by animals with particular attention to those perpetuated in nature by wildlife and which are of greater public health and economic significance.

216. Immunodiagnostic Techniques (3) II. Yamamoto, Lam Lecture—2 hours. Prerequisite: enrollment in PVM degree program or consent of instructor. Consideration of immunodiagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple and inexpensive procedures for mass screening.

216L. Immunodiagnostic Techniques Laboratory (2) II. Yamamoto, Lam Discussion—1 hour; laboratory—2 hours. Prerequisite: course 216 (may be taken concurrently) or consent of instructor. Application and interpretation of serologic techniques for diagnosis of animal diseases. (SU grading only.) Limited enrollment.

217. Evaluation of Screening Tests (3) I. Yamamoto Discussion—2 hours (alternate weeks). Prerequisite: consent of instructor. Evaluation of screening tests (biochemical, serological or hematological) in the context of the population in which the test is performed to demonstrate how changes in various population parameters will influence test efficiency. Offered in odd-numbered years.

219. Mycoplasma as Agents of Disease (3) III. Yamamoto, Lam Lecture—2 hours. Prerequisite: Veterinary Microbiology 127 or the equivalent or consent of instructor. Mid-term and final examination. Offered in even numbered years.

220. Advanced Avian Medicine (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: enrollment in Avian Medicine option of PVM program, senior standing in School of Veterinary Medicine, or consent of instructor. Instruction on the methods of prevention of the major diseases of domestic poultry. (SU grading only.)

221. Epidemiological Approaches Used in Chronic Disease Studies (3) III. Schneider Lecture—2 hours; laboratory—3 hours. Prerequisites: course 404, 407, or consent of instructor. Emphasis on approaches to chronic disease understanding and prevention in animals. Discussions on disease registries, incidence rates, predictive and retrospective study designs, surveys and interview schedules. Comparative aspects of select chronic disease experience in various animal species and man.

222. Epidemiological Modeling (2) II. Carpenter Lecture—1 hour; discussion—1 hour. Prerequisites: courses 403 and 406 (may be taken concurrently). Techniques of model-building and simulation of infectious diseases will be explained. Mathematical modeling will be explained. Construction and validation will be emphasized.

225. Preventive Avian Medical Practice (3) III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: enrollment in avian medicine option of PVM program, junior or senior standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic impact of the broiler, commercial egg and turkey industries and the delivery of preventive veterinary medical services within these industries. Specific prevention and eradication programs pertaining to diseases of economic importance are covered.

240. Veterinary Medicine and Human Health (3) III. Schwabe Lecture—2 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or consent of instructor. Fulfillment of veterinary medicine's historic and newer roles as a human health profession; emphasis on zoonoses prevention, comparative medical research, monitoring environmental hazards, organized efforts to promote human values and mental health.

242. Veterinary Medicine and the World Food/Population Problem (3) II. Schwabe Lecture—2 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or consent of instructor. Survey of the world food/population problem, emphasizing effects of animal diseases and their control upon production of foods of animal and plant origin; comparisons of important Third World and other situations; discussion of current and future prospects.

254. Public Health Aspects of Meat and Meat Products Technology (3) II. Genigeorgis Lecture—3 hours. Prerequisite: consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.
255. Animal Health Economics (3) II. Carpenter
Lecture—3 hours. Prerequisite: consent of instructor. Basic concepts of microeconomics (production and cost functions, firm decision making, and the market place) as they relate to animal health are examined. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

256. Advanced Food Hygiene Laboratory (3) III. Genegesser
Lecture—1 hour; laboratory—6 hours. Prerequisite: a DVM degree or the equivalent, or consent of instructor. Techniques used in a veterinary food hygiene laboratory to detect pathogens, adulterants, contaminants, and other substances and factors affecting wholesomeness of foods of animal origin.

259. Current Topics in Avian Medicine (1) I, II, III, Lam
Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for study and interpretation.

291. Seminars in Epidemiology (I) III. Ruppenthal
Seminar—1 hour. Participants will present and discuss ongoing or published research projects in epidemiology. Emphasis will be on study design and data analysis. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Courses

400. Orientation to Statistics (4) I. Lever
Lecture—40 hours. Prerequisite: enrollment in MVPH degree program. Introduction and overview to the concepts basic to biostatistics and epidemiology. (SU grading only.)

401. Biomedical Information Resources and Retrieval (3) I, Koster, Menala
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Use of bibliographic tools for retrieval of biomedical literature; sources of epidemiological and statistical data; computerized retrieval of information; preparation of bibliographies.

402. Medical Statistics I (3) I. Farver
Lecture—2 hours; laboratory—2 hours. Prerequisite: course 400 or Statistics 13 (or the equivalent); consent of instructor. Use of statistics in clinical, laboratory, and population medicine; graphical and tabular presentation; probability, binomial, normal, t-, F-, and Chi-square distributions; elementary nonparametric methods; introductory methods in regression and correlation; lifetables.

403. Medical Statistics II (3) II. Farver
Lecture—2 hours; laboratory—2 hours. Prerequisite: course 400 or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; problems in sampling and surveys; time dependent variation of trends; biomedical applications of statistical methods.

404. Medical Statistics III (3) III. Farver
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 400 or consent of instructor. Continuation of course 402. Multiple regression, discriminant analysis, analysis of covariance, analysis of multiple frequency tables; biomedical applications.

405. Principles of Epidemiology (3) I. Ruppenthal, Hrd
Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: course 400 or the equivalent; a degree in veterinary medicine, medicine or dentistry, or consent of instructor. Combination of lectures, classes, discussions, and problem solving. Topics are: methods of investigating disease outbreaks, quantifying disease in populations, medical ecology survey methods, an introduction to epidemiologic study design and animal disease surveillance.

406. Epidemiologic Study Design (3) II. Hrd
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 403 (may be taken concurrently) and 405, or consent of instructor. Design and interpretation of cross-sectional, case-control, and cohort studies (including controlled clinical trials), with examples pertinent to veterinary medicine. Critical review of published epidemiologic studies. Principles of association and causality.

407. Analytical Epidemiology (3) III. Farver
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 406 and 404 (may be taken concurrently). Uses of multiple regression, discriminant analysis, factor analysis, path analysis and other multivariate techniques in epidemiology. Approaches for handling the analysis of large data sets.

NOTE: For key to footnote symbols, see page 124.

408. Research Methodology and Research Reports (3) I. Meyer
Lecture—1 hour; discussion—2 hours. Prerequisites: enrollment in MPVM degree program or consent of instructor. Application of the experimental method to solving specific epidemiological field problems involving disease of animals. Students must identify and select a problem, and complete all the work prerequisite to the actual field collection of data or specimen.

411. Disease Control and Eradication (3) III. Rieman, Schwabe, Carpenter
Lecture—2 hours; laboratory—3 hours. Prerequisites: courses 404 and 407 (may be taken concurrently). Studies of various approaches to control or eradicate disease in animal populations. Design and economic analysis of control programs.

Family Practice

See Medicine

Fermentation Science

(College of Agricultural and Environmental Sciences)

The Major Program

The Fermentation Science major is a program of study of the fundamental and applied sciences related to the use of microorganisms as producers of processing agents. A broad interdisciplinary food-related education is offered which may be combined with specializations in enology (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations such as those used in the production of microbial cells, drugs, enzymes, solvents, acids, and vitamins, in the expansion of the food supply, and in waste management and preservation of the environment, are further opportunities for study. Courses are selected in consultation with advisors. Graduates qualify for supervisory, technical, research, sales or executive positions in the food, beverage, and allied industries, in the fermentation industries, and in governmental agencies. The major can provide preparation for graduate study in food science, microbiology, agricultural chemistry or biochemistry. It may be necessary to limit enrollment in this major due to limitations placed on UC Davis resources.

Fermentation Science

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>Biochemistry (Biochemistry 101A, 101B)</td>
</tr>
<tr>
<td></td>
<td>Biology (Biological Sciences)</td>
</tr>
<tr>
<td></td>
<td>Chemistry (Chemistry 1A, 1B, 1C, 5A, 8A, 8B)</td>
</tr>
<tr>
<td></td>
<td>Mathematics (Mathematics 16A, 16B)</td>
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<tr>
<td>150</td>
<td>Agriculture and Management</td>
</tr>
<tr>
<td>102</td>
<td>Statistics 102</td>
</tr>
<tr>
<td>4</td>
<td>Microbiology (Bacteriology 2, 3)</td>
</tr>
</tbody>
</table>

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

Food Biochemistry

(College of Agricultural and Environmental Sciences)

The Major Program

The major in Food Biochemistry stresses the principles of chemistry and biochemistry as related to the constituents of foods and the changes which occur in the constituents before and during storage and on processing. Particular emphasis is placed on the roles of enzymes, changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their effect on the quality attributes of foods. Through the appropriate choice of both electives and in-depth courses in food science and technology, the major offers broad educational preparation for students planning careers in food processing, food research, and other food-related fields.

The major also offers excellent preparation for graduate work in agricultural chemistry, biochemistry, nutrition, medicine, and the life sciences.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>68</td>
<td>Biochemistry (Biochemistry 101A, 101B)</td>
</tr>
<tr>
<td></td>
<td>Biology (Biological Sciences)</td>
</tr>
<tr>
<td></td>
<td>Chemistry (Chemistry 1A, 1B, 1C, 5A, 8A, 8B)</td>
</tr>
<tr>
<td></td>
<td>Mathematics (Mathematics 16A, 16B)</td>
</tr>
<tr>
<td></td>
<td>Agriculture and Management</td>
</tr>
<tr>
<td></td>
<td>Statistics 102</td>
</tr>
<tr>
<td></td>
<td>Microbiology (Bacteriology 2, 3)</td>
</tr>
</tbody>
</table>

Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Food Science

(College of Agricultural and Environmental Sciences)

The Major Program

Food Science applies physical, biological, engineering, and social sciences to processing, preservation, packaging, storage, evaluation and utilization of foods. Instruction emphasizes the principles of biology, chemistry, microbiology, and other sciences as they are applied to the conversion of raw materials into processed foods. General principles are stressed, not specific food commodities.

Students completing this major receive excellent training and experience for employment in the world's largest industry, the food industry. Opportunities for employment include positions in the food and allied industries where graduates can engage in processing, sensory evaluation, quality assurance, product development, research, and management functions; in education as teachers; and in research, extension, and administration. Local, state, and federal governments offer opportunities for employment as research supervisors, in regulatory agencies, in policy and management positions. Graduate study for the Food Science student may lead to the M.S. degree in Food Science, the Ph.D. degree in related fields such as agricultural chemistry, biochemistry, microbiology, and nutrition.

B.S. Major Requirements:

For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Biochemistry (Biochemistry 101A, 101B)</td>
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</tr>
<tr>
<td>Biology (Biological Sciences 1)</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry, one year general and analytical chemistry (Chemistry 1A-18C, 5 or 4A-46C), one year organic chemistry including at least one laboratory course (Chemistry 128A-128B, 128C-129A), and two quarters of physical chemistry (Chemistry 107A-107B or 110A-110B)</td>
<td>32-36</td>
</tr>
<tr>
<td>Mathematics, including one year of calculus (Mathematics 16A-16B-16C or 21A-21B-21C), and one course from Mathematics 20, 22A, 208, 23C, 23D, Statistics 13</td>
<td>12</td>
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<tr>
<td>Bacteriology 2 or 102, and 3</td>
<td>4.5</td>
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<tr>
<td>Physics, any course except Physics 10 and including at least one laboratory course (Physics 2A-28B-2C and 3A or 3B or 3C, or 8A-8B-8C)</td>
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<tr>
<td>English (see College requirement)</td>
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Elective Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Food Science and Technology, including 103, 104, 104L, 110A or 111</td>
<td>25</td>
</tr>
<tr>
<td>Biochemistry 123, 123L</td>
<td></td>
</tr>
<tr>
<td>Biology and chemistry, including units of electives</td>
<td>22</td>
</tr>
<tr>
<td>Restricted Electives:</td>
<td>26</td>
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<tr>
<td>At least one upper division biochemistry, course, other than Biochemistry 101A, 101B, 101L, and one nutrition course of at least 3 units. The remaining units can be selected from biochemistry, physiology, environmental toxicology, public health, bacteriology, or other subjects related to Food Science</td>
<td></td>
</tr>
<tr>
<td>Social sciences and humanities electives</td>
<td>28</td>
</tr>
<tr>
<td>Restricted Electives: Nutrition 112 and other courses selected in accordance with student's educational goal and upon approval of adviser</td>
<td>32-37</td>
</tr>
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</table>

Elective Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Food Science and Technology, including 103, 104, 104L, 110A or 111</td>
<td>25</td>
</tr>
<tr>
<td>Major Adviser: E. B. Collins (Food Science and Technology)</td>
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</tbody>
</table>

Graduate Study. A program of study and research leading to the M.S. degree in Food Science is available (see below). For further information on graduate study see page 95 and the Announcement of the Graduate Division.

Food Science (A Graduate Group)

Dietrich W. Gruenwedel, Ph.D., Chairperson of the Group

Group Office, 126 Crues Hall (Food Science and Technology), (752-1415)

Graduate Study. The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree under both Plan I (thesis) and Plan II (comprehensive final examination). Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the Announcement of the Graduate Division.

Graduate Advisers. Contact the Graduate Division for the list of advisers.

Food Science Technology

(College of Agricultural and Environmental Sciences)

Bernard S. Schweigert, Ph.D., Chairperson of the Department

Department Office, 126 Crues Hall (752-1465)

Faculty

Everett Bandman, Ph.D., Assistant Professor
Eriska L. Barrett, Ph.D., Associate Professor
Richard A. Bernhard, Ph.D., Professor
Wade J. Brandt, Ph.D., Adjunct Lecturer
John Buxhofer, Ph.D., Adjunct Lecturer
Edwin B. Collins, Ph.D., Professor
Walter L. Dunkley, Ph.D., Professor
Robert E. Feeney, Ph.D., Professor
Dieter W. Gruenwedel, Ph.D., Professor
Jerald A. Henderson, D.Engr., Professor
Eugene L. Jack, Ph.D., Professor Emeritus
Terry L. Jennings, Ph.D., Professor
Michael J. Lewis, Ph.D., Professor
Bor S. Lu, Ph.D., Lecturer
George L. Marsh, M.S., Professor Emeritus
Marcia Mazelis, Ph.D., Professor
Robert M. Menzies, Ph.D., Professor
Martin W. Miller, Ph.D., Professor
Emil M. Mink, Ph.D., Professor Emeritus
David M. Ogrydziak, Ph.D., Associate Professor
Michael A. O'Mahony, Ph.D., Associate Professor
Rose Marie Pangborn, M.S., Professor
Hugo Patho, Ph.D., Assistant Professor
Herman J. Pfaff, Ph.D., Professor Emeritus
Robert J. Price, Ph.D., Adjunct Lecturer
David S. Reid, Ph.D., Associate Professor
Gerald F. Russell, Ph.D., Associate Professor
Barbara A. Schneeman, Ph.D., Associate Professor
Food Science and Technology, Agricultural Engineering

Majors Program and Graduate Study. See the major in Food Science (this page); and page 95 for graduate study.

Related Courses. See courses in Biochemistry and Biophysics, Consumer Science, Nutrition, and Viticulture and Enology:

Food Science Technology 101, Food Science and Technology 102, and Preventive Medicine 150, Plant Science 112, and 112L.

Courses in Food Science and Technology

Lower Division Courses

1. Food Science and Society (3) I, II, III, Jennings, Bernhard, Schweigert

Lecture-2 hours; discussion-1 hour. Nature and scope of world food problem; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared foods; improvement and evaluation of acceptability and nutritional value of foods.
20. Food and Culture: An Introduction to Culture, Diet, and Cuisine (4) I. Givens, Nutrition, Geography
Lecture—10 hours; laboratory—1 hour. Prerequisite: Anthropology 2, Geography 2 and Nutrition 10 recommended. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habit research; minority food habits, origins and development of dietary practices. (Same course as Nutrition 20.)

49. Processing Plant Studies (1) I. Luh Discussion—1 hour; field trips—3 hours. Field trips to observe processing, distribution, quality control and regulatory control of fruits and related materials.

92. Public Issues in Nutrition and Food Science (1) I. Ferris (Nutrition), Swishewel Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to nutrition and food science for students new to the campus. (P/NP grading only.) (Same course as Nutrition 93.01.)

99. Special Study for Undergraduates (1-3) I, II, III. The Staff (Swishewel in charge) (P/NP grading only.)

Upper Division Courses

100A. Principles of Food Composition and Properties (3) I. Russell Lecture—3 hours. Prerequisite: Chemistry 8A and 8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

100B. Principles of Food Composition and Properties (3) II. Mazzolesi Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

101A. Principles of Food Composition and Properties Laboratory (2) I. Shoemaker Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100A (may be taken concurrently). Course designed to give laboratory experience in the food systems and properties described in course 100A.

101B. Principles of Food Composition and Properties Laboratory (2) II. Shoemaker Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100B.

102. Melting and Brewing Technology (3) I. Lewis Lecture—3 hours; field trips and pilot-scale brewing by arrangement. Prerequisite: preparation in biochemistry, microbiology, and chemistry. Technology of the melting, brewing and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determine indurment, product quality, and profitability.

102L. Melting and Brewing Science Laboratory (3) II. Lewis Discussion—1 hour; laboratory—6 hours. Prerequisites: courses 102, 103, Chemistry 5. Laboratory experience in the use and application of standard brewing methods or analysis. Data collection on raw materials and application of these data in pilot-scale melting and brewing exercises. Processing studies and influence of process variables on product attributes.

103. Physical and Chemical Methods for Food Analysis (5) I. Bernhard, Tappel, G. Smith Lecture—3 hours; laboratory—6 hours. Prerequisites: Chemistry 5 and 8B; Biochemistry 101B (may be taken concurrently). An introduction to the theory and application of physical and chemical methods for the analysis of foods. Modern separation and instrumental analysis techniques are stressed.

104. Food Microbiology (3) I. Collins Lecture—3 hours. Prerequisite: Bacteriology 2: Chemistry 8A; or equivalent courses. Taxonomy, physiology, ecology, and control of beneficial microorganisms important in the manufacture and ripening of foods, undesirable microorganisms that produce defects and spoil foods, and harmful microorganisms associated with foodborne infections and intoxications.

104L. Food Microbiology Laboratory (3) I, II. Barnett Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2 and 3, course 104 (may be taken concurrently). Cultural and biochemical characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods.

107. Principles of Sensory Analysis of Foods (4) I. Pangborn Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Science and Management 150 or the equivalent course in statistics. Nature of sensory responses, development of sensory systems, background and texture of foods; critical ability of analytical laboratory methods; relation of sensory data to chemical and instrumental measurements; collection and statistical analysis and interpretation of sensory data.

108. Food Processing Plant Sanitation (3) I. Lewis Lecture—3 hours. Prerequisite: Chemistry 8B and Bacteriology 101B and 110A. Basic controls of food processing plant sanitation; feeding management; cleaning and chemical and physical sanitizing agents; principles of cleaning and hard surface degreasing; garbage disposal and the disposal of wastes and the pertinence of government control agencies.

109. Principles of Quality Assurance in Food Processing (3) I. Lecture—1 hour; discussion—1 hour. Prerequisite: one course each in food microbiology, food processing, food chemistry, and sensory evaluation. General principles underlying Quality Assurance with examples of application to selected processed foods. Ratience for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs. Review of typical quality assurance programs.

110A. Physical Principles in Food Processing (3) I. Merson Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 2A and 2B or the equivalent; calculus recommended. Not open to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and problem solving.

110B. Heat and Mass Transfer in Food Processing (3) I. Singh Lecture—2 hours; laboratory—2 hours. Prerequisite: course 110A or the equivalent. Basic conduction, convection, and radiation heat transfer; refrigeration principles; psychrometrics; mass diffusion and interphase heat transfer.

111. Introduction to Food Processing (4) I. Miller Lecture—3 hours; discussion—2 hours. Prerequisite: Bacteriology 2, Chemistry 8B-8B, and Physics 2A-2B or the equivalent. Course designed to introduce students to the food processing industry. Characteristics of raw materials, fresh produce handling, overview of food processing and processing unit operations, chemical additives. Demonstration and field trips.

117. The Senses, Sensory Measurement, Psychophysics and Food (4) I. O'Mahony Lecture—4 hours. Prerequisite: Biological Sciences 1, Statistics 13 or Agricultural Science and Management 150 (may be taken concurrently). Structure and function of sensory receptor systems and sensory variables affecting sensory responses. Critical examination of modern psychophysical methods for the investigation of the mechanisms of human sensory response and the relation of sensory measurement and their relation to food flavor.

118AT. Principles of Dairy Processing (3) I. Dunkley Personalized system of instruction. Prerequisite: Bacteriology 2, Chemistry 8B. Technical principles related to the commercial processing of milk from the farm to the consumer; includes fluid, concentrated, dried and frozen products; butter, cheese; theory and practical applications.

120. Principles of Meat Science (3) I. Bandman, Lee (Animal Science) Lecture—3 hours. Prerequisite: Biochemistry 101B or the equivalent. Anatomical, physiological and biochemical characteristics of muscle and the chemical conversion of muscle to muscle products. (Same course as Animal Science 120.)

120L. Meat Science Laboratory (3) I. Lee (Animal Science), Bandman Discussion—1 hour; laboratory—3 hours. Prerequisite: Biochemistry 101B, course 120 (may be taken concurrently). Laboratory exercises and student participation in the transformation of live animal into meat products. Structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plants and processing plants. (Same course as Animal Science 120L.)

121. Birds and their Eggs as Food (3) I. King (Animal Science) Lecture—3 hours; demonstrations. Prerequisite: consent of instructor. Biochemistry 101B recommended. Avian products as food considered from the physical, chemical and nutritional aspects. Factors affecting processing, preservation and quality.

122. Marine Food Science (3) I. Ogurczak Lecture—3 hours. Prerequisite: Bacteriology 2 and Biochemistry 8B or the equivalent. Marine life cycles and their interaction with biologi- cal, microbial, and ecological principles unique to fish; where fish are found and why; fishing and fishing techniques as they relate to the marine environment; processing, storage, and public health aspects of marine organisms; resource development including aquaculture.

125. Corrosion Principles in Food Processing Interactions (3) I. Greenweel Lecture—3 hours. Prerequisite: Mathematics 16B, Physics 2C; Chemistry 8B. Course covers thermodynamic and kinetics of corrosion for both stainless steel (micro and corrosion) and investigates how these interactions affect the wholesomeness of processed, canned foods. Offered in even-numbered years.

126. Food Toxicology (3) I. Swishewel, Russell, Shibamoto (Environmental Toxicology) Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B. Chemistry and biochemistry of toxins and surrogates, including animal and plant toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Environmental Toxicology 128.)

130. Chemistry of Milk and Dairy Products (3) I. Smith 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.


140. Food Laws and Regulation (3) I. Loiseau (Law) Lecture—3 hours. Prerequisite: upper division standing. Legal and scientific issues involved in the regulation of the nation’s food supply and nutritional status. Philosophy underpinning the application of regulatory statutes. Sources of information necessary for communication with government on public policy issues.

159. Thermal Processing of Foods (3) I. Merson Lecture—2 hours; discussion, demonstration, and problem workshops—2 hours. Prerequisite: courses 104 and 110B or the equivalent. Theory and practical considerations of thermal processes by canning, pasteurization, and aseptic processing. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutrition, and consumer acceptance. Description and engineering analysis of thermal processing equipment.

160. Thermal Processing Laboratory (2) I. Merson Laboratory—4 hours. Prerequisite: courses 104 and 110B; course 150 (may be taken concurrently). Laboratory exercises and student participation in the use and application of the many thermal processing methods and equipment. Procedures for the interpretation of results, including evaluation of can closures, operation of thermal processing equipment, and productivity and testing of sterilization processes.

161. Freezing Preservation of Food (3) I. Reno Lecture—3 hours. Prerequisite: course 110B, Bacteriology 2, and Chemistry 8B; course 104 recommended. Freezing of fresh processing and storage of fresh foods. Principles of micro and minicomputer use in measurement and control of laboratory instrumentation and processing operations with both theoretical and practical aspects of computer interfacing.

165. Senior Seminar (1) I. Reid, Schwegel Seminar—1 hour. Prerequisite: senior standing or consent of instructor. Selected topics presented by students on recent developments in food science and technology. Reports and discussions concerning presentations, literature sources and career opportunities.

183. Internship for Advanced Undergraduates (1-12) I, II, III. The Staff (Swishewel in charge) Laboratory—3 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.)

186. Directed Group Study (1-5) I, II, III. The Staff (Swishewel in charge) Prerequisite: consent of instructor. (P/NP grading only.)
Food Service Management

(Faculty)

See under the Department of Nutrition.

The Major Program and Graduate Study

Food Service Management has been incorporated as an option within the major in Dietetics (page 171). If you are interested in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, and contract food services, as well as in public and private institutions such as hospitals, correctional institutions, schools, and colleges, consult the Department of Nutrition regarding the Management specialization listed under the Unrestricted Electives of the Dietetics major.

Related Courses. See Food Science and Technology, and Nutrition.

Courses in Food Service Management

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Office, 128 Everson Hall.

Upper Division Courses

120. Principles of Quantity Food Production (3) III, Prophet. Quantity Food Production. Food Science and Technology 100B and 101B. Fundamental principles of food service management including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

120L. Quantity Food Production Laboratory (2) I, II, Prophet, Zeman. Laboratory—4 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

121. Quantity Food Purchasing and Sanitation (3) I, II, Schneeman. Discussion—3 hours. Prerequisite: course 250. This course includes food purchasing and sanitation principles as they apply to numerical and weight methods of food production; includes discussions of methods for optimizing gas chromatographic performance, treatment of retentive data, preparation and evaluation of packed, SCOT and open tubular glass capillary columns, sample preparation and trapping, and conversion of gas chromatography infrared and mass spectrometry.


French

(Faculty)

Claude Abraham, Ph.D., Professor
Max Bach, Ph.D., Professor
Marc El Bianchard, Agrégé de Lettres, Associate Professor
Edward M. Bloomberg, Ph.D., Associate Professor
Richard N. Coo, Ph.D., F.A.H.A., Professor
Ruby Cohn, Ph.D., Professor (Comparative Literature, Dramatic Art)
Peter Hampshire, D.Litt., Visiting Professor
Gerald Herman, Ph.D., Associate Professor
Margo R. Kaufman, M.A., Lecturer
Manfred Kusche, Ph.D., Associate Professor
Marshall Lindsay, Ph.D., Professor
Maria I. Maruhl-Maneu, Ph.D., Professor
Ruth B. York, Ph.D., Lecturer

The Program of Study

The Program offers courses in language, culture, and literature (the latter in French and in translation) most of which may be taken to satisfy the Humanities Area Requirement.

Although a major or minor in French is excellent preparation for prospective teachers or for those contemplating careers in government or business, it has broader applications and is designed for those wishing to obtain solid training in a humanistic discipline and to enrich themselves through the
study of a foreign culture, thus enabling themselves to play a more enlightened role in the international scene. It is an excellent preparation for professional schools.

The UCD facilities and activities supporting these programs are manifold: an up-to-date language laboratory, a departmental reading room, a superb research library, the French Club, and the Pi Delta Phi National French Honoray Society to name just a few. There are, of course, close ties to several French campuses, thanks to the Universitywide Education Abroad Program.

The Major and Minor Programs

Two tracks of study are available to prospective majors and minors, one emphasizing the language, the other the literature. Both train the student in all four of the language skills (reading, writing, speaking, and understanding). Plan A is usually followed by students interested in teaching, a career in the arts, general cultural positions, or graduate studies in French. Plan B is generally selected by those interested in teaching, international business, or government work.

French

A.B. Major Requirements:

Plan A: Literature Emphasis

Preparatory Subject Matter
French 1, 2, 3, 4 (or the equivalent) 0-23
French 6, 30A, 30B 12
French 45 strongly recommended.

Depth Subject Matter
French 101, 102 12
French 135 4

One course chosen from each of the following literary periods (a-f) 16

a. Medieval period: French 116
b. Sixteenth century: French 116


d. Eighteenth century: French 118A, 118B

f. Twentieth century: French 120A, 120B, 121, 122, 123

Additional upper division units in French language and literature 8

One additional upper division course in national literature other than French, or in Comparative Literature 4

Total Units for the Major (Plan A) 56-79

Plan B: Language Emphasis

Preparatory Subject Matter
French 1, 2, 3, 4 (or the equivalent) 0-23
French 6, 30A, 30B, 59 14

Depth Subject Matter

Two courses chosen from French 101, 102 103
French 104, 110, 130, 159, 160 20
Four courses chosen from French 106, 107, 138, 161, 162 16

Total Units for the Major (Plan B) 56-81

Recommended

French 108A, 108B; French 107 and 160 for students interested in obtaining a "single subject" teaching credential in California.

Major Adviser: G. Herman.

Minor Program Requirements:

The minor in French may be pursued with emphasis on either literature or language and civilization.

French

<table>
<thead>
<tr>
<th>Literature emphasis</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two courses chosen from French 101, 102, 103</td>
<td>8</td>
</tr>
<tr>
<td>Four upper division literature courses chosen in consultation with undergraduate adviser from at least three of the following periods (a-f)</td>
<td>16</td>
</tr>
<tr>
<td>(a) Middle age</td>
<td></td>
</tr>
<tr>
<td>(b) Sixteenth century</td>
<td></td>
</tr>
<tr>
<td>(c) Seventeenth century</td>
<td></td>
</tr>
<tr>
<td>(d) Eighteenth century</td>
<td></td>
</tr>
<tr>
<td>(e) Nineteenth century</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language and Civilization emphasis</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>French 104, 107, 110 or 138, 135</td>
<td>16</td>
</tr>
<tr>
<td>Two additional courses chosen in consultation with undergraduate adviser in French language or literature, or in French culture offered outside the department</td>
<td>8</td>
</tr>
</tbody>
</table>

Prerequisite Credit: Credit will not normally be given for a course if it is prerequisite to a course already successfully completed. Exceptions can be made by the Department Chairperson only.

Graduate Study: The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French.

The Master of Arts degree program is available to students who complete an undergraduate major in French or the equivalent. Students, in special circumstances, may make up work deficient to the major requirements and then continue with an advanced degree. Candidates will be recommended for admission to graduate study in French provided they meet the requirements of the Graduate Division and the Department of French and Italian have been met. Basic requirements are: a minimum residence of three quarters, 36 quarter units, and a passing score in the comprehensive examination, or 30 quarter units and the acceptance of a written thesis.

The doctoral program stresses individualized study suited to the student's interest. Particularly encouraged are programs that involve the use of resources in allied departments and programs, such as Dramatic Art, Comparative Literature, English, etc. The Department regularly sponsors an exchange program with French institutions of learning. Basic requirements include demonstration of linguistic competence, passing of a qualifying examination, completion of an acceptable dissertation, and one year of teaching in the department as a Teaching Assistant.

Graduate Advisers, M. Lindsay (M.A. degree), R. N. Coe (Ph.D. degree).

Teaching Credential Subject Representative: M. R. Kaufman. See page 99 for Teacher Education Program.

Courses in French

Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement: Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 4.

Lower Division Courses

1. French for Graduate Students (5) Extra session summer. The Staff (Chairperson in charge) Lecture-discussion course designed to prepare students for the graduate reading examination in French. (P/NP grading only.)

1. Elementary French (6) I, II, III. The Staff
Discussion—5 hours; laboratory—two 1-hour sessions. Students who have successfully completed (C or better) French 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course for the P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless the student petitions to have his or her P/NP option filed.

2. Elementary French (6) I, II, III. The Staff
Discussion—5 hours; laboratory—two 1-hour sessions. Prerequisite: course 1 or the equivalent. Continuation of course 1.

3. Intermediate French (6) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.

4. Intermediate French (6) I, II, III. The Staff
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 3.

5. Problems in Language and Style (4) I, II, III. The Staff
Discussion—3 hours. Prerequisite: course 4 or the equivalent. Reading of selected literary texts with emphasis on problems of syntax, style, and vocabulary development.

Class discussion and composition.

6. French Conversation (2) I, II, III. The Staff
Discussion—2 hours. Prerequisite: course 3. Practice in speaking French. May be repeated once for credit. (P/NP grading only.)

7. French Conversation (2) I, II, III. The Staff
Discussion—2 hours. Prerequisite: course 4. Practice in speaking French. May be repeated once for credit. (P/NP grading only.)

8. French Literature in Translation (3) I, II, III. The Staff
Chairperson in charge Lecture—1 hour; discussion—2 hours. Course is intended to acquaint the non-major with representative examples of French literature. Selected topics will include major authors, genres, literary periods, movements, or special themes.

9. Advanced Grammar (4) I, II, III. The Staff
Lecture-discussion—2 hours; written papers and reports. Prerequisite: course 5. Grammar review, composition, and the reading and discussion of literary texts.

10. Advanced Grammar (4) I, II, III. The Staff
Lecture-discussion—3 hours; written papers and reports. Prerequisite: course 6 or placement by examination. Continuation of course 30A.

11. Explication and Dissertation (3) I, II, III. The Staff
Chairperson in charge Lecture—1 hour; discussion—1 hour. Prerequisite: course 6. Theory and practice of French explication de texte and dissertation. Especially recommended for those students planning to study abroad in French universities.

12. Introduction to French Literature (4) I, II, III. The Staff
Lecture-discussion—3 hours; written papers. Prerequisite: course 6 or the equivalent. Selected themes in French literature.

13. Introduction to French Phonetics (2) I, II, III. The Staff
Chairperson in charge Lecture—1 hour; laboratory—3 hours. Prerequisite: course 4 or the equivalent. Practically oriented presentation of French phonetics and international patterns. Laboratory drills with emphasis on phonetic features specific to contemporary spoken French.

14. Direct Group Study (1-5) I, II, III. The Staff
Chairperson in charge Primary intended for lower-division students. Special Study. (P/NP grading only.)

15. Special Study for Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge (P/NP grading only.)

Upper Division Courses

16. Introduction to French Poetry (3) I, II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 6 or the equivalent. Analysis and evaluation of works representing the main types of French poetry. Study of French poetic conventions and variations.

17. Introduction to French Drama (3) I, II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 6 or the equivalent. Analysis and evaluation of plays representing the main types of French drama, with emphasis on dramatic structure and techniques.

18. Introduction to French Prose (3) I, II, III. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 6 or the equivalent. Analysis and evaluation of works representing the main types of French prose, with emphasis on narrative structure and techniques.

NOTE: For key to footnote symbols, see page 124.
208B. Eighteenth-Century Literature: Novel (4) I, II, III. Kusch Seminar—3 hours. Study of the works of one or more novelists and their contributory influences. May be repeated for credit when different topics are studied.

208A. Nineteenth-Century Literature: Fiction (4) I, II. Blanchard Seminar—3 hours. Study of the works of one or several novelists and their contributory influences. May be repeated for credit when different topics are studied.

208. Nineteenth-Century Literature: Theater (4) I, II. The Staff Seminar—3 hours. May be repeated for credit when different topics are studied.

208C. Nineteenth-Century Literature: Poetry (4) II. Lindsay Seminar—3 hours. Study of the works of one or several poets of the period. May be repeated for credit when different topics are studied.

209. Twentieth-Century: Prose (4) II. The Staff Seminar—3 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

209B. Twentieth-Century: Theater (4) I. Cohn Seminar—3 hours. Study of the works of one or several dramatists of the period. May be repeated for credit when different topics are studied.

209A. Twentieth-Century: Poetry (4) II. The Staff Seminar—3 hours. Study of the works of one or several poets of the period. May be repeated for credit when different topics are studied.

210. Studies in Interactive Fiction (4) I, II. Blanchard Seminar—3 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

211. Studies in Critical (4) I, II. Blanchard Seminar—3 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

212. Studies in Poetry (4) I, II. The Staff Seminar—3 hours. May be repeated for credit when different topics are studied.

213. Studies in Poetry (4) I, II. The Staff Seminar—3 hours. May be repeated for credit when different topics are studied.

238. Problems in French Composition and Syntax (4) I, II. Bloomer Seminar—3 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

250A. French Linguistics: Morphology (4) I, II. Manoukian Seminar—4 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

250B. French Linguistics: Transformational Syntax (4) I, II. Manoukian Seminar—4 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

251. Trends in French Contemporary Linguistics (4) I, II. Manoukian Seminar—3 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

209. Research Methods (4) I, II. Graduate Staff Seminar—3 hours. Study of the works of one or several writers of the period. May be repeated for credit when different topics are studied.

287. Individual Research (1-3) I, II, III. The Staff (SU grading only.)

NOTE: For key to footnote symbols, see page 124.

Genetics
(College of Agricultural and Environmental Sciences)

S. Richard Snow, Ph.D., Chairperson of the Department
Department Office, 257 Briggs Hall (752-0200)

Professor
Robert W. Allerd, Ph.D., Professor
Francisco J. Ayala, Ph.D., Professor
James B. Boyd, Ph.D., Professor
Gordon J. Edlin, Ph.D., Professor
John H. Gillespie, Ph.D., Professor
Leslie D. Gottlieb, Ph.D., Professor
Melvin M. Green, Ph.D., Professor Emeritus
Paul E. Hansen, Ph.D., Professor (Genetics, Biometry)
John A. Kiger, Jr., Ph.D., Professor
Timothy Pruitt, Ph.D., Professor (Genetics, Entomology)
Raymond L. Rodriguez, Ph.D., Associate Professor
Che-Kun J. Shen, Ph.D., Associate Professor
S. Richard Snow, Ph.D., Professor
G. Leday Stephens, Ph.D., Professor
Emil Michael A. Turelli, Ph.D., Associate Professor

The Major Program
The Genetics major is designed to provide a broad background in the biological, mathematical, and physical sciences basic to the study of heredity and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects in improving domestic plants and animals.

Choice of College
Students may elect this major either in the College of Agricultural and Environmental Sciences or in the College of Letters and Science.

Students majoring in Genetics in the College of Letters and Science may petition the Dean of the College to receive credit toward the B.S. upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis. Further information can be obtained from the Division of Biological Sciences office, 150 Mrak Hall.

Genetics

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalents or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Required Units</th>
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<tbody>
<tr>
<td>Bacteriology 102 or 202 (recommended)</td>
<td>3</td>
</tr>
<tr>
<td>Botany 2</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry (Chemistry 1A-1B-1C or 4A-4B-4C)</td>
<td>8A-8B or 12A-12B-12C</td>
</tr>
<tr>
<td>Mathematics (Mathematics 16A and 16B) or 21A-21B-21C</td>
<td>12-14</td>
</tr>
<tr>
<td>Statistics 13 or 102 (102 recommended)</td>
<td>4</td>
</tr>
<tr>
<td>Physics (Physics 2A-2B-2C)</td>
<td>9</td>
</tr>
<tr>
<td>Zoology 1, 2, 3 (recommended)</td>
<td>4</td>
</tr>
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</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Required Units</th>
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</thead>
<tbody>
<tr>
<td>Biochemistry 10A-10B-11B</td>
<td>8</td>
</tr>
</tbody>
</table>

Genetics 100A-100B or 120 (100A-100B recommended) | 100 |

Four additional courses in genetics | 12-16 |

Inclusive at least one course from Group A, Genetics 101, 102, 104, 120, and one course from Group B, Genetics 103, 105.

Breadth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Required Units</th>
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<tbody>
<tr>
<td>College of Agriculture and Environmental Sciences students:</td>
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</tr>
<tr>
<td>English and/or rhetoric (see College requirement)</td>
<td>8</td>
</tr>
<tr>
<td>Social sciences and/or humanities</td>
<td>28</td>
</tr>
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</table>

Additional requirements as described in the major.

Restricted Electives

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<tr>
<th>Course</th>
<th>Required Units</th>
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<tbody>
<tr>
<td>Six upper division courses in biological sciences or other fields relevant to the student's interest chosen in consultation with the adviser.</td>
<td>18</td>
</tr>
</tbody>
</table>

Unrestricted Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Required Units</th>
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</thead>
<tbody>
<tr>
<td>Total Units for the Major</td>
<td>190</td>
</tr>
</tbody>
</table>

Majors Advisor: G. J. Edlin.

Graduate Study.

The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics (see page 224).

Related Courses.

See Agronomy 221, 222, 224, 225, 230, Animal Genetics 107, 108, 204, 206, 207; Anthropology 151, 152, 153, 157, 157L, 260, 280, 292; Biochemistry and Biophysics 201C, 204; Biological Chemistry 225; Genetics Graduate Group; Plant Pathology 215; Plant Science 103, 113, 122; Psychology 251; Vegetable Crops 220; Zoology 148, 149, 156.

*Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.*
Genetics

Courses in Genetics

Lower Division Courses
10. Heredity and Evolution for the People (4) I. Edlin; II. Gordon Lecture—three hours; discussion—1 hour. Course intended for liberal arts students. Examines principles and recent developments in genetics and evolution in context of their social implications.

99. Special Study for Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Individual study for undergraduates. (P/NP grading only.)

Upper Division Courses

Courses 100A and 100B form a two-quarter, 6-unit sequence of introductory genetics in contrast to the one-quarter, 4-unit course 120. The level of the courses is the same.

100A. Principles of Genetics (3) I, Snow Lecture—three hours; or autodidactic—2 hours and general assembly—1 hour. Prerequisite: Biological Sciences 1, and either Bacteriology 2 (especially relevant), Botany 2, or Zoology 1. Lecture introduces principles of genetics, covering the areas of classical molecular and biochemical, and developmental genetics. Not open for credit to students who have received credit for Genetics 116 or 120.

100B. Principles of Genetics (3) II. Turelli Lecture—three hours; or autodidactic—2 hours and general assembly—1 hour. Prerequisite: course 100A; a course in statistics. Continuation of course 100A, covering topics of cytoplasmic inheritance, quantitative inheritance, and evolutionary genetics. Not open for credit to students who have received credit for Genetics 116 or 120.

100L. Principles of Genetics Laboratory (1) Boyd, III, Snow Laboratory—three hours. Prerequisite: course 100A, 116, or 120. Bacteriology 3. Laboratory work in basic genetics to supplement courses 100A, 100B, 116, and 120.

101. Cytogenetics (3) III. Dorovak (Agronomy and Range Science) Laboratory—three hours. Prerequisite: course 100B, 116, or 120. Gross and fine-structure of chromosomes and associated cell organelles, chromosome reproduction; behavior of chromosomes as related to genetics and evolution in polyplody, aneuploidy, and structural heterozygotes. Offered in odd-numbered years.

101L. Cytogenetics Laboratory (2) III. Dorovak (Agronomy and Range Science) Laboratory—six hours. Prerequisite: course 101 (may be taken concurrently). Laboratory study of chromosome structure and behavior. Offered in odd-numbered years.

102. Molecular and Biochemical Genetics (3) I. Kiger Lecture—three hours. Prerequisite: course 100A or 120. Biochemistry 101B. Study of gene structure, function, and the biochemical basis of gene function.

103. Organic Evolution (3) III. Gillespie Lecture—three hours. Prerequisite: course 100B, 116 or 120. Evolution processes in higher organisms.

104. Developmental Genetics (4) II. Abbott (Avian Sciences) Lecture—three hours; discussion—1 hour. Prerequisite: course 100A, 116, or 120. Biochemistry 101B. Study of development and differentiation of vertebrates and other higher organisms. Emphasis on current relevant topics in genetic and biochemical approaches to the study of control mechanisms operative at the various levels of gene action.

105. Population Genetics (4) I. Proulx Lecture—four hours. Prerequisite: course 100B, 116, or 120. A course in statistics and Mathematics 16B recommended. An introductory course in the analysis and interpretation of quantitative genetic systems. Course covers Mendelian in populations, with emphasis on the factors affecting the genetic organization of multispecies systems.


116. Human Genetics (4) III. Shen Lecture—three hours; discussion—1 hour. Prerequisite: Biological Sciences 1 or 10, a course in statistics and a course in organic chemistry. Mendelian and human population genetics. Genetics of human chromosomes: moleculare aspects of human biology, and recent applications of molecular techniques to cloning and characterization of human genes and to the understanding of human genetic diseases. Not open to students who have received credit for Genetics 100A-100B or 120.

120. General Genetics (4) I. Edlin, Hanische; II. Shen, Gillespie; III. Hanische, Boyd Lecture—four hours. Prerequisite: Biological Sciences 1; Bacteriology 2, Botany 2, or Zoology 2; a course in statistics. Course is designed to provide an intensive treatment of the science of genetics for students in the biological sciences who require only a short course in general genetics. Not open to students who have received credit for Genetics 100A-100B or 120.

160. Molecular Genetics Laboratory (3) I, Kiger Laboratory—eight hours; lecture—discussion—1 hour. Prerequisite: courses 100L, 102 (may be taken concurrently), Biochemistry 101L, and consent of instructor. Bacteriology 301 recommended. Genetic analysis of gene structure and function using recombinant DNA technology. Experiments will involve the isolation of plasmidic genes for the purpose of demonstrating the genetic principles of complementation, mutation, and suppression.

190. Introduction to Genetics Research (1) I, II, III. Summer. The Staff (Chairperson in charge). Prerequisite: upper division standing and consent of instructor. Conducting of research projects affiliated with one of the department's regular courses. (P/NP grading only.)

197. Tutorial In Genetics (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: upper division standing and consent of instructor. Director of tutorial study of special topics in genetics. (P/NP grading only.)

198. Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. Directed group study of special topics in genetics. (P/NP grading only.)

209. Research Conference in Genetics (1) I, II, III. The Staff (Chairperson in charge). Discussion—1 hour. Prerequisite: graduate standing in Genetics; consent of instructor. Presentations and critical discussions of current research in genetics. Intended primarily for graduate students. May be repeated for credit. (SU grading only.)

208. Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Lecture-discussion—1 hour. Prerequisite: graduate standing in Genetics and consent of instructor. Experience in methods and problems of teaching genetics, including analysis of texts and other materials, teaching techniques, preparing for and conducting discussion and laboratory sections, preparing examinations. May be repeated for credit. (SU grading only.)

Professional Course

300. Methods in Teaching Genetics (1) I, II, III. The Staff (Chairperson in charge). Lecture-discussion—1 hour. Prerequisite: graduate standing in Genetics and consent of instructor. Experience in methods and problems of teaching genetics, including analysis of texts and other materials, teaching techniques, preparing for and conducting discussion and laboratory sections, preparing examinations. May be repeated for credit. (SU grading only.)

Genetics (A Graduate Group)

S. Richard Snow, Ph.D., Chairperson of the Group

Graduate Office, 357 Briggs Hall

Graduate Study. The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advisers. Consult Genetics Graduate Group Office.

Courses in Genetics

Graduate Courses

201. Seminar in History of Genetics (2) II. The Staff Seminar—two hours. Prerequisite: Genetics 100B, 116, or 120. The development of modern genetic theories beginning with Mendel. (SU grading only.)

202. Seminar in Gene Structure and Action (1-3) III. The Staff Seminar—one hour. Prerequisite: Genetics 102 or consent of instructor. Topics of current interest related to the structure of genes, mutation, and the mechanisms of gene action. Offered in odd-numbered years only.

203. Seminar in Cytogenetics and Evolution (1-3) II. The Staff Seminar—three hours. Prerequisite: Genetics 101 or consent of instructor. Topics of current interest related to chromosomal changes, mutation, and other genetic changes in natural populations, and the applications of genetics to the study of organismic evolution. Offered in odd-numbered years. (SU grading only.)

204. Seminar in Populational, Ecological, and Behavioral Genetics (1-3) I and II. The Staff Seminar—three hours. Prerequisite: Genetics 103 and 105 or consent of instructor. Topics of current interest relating genetics to problems of populations, ecology, and behavior. Offered in even-numbered years.

208. Group Study (1-5) I, II, III. Members of the Group (Chairperson in charge). Prerequisite: consent of instructor. Directed group study of special topics in genetics. (SU grading only.)

209. Research (1-12) I, II, III. Members of the Group (Chairperson in charge). (SU grading only.)

224
The Major Program

Geography is a multifaceted discipline which strives to understand the human and physical systems of our global environment and their interaction. Knowledge of the physical processes which shape our natural environment and of the human processes that have led to different cultural patterns and landscapes is especially valuable in understanding the diverse spatial organization of our world. The curriculum for the major permits students to pursue a program of study compatible with individual needs, interests, and objectives. In the Bachelor of Arts program, the student may choose the general emphasis or a specialization in cultural/historical, economic/urban, physical, or regional planning and analysis. The Bachelor of Science program is for students with a strong science background interested in some aspect of physical geography. Both degree programs include opportunities for developing skills in cartography, field techniques, quantitative methods, and remote sensing and are planned in consultation with the major adviser.

The major in Geography provides training for students interested in careers in business, government, elementary and secondary education, and regional planning. The undergraduate program is especially suitable for students who wish to pursue graduate study leading toward professional careers in geography.

A.B. Major Requirements:

- **Preparatory Subject Matter** 12
  - Geography 1, 2, and 5
  - *Addendum: Choose one subcategory from the following five:
    - Emphasis I (General) 28
    - One course from each of the following three groups:
      a. Geography 170 and 171
      b. Geography 141 and 155
      c. Geography 108 and 115
      Four additional upper division geography courses.*

B.S. Major Requirements:

- **Preparatory Subject Matter** 56-60
  - *Addendum: Choose one subcategory from the following:
    - Emphasis II (Cultural/Historical) 28
      - Geography 170, 171, plus one course from 106, 115, 141, 155.
      - Four additional courses chosen from Geography 110, 143, 152, 172, 173, 175.
    - Emphasis III (Economic/Urban) 28
      - Geography 110, 141, 155, plus one course from 108, 115, 170, 171.
      - Three additional courses chosen from Geography 104, 142, 143, 156, 161, 162.
    - Emphasis IV (Physical) 30
      - One additional course from Geography 102, 112, 177, 171.
    - Emphasis V (Regional Planning and Analysis) 31-32
      - Geography 155 of 156, 110, plus one additional course from 122-127, and one course from 142, 161, 162, 170, 173.
      - Environmental Planning and Management 100, 101, 134, or Environmental Studies 117, plus Political Science 107 or Environmental Studies 111.
      - One course from Economics 115A, Agricultural Economics 148, or Geology 134.

**Total Units for the Major:** 52-56

- **Recommended:** Geography 4.

Courses in Geography

**Lower Division Courses**

1. **Physical Geography** (4) I, Jett; II, Elliot-Fisk; III, Jett
   - Lecture: 3 hours; laboratory: 2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

2. **Introduction to Cultural Geography** (4) I, II, III, Simoons

3. **Climate and Weather** (4) I, III, Shelton
   - Lecture: 3 hours; discussion: 1 hour. Basic concepts of climate and weather: energy and moisture exchanges, atmospheric pressure, global circulation and winds, instruments for obtaining climatological data; weather maps; severe storms; global, regional, and local climate and weather; climate change; climate of California.

4. **Maps and Map Interpretation** (3) I, Bahre

5. **Introduction to Urban and Economic Geography** (4) I, Dingemans, II, Gregor
   - Lecture: 3 hours; discussion: 1 hour. The location of economic and urban activities: Patterns and theories of spatial organization: resource development, agricultural and manufacturing regions, urban systems, and urban structure.

6. **Human Impacts on the Landscape** (4) I, Thompson
   - Lecture: 4 hours. Man's influence on world geography and ecology. The effects of human occupation and activities on the environment, especially the landscape.

7. **Problems in Regional Ecology** (4) II, Simoons
   - Lecture: 4 hours. Selected historical and contemporary ecological problems from various parts of the world. Emphasis on interaction between cultural and physical environments. Regions selected from areas of faculty specialization.

8. **The World's Regions** (3) I, III, The Staff (Chairperson in charge)
   - The major geographic regions of the world, the origins, physical environments, cultures and economies, their interactions and global roles. Designed for non-majors.

9. **Geography and Environmental and Regional Planning** (9) III, Dingemans

96. **Directed Group Study** (1-5) I, II, III, The Staff (Chairperson in charge)
   - Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. **Independent Study** (1-5) I, II, III, The Staff (Chairperson in charge)
   - Independent study with a major adviser. (P/NP grading only.)

**Upper Division Courses**

102. **Field Course in Physical Geography** (4) III, Elliot-Fisk
   - Lecture and field trip—1 day per week. Prerequisite: courses 2 and 12 and consent of instructor. Research methodology and field study. Systems analysis of selected environments. Special attention to environmental behavior and its effects on ecological, functional, and social structures and processes, and on land use changes and their effects on the social and economic characteristics of the region. Special attention to regional case studies: urbanization, industrialization, and cultural change.

104. **Field Course in Urban Geography** (4) III, Dingemans
   - Lecture: 1 hour; full-day field trip. Field analysis of selected urban problems in California. Special attention to regional interactions and functional structure, and land use changes due to changing residential and retail patterns, and urban encroachment on agricultural lands.
Geography

105. Cartography (4) II. Barhe Lecture—4 hours; laboratory—8 hours. Prerequisite: course 4 or consent of instructor. Compilation and generalization of base-map data; symbolization and processing of map data; cartographic design and lettering techniques; map reproduction.

106. Aerial Photo Interpretation and Remote Sensing (4) III. Bahre Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or consent of instructor. Basic photogrammetry; sensors and platforms, aerial photo interpretation, and remote sensing applications.

107. Advanced Cartography (4) III. Barhe Lecture—4 hours; laboratory—5 hours. Prerequisite: course 105. Advanced principles and techniques of cartographic representation. Emphasis on scanning, plate making, process preparation, reproduction, and color proofing. Use of contemporary cartographic and photographic equipment utilized in producing maps. Offered in even-numbered years.

108. Analysis of Landforms (4) I. Elliott-Fisk Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landforms and geomorphic processes. Topics include structural landforms, rock weathering and soil genesis, hillslope processes, and fluvial, glacial and coastal landforms.

110. Quantitative Spatial Analysis (4) II. Diggens Lecture—3 hours; term paper. Prerequisite: course 1, 2, 5, and 13. Emphasis on quantitative analysis of spatial phenomena. Development of methods for graphic research and location planning; quantitative summary and analysis of spatial data patterns and trends; optimal location solutions; analysis of spatial structures and patterns; statistical analysis and use of pre-packaged computer programs.

111. Coastal Landforms and Landscape (4) II. Elliott-Fisk, Sletton Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 or consent of instructor. Examination of the landforms and processes found along coast. Analyses of coasts in various climates, physical, climatic, and "wave climate" settings. Emphasis on the Quaternary history of coastal landforms. Offered even-numbered years.

115. Mesoscaleology (4) II. Sheldon Lecture—3 hours; term paper. Prerequisite: course 3. Examination of areal energy and moisture exchanges at the earth's surface; interaction of physical and biological processes; temporal variations, measuring and modeling the exchange processes, classification of mesoscaleologies. Climate and related processes in areal systems. Man's alteration of mesoscaleologies.

118. Climate Change (4) II. Elliott-Fisk, Sheldon Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and 3. Nature, magnitude, timing, and causes of climate change. Spatial and temporal climate variations within the Quaternary emphasized. Offered in even-numbered years.

117. Quaternary Environments (3) I. Elliott-Fisk Lecture—3 hours; term paper. Prerequisite: course 1, or Biological Sciences 1 or consent of instructor. Introduction to character, timing and magnitude of environmental changes during the Quaternary (Pleistocene and Holocene). Analysis of methods of paleo-environment investigation. Survey of Quaternary record for selected regions.

119. Arid Lands (4) II. Jett Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Physical characteristics and human utilization of rain- and desert-deficient regions.

120. North America (4) I. Gregor Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and lifeways in the United States and Canada, and the ways in which physical and human forces have contributed to their variation. Regional stresses within and between the two countries.

122. Mexico and Central America (4) I. Barhe Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Environment, culture, and history of Mexico and the Caribbean. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of Central America. Approach will be cultural, historical and ecological. Offered in even-numbered years.

122B. South America (4) III. Bahre Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and history of South American countries. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of South America. Approach will be cultural, historical and ecological. Offered in even-numbered years.

123. Western Europe (3) I. Thompson Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, or 2 and 2 or consent of instructor. Geographic and cultural characteristics and the relation to the economic, social and political problems of the countries of Western Europe.

124. The Soviet Union (4) II. Diggens Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 or 2 or consent of instructor. Physical landscapes and cultural regions of U.S.S.R.

125A. North Africa and the Middle East (4) II. Grivetti Lecture—4 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geographic and cultural characteristics of North Africa and the Middle East. Physical geography, climate and vegetation, and historical geography of the region.

125B. Sub-Saharan Africa (4) II. Simons Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1 or 2 or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara.

126. Southern Asia (4) II. Simons Lecture—4 hours; discussion—1 hour. Prerequisite: course 1, or 2 or consent of instructor. Physical, cultural, and historical geography of South Asia.

127. Geography of Contemporary China (3) III. Diggens Lecture—3 hours. Prerequisite: course 1 or consent of instructor. Survey of the physical and human environments in China. The location of resources, agriculture, industry, cities, and contemporary environmental problems as it modifies transportation and urban landscapes. Analysis of China as one model of economic development.

131. California (4) III. Gregor Lecture—3 hours; discussion—1 hour. The regional nature and variety of California landforms, climates, vegetation, and soils; California agriculture, and the cities. Ecological problems caused by increasing population and technological pressures on these environments.

131. Organization of Economic Space (4) I. Gregor Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Survey of the principal environmental, social, political, and cultural forces contributing to the regionalization of the world's economic activities. Outline of the varieties of regionalization resulting from the interaction of these forces. Emphasis will also be put on these aspects as they pertain to the problems of regional disparities within and between nations.

142. Geography of Agriculture (4) II. Gregor Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Distribution and areal variety of the world's food-producing areas, and the ways physical, economic, cultural, and historical factors have influenced these aspects of agriculture. Current and future trends and associated resource problems.

143. Political Geography (4) II. Thompson Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.

151. History of Geographic Thought (4) I. Thompson Lecture—3 hours; term paper. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

152. Geographical Discovery and Exploration (4) II. Thompson Lecture—4 hours. Expansion of western world's geographical horizons from ancient through modern times.

155. Urban Geography (4) I. Diggens Lecture—3 hours; laboratory—1 hour. Prerequisite: course 5 or consent of instructor. Geography of land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planned policy, transportation systems, and residential structure.

156. The Urban Region (4) III. Diggens Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Functional interdependence of cities. Relations between city and hinterland, including "urban" shed, service area, and economic base. Role of urbanization in regional development.

160. World Resource Patterns (3) III. Gregor Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Principal world patterns of resource distribution. Concentrations and voids, and their significance for economic development of the nation and the state. Focus on both natural and human resources of the geographic complex. Resource status of major economic regions.

161. Conservation of Resources and Environment (4) III. Jett Lecture—3 hours; laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Natural resource and environmental-qualy conservation. Land use conflicts between forestry, agricultural, mining, military, and recreational interests. Roles of government and society in creating and resolving resource and environmental problems.

162. Geography of Water Resources (4) II. Shelton Lecture—4 hours; discussion—1 hour. Prerequisite: course 1. Geographical survey of water on the land; needs and opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements.

170. Cultural Ecology (4) II. Jett Lecture—4 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographic theories of environment-man relations. Ecologic relations of gatherers, fisherment, hunters, cultivators, and urbanites; their environmental impacts; their domestic plants and animals.

171. Cultural Geography (4) III. Simons Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Consideration of the principal approaches to cultural geography in modern times, including environmental determinism and possibilities, regional geography, cultural history, cultural ecology, and environmental perception.

172. Animals and Culture History (4) III. Simons Lecture—4 hours. Prerequisite: Anthropology 2, or consent of instructor. Theories of animal domestication; spread of domesticated animals in Old and New World; traditional and contemporary roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.

173. Human and Vegetation Change (4) III. Bahre Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Agricultural and cultural relations of the world's principal vegetation patterns. Particularly emphasis on land-use practices and vegetation change.

175. Geography of Food and Diet (4) II. Grivetti Lecture—4 hours. Prerequisite: course 2 or Anthropology 2. Nutrition: food science and technology recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Offered in odd-numbered years.

182. Student Internship in Geography (2-4) I, II, III. The Staff Internship—6-15 hours at employing agency; term paper. Prerequisite: consent of an undergraduate Geography advisor and consent of instructor. Supervised program of student internships with public agencies dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (P/NP grading only.)

189. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. Research Trends in Geography (1) I. The Staff (Chairperson in charge) Seminar—1 hour. Major current research themes and trends in geography. (SU graded only.)

201. Sources and General Literature of Geography (4) I, II, III. The Staff Lecture—4 hours. Prerequisite: graduate status in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, historical, economic, urban, political, conservation, and regional geography. Lecture—2 hours; discussion—1 hour.

209. Seminar: Selected Regions (4) III. Bahre Seminar—3 hours. Region to be announced annually.

211. Seminar in Cultural Geography (4) II. Jett Seminar—3 hours.

223. Seminar in Political Geography (4) III. Thompson Seminar—3 hours.

224. Seminar in Climatology (4) I. Shelton, Elliott-Fisk Seminar—3 hours.

225. Seminar in Urban Geography (4) II. Diggens Seminar—3 hours.

226
Geology

(College of Letters and Science)

Jere H. Lipps, Ph.D., Chairperson of the Department

Department Office, 175 Physics-Geology Building

Faculty

Richard Cowen, Ph.D., Professor
Howard W. Day, Ph.D., Associate Professor
Cordell E. Durrell, Ph.D., Professor Emeritus
Anthony A. Finnerty, Ph.D., Assistant Professor
Harry W. Green II, Ph.D., Professor
Charles G. Higgins, Ph.D., Professor
Jere H. Lipps, Ph.D., Professor
Stanley V. Margolis, Ph.D., Professor
Robert A. Matthews, A.B., Lecturer
James S. McClain, Ph.D., Assistant Professor
E. M. Moores, Ph.D., Professor
Jeffrey F. Mount, Ph.D., Assistant Professor
Dennis R. Ojakangas, Ph.D., Lecturer
Philip W. Signor, Ph.D., Adjunct Lecturer
Bruce E. Taylor, Ph.D., Assistant Professor
Robert J. Twiss, Ph.D., Associate Professor
Kenneth L. Versub, Ph.D., Associate Professor
Peter D. Ward, Ph.D., Associate Professor

The Major Programs

Students interested in becoming professional geologists or continuing their geological studies at the graduate level should elect the program leading to the Bachelor of Science degree. The Bachelor of Arts degree program is designed for those students for whom the program serves as part of an interdisciplinary course of studies. In either program additional courses may be elected for emphasis in physical or environmental geology or paleontology.

High School students should note that the preparation for either program requires high school chemistry and four years of mathematics or the equivalent. Transfer students will be admitted into the B.S. degree program only after completion of the equivalent of Chemistry 1A, 1B, 1C, Mathematics 21A, 21B, 21C, and a course in physical geology with laboratory, with an overall average grade of C or better.

Geology

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Major</th>
</tr>
</thead>
</table>
| Chemistry 1A-1B or 4A-4B | 10
| Geology 50, 60, 80, 90 | 10
| Mathematics 16A, 16B, 16C or 21A-21B | 8-9
| Physics 2A, 2B, 2C | 9
| Zoology 2 or Geology 3-3L | 4

NOTE: For key to footnote symbols, see page 124.

Geology

Depth Subject Matter:

- 39

- 10

- 107L, 122, 123, 124

- 34

- Additional upper division units in geology and related fields approved by the major adviser

Total Units for the Major

- 74-76

Recommended

- Chemistry 1C or 4C, Geology 2L, 3, 5L; Physics 3A, 3B, 3C; Statistics 11 or 12

B.S. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Subject Matter</th>
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</table>
| Mathematics 1A | 1B-
| or preferably 4A-4B | 4C |
| Geology 50, 50L | 60, 60L |
| Mathematics 21A, 21B, 21C | 10 |
| Physics 8A-8B, 8C | 2A-2B, 2C |
| Geology 2 or Geology 3-3L | 4 |

Total Units for the Major

- 111

Geology

Recommended

Geology 2, 2L, 3, 3L, Statistics 12 One or more of the following courses, depending on emphasis in geology, Mathematics 22A, 22B, 22C, Statistics 12, 104, 106, 107, 110, 111, 112, 123, 124, 125, 253

Minor Adviser: C.G. Higgins (A.B. degrees); C.G. Higgins, R.A. Matthews, R.J. Twiss (B.S. degrees); R.J. Twiss (Ph.D. degrees).

Minor Program Requirements:

Students in other disciplines may elect to complete a minor in Geology by choosing one of the geological subject emphases listed below. On transcripts the minor will appear as a minor in Geology.

Geology

Economic emphasis

Geology 115, 117A, 117B, 120, 130, 170 | 18
One course chosen from Economics 125, 129, 160 Engineering 150, 152, 180, 181 | 3-5

Minor Adviser: B. E. Taylor

Engineering emphasis

Geology 202-217
Civil Engineering 171, 172, 175 | 17

Minor Adviser: R. A. Matthews

Environmental emphasis

Geology 130, 132, 152, 175 | 13
Air Science 118, 119
Water Science 141 or Civil Engineering 142 | 4
One course chosen from Environmental Studies 160, 171, 179, Geology 144 | 3-4

Minor Adviser: R. A. Matthews

Geochemistry emphasis

Geology 110A, 110C | 6
Chemistry 40, 60, 115, 180 | 13
One elective course chosen from Chemical Engineering 151, Chemistry 126, Engineering 130, 134, Geology 150A, Soil Science 102, Water Science 180 | 3-5

Minor Adviser: B. E. Taylor

Courses in Geology

Lower Division Courses

1. Earth (3)
Lecture—3 hours. Introduction to geology for those not majoring in geology or associated sciences. Constitution of the Earth and the internal and external processes that form and change it. Not open for credit to students who have taken course 50.

2. Landsforms (3)
Lecture—3 hours. Prerequisite: course 1 recommended. Study of landscapes and the processes that form them. Not open for credit to students who have taken course 50.

3. History of Life (3)
Lecture—3 hours. Prerequisite: course 1 recommended. The history of life during the three- to one-half billion years from its origin to the present. Of life and processes of evolution: how to visualize and understand living organisms from fossil remains.

4. History of Life Laboratory (1)
Lab—1 hour. Prerequisite: course 3 recommended. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution.

Geology

Geophysics emphasis

Geology 106, 134, 152, 153 | 14
Soil Science 120, 120L | 3
All or one course chosen from Civil Engineering 171, Geology 111, 112, 117, Geology 154, Soil Science 121 | 3-4

Minor Adviser: C. G. Higgins.

Geophysics emphasis

Geology 117A, 117B, 181 | 21-24
Applied Science Engineering 115 | 5
One course sequence chosen from the following:
(a) Atmospheric Science 120, 121A, 121B
(b) Electrical and Computer Engineering 112, 151, 161
(c) Geology 105, 162, Physics 105C
(d) Mathematics 128A, 128B, 128C
(e) Physics 104A, 104B, 105C

Minor Adviser: J. S. McClain.

Oceanography emphasis

Geology 106, 116, 150, 150E, 150G | 16
One course chosen from Environmental Studies 100, 151, Geology 111A, 111B, 518C, Water Science 180 | 3-8

Minor Adviser: P. D. Ward.

Paleobiology emphasis

Botany 140 | 4
Geology 107, 107L, 111A, 111B | 13
At least one course chosen from Anthropology 162, Botany 142, 143, Genetics 103, Geology 138, 150C, 519C, Zoology 112A, 125, 147, 148, 149 | 3-7

Minor Adviser: P. D. Ward.

Teaching Credential Subject Representative: C. G. Higgins. See page 99 for the Teacher Education Program.

Graduate Study. The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Graduate Advisers: R. Cowen.
107. Principles of Paleobiology (2) [III] Signor Laboratory—4 hours. Prerequisite: courses 3-3L or Zoology 2. Course 122, course 123, and study of the environmental effects of evolution of organisms, populations, and communities of fossil organisms in field and laboratory.


110. Regional Structure and Stratigraphy (2) [III] Lab Lecture—2 hours. Laboratory—2 hours; two one-day field trips. Prerequisite: course 108 (preferably taken concurrently). Illustration of concepts covered in course 108. Emphasis on the interpretation of geologic history using geologic maps selected from a variety of structural and stratigraphic provinces.

111. Paleobiology of Invertebrates (4) [I] Cowen Lecture—2 hours; laboratory—2 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates.

112. Paleobiology of Protists (4) [II] Uppes Lab Lecture—2 hours; laboratory—2 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms.


115. Geochemistry (3) [III] Taylor Lecture—3 hours. Prerequisite: Chemistry 1A (may be taken concurrently); course 50. Application of principles of solution, physical, structural, and isotopic chemistry to the study of carbon and oxygen isotopes in the atmosphere.

116. The Oceans (3) [II] Wantt; Powell (Environmental Studies) Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Survey of the marine environment; physical, chemical, and biological processes of the oceans; major ocean currents; and their effects on climate.

118. Geophysics I: Gravity and Magnetics (3) [III] Verosub Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 85B and Mathematics 21C or consent of instructor. Introduction to the use of physics in the study of the earth's structure and processes: seismology, gravimetry, magnetometry, and radioactivity. Application to geophysical exploration as well as solid earth geophysics.

119. Geophysics I: Seismology and Heat Flow (3) [II] McClain Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 85B and Mathematics 21C or consent of instructor. Introduction to the use of physics in the study of the earth's structure and processes: seismology, heat flow, radioactive isotopes. Application to geophysical exploration as well as solid earth geophysics.

120. Summer Field Geology (5) Extra-summer session. Staff

122. Optical Mineralogy: Ore Microscopy (2) [II] Taylor Lecture—2 hours; laboratory—2 hours. Prerequisite: courses 60, 60L. Introduction to the techniques used to identify opaque minerals, their distribution, and their occurrence.

126. Sedimentary Petrology (3) [III] Mount Lecture—3 hours; laboratory—2 hours. Prerequisite: course 122. Course 122 introduces the study of the petrology of sedimentary rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

127. Principles of Paleobiology (2) [III] Signor Lecture—3 hours. Prerequisite: courses 3-3L or Zoology 2. The evolution and ecological structure of the biosphere from the origin of life to the present, with special emphasis on the oceanic environment during the last 600 million years.

128. Sedimentary Petrology (3) [III] Mount Lecture—3 hours; laboratory—2 hours. Prerequisite: course 122. This course is designed for students interested in the study of sedimentary rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.
213. Studies in Geomorphology (3) I. Higgins Lecture—2 hours; laboratory—4 hours. Prerequisite: course 153 or Geography 108. Topics selected from: studies of landforms and landscape development and of the action of formative processes, methods of analysis of geomorphic development of geomorphic theory. Topics change from year to year. May be repeated three times for credit.

214. Seminar in Quaternary Geology and Geomorphology (3) I. Higgins Seminar—1 hour; field trip(s)—approximately 10 hours. Presentation of preliminary research reports; review and discussion of selected papers on Quaternary geologic and geomorphic subjects. May be taken for credit. (SU grading only.)

215. Advanced Geochemistry (3) I. Taylor Lecture—3 hours. Prerequisite: course 115, Chemistry 110A or consent of instructor. Principles and applications of nuclear chemistry to geology; radiogenic and stable isotope geochemistry. Trace elements. Applications to geology. Topics covered include age and origin of earth materials, geochemistry, paleoclimatology, and applications to the study of earth processes.

216. Tectonics (3) I, II. Moores Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Nature and evolution of geologic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts.

217. Topics in Geophysics (3) II. McClain Lecture—1 hour, seminar—1 hour. Prerequisite: consent of instructor. Instructor: Geometric and kinematic analysis and interpretation of seismographic and gravimetric geologic structures and fabrics; geometry of folding, topographic structures, and folded lineations; symmetry arguments in the interpretation of fabrics; determination of slip lines of deformation; regional structural synthesis. Offered in odd-numbered years.

218A. Structural Analysis I: Microfabrics (3) II, III. McClain Lecture—3 hours. Prerequisite: course 128, consent of instructor. Topics covered include: structural features of the Eath's geologic features. Topics will change from year to year. May be repeated for credit.

218B. Structural Analysis II: Microfabrics (3) I. Green Seminar—3 hours; laboratory—3 hours. Prerequisite: consent of instructor; course 218A recommended. Microscopic structural features of deformed metamorphic rocks. Emphasis on deformation features and the origin and significance of preferred crystallographic orientation. Offered in odd-numbered years.

225. Mechanics of Geologic Structures (3) II. Wise Lecture—2 hours; laboratory—1 hour. Prerequisite: course 162, or consent of instructor, and 105. Application of principles of continuum mechanics to understanding development of geologic structures. Modes of fracturing, faulting, and dike emplacement. Offered in odd-numbered years.

226. Advanced Sedimentation and Sedimentary Petrology (4) I. Moore Lecture—2 hours; laboratory—4 hours. Prerequisite: course 124 or consent of instructor. Topical study of major sedimentary rock assemblages of stable platform areas and of deposits of crustal instability in respect to depositional environments, depositional processes, and provenance. Laboratory study of selected suites of sedimentary rocks.

230. Advanced Geochemistry Seminar (3) I. Taylor Seminar—3 hours. Prerequisite: course 115 or consent of instructor. Critical review of selected topics in geochronology including; isotopic geology, hydrothermal and geothermal systems, and recent and ancient sediments. Ideal topics; geochronology, origin and chemistry of the oceans. Subject varies: depending upon student interest. May be repeated for credit. Offered in odd-numbered years.

234. Plate Tectonics (3) G. Finnerty Seminar—3 hours. Prerequisite: Chemistry 1C or Mathematics 22A; physical chemistry recommended. Physico-chemical aspects of the plate tectonics in relation to ocean systems and to the geological evolution. Offered in odd-numbered years.

235. Genesis of Metamorphic Rocks (3) D. Day Lecture—2 hours. Prerequisite: course 124, Chemistry 110A or consent of instructor. Physico-chemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks.

260. Paleontology (3) I. Lipsy, Cowen Seminar—3 hours. Prerequisite: course 111A or 111B, or graduate standing in a geological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting.

263. Functional Morphology of Fossil Invertebrates (4) D. Cowen Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A or Zoology 112A. Principles and methods of functional analysis of fossils with special reference to selected problems in invertebrate phyta.

265. Evolutionary Biology of Protists (3) F. Lipp Seminar—3 hours. Prerequisite: course 111D. Analysis and discussion of selected topics on the evolution of single-celled organisms with emphasis on their fossil record and biology. Offered in even-numbered years.

270. Advanced Study of Ore Deposits (5) II. Taylor Lecture—4 hours; laboratory—6 hours. Prerequisite: coursework 120 (may be taken concurrently). 123, 125, 127, or consent of instructor; course 124 recommended. Mode of occurrence, genesis, geochronology, petrology, and aspects of exploration of selected varieties of ore deposits. Laboratory study of representative suites of ores and associated rocks by transmitted and reflected light. Offered in even-numbered years.

271. Seminar in Ore Deposits (3) II. Taylor Seminar—3 hours. Prerequisite: course 170. Critical review of topics in ore deposits selected according to participants' particular interests, such as studies of particular types of ore deposits, tectonic settings, sulfide mineralogy, etc. May be repeated for credit. Offered in even-numbered years.

280. Igneous Petrology (3) E. Finkley Seminar—2 hours; laboratory—3 hours. Prerequisite: course 123. Integrated laboratory, field study, and seminars on igneous processes and products.

281. Metamorphic Petrology Seminar (3) D. Day Seminar—3 hours. Prerequisite: course 128, course 255 recommended. Selected topics in metamorphic petrology will vary (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). May be repeated for credit. Offered in odd-numbered years.

290 Seminar in Geology (1) I, II, III. The Staff Seminar—1 hour, discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (SU grading only.)

295. Advanced Problems in Geology (3) D. Wise Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., crustal deformation mechanisms, tectonic friction, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature may be repeated for credit. (P/N grading only.)

298. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

NOTE: For key to footnote symbols, see page 124.
German

College of Letters and Science
John F. Feitler, Ph.D., Chairperson of the Department
Department Office (German and Russian), 416 Sprout Hall

Faculty
Wilbur A. Benware, Ph.D., Associate Professor
Clifford A. Bernd, Ph.D., Professor
John F. Feitler, Ph.D., Professor
Ingeborg Henderson, Ph.D., Lecturer
Roland W. Hoermann, Ph.D., Professor
Winder McConnell, Ph.D., Associate Professor
Karl R. Menges, Ph.D., Professor
H. Guenther Nerjes, Ph.D., Associate Professor
Fritz Sammern-Frankenegg, Ph.D., Associate Professor
Peter M. Schaeffer, Ph.D., Professor

The Major Program
This major explores in depth the language, the literary developments, and the cultural trends in the German-speaking world. The program is designed in such a way as to accommodate students whose interest lies either in the pursuit of literary or linguistic studies. Accordingly the department offers a major program with emphasis on the literary movement from the beginnings to the present time as well as a program which focuses on the acquisition of language skills (reading, writing, speaking, understanding) within the frameworks of theoretical and historical courses in German linguistics. Both programs open possibilities for advanced study at the graduate level as well as career opportunities in fields such as international relations, business, the sciences and the arts.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>Preparatory Subject Matter (for both German Language and Literature)</td>
<td>4-2</td>
</tr>
<tr>
<td>German 1-2 or equivalent</td>
<td>2-3</td>
</tr>
<tr>
<td>German 4 or 6A-6B</td>
<td>4</td>
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<tr>
<td>Recommended: Linguistics 1</td>
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Depth Subject Matter

<table>
<thead>
<tr>
<th>Language Emphasis</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>German 101, 102, 125, 121C</td>
<td>12</td>
</tr>
<tr>
<td>German 102, 103 (must be taken in residence)</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units in literature 1</td>
<td>8</td>
</tr>
<tr>
<td>Additional upper division units in literature 2</td>
<td>8</td>
</tr>
<tr>
<td>Additional upper division units in comparative literature, another national literature, or German literature in translation</td>
<td>8</td>
</tr>
</tbody>
</table>

Total Units for the Major (both emphases) 44-62

Minor Program Requirements:
The Department offers a German Language minor and a German Literature minor. In addition, individualized minor programs may be designed upon consultation with the undergraduate advisor. The minor program can be of particular importance to students who plan to extend their training in other fields through a foreign language or literature degree.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>German Language</td>
<td>18-24</td>
</tr>
<tr>
<td>Choose courses numbered from German 104a through 106a</td>
<td></td>
</tr>
<tr>
<td>German Literature</td>
<td>18-24</td>
</tr>
<tr>
<td>Choose courses numbered from German 110</td>
<td></td>
</tr>
<tr>
<td>One two unit lower division course from German 50 to 52 may be counted</td>
<td></td>
</tr>
</tbody>
</table>

Major Adviser: F. Sammern-Frankenegg

Honors and Honors Program. The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination. See also page 93.

Teaching Credential Subject Representative. I. Henderson. See page 98 for the Teacher Education Program.

The Master of Arts Degree. The Department offers programs of study leading to the M.A. degree under both Plan I (thesis) and Plan II (comprehensive final examination). A minimum of 36 units is required. Further information may be obtained by writing to the Department Chairperson.

The Degree of Doctor of Philosophy. The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Department Chairperson.

Graduate Adviser. W.R. Hoermann, W.A. Benware.

Courses in German

Lower Division Courses

Course Placement: Students with two years of high school German normally continue in German 2; those with three years, German 3; those with four years, German 4 or 6A/6B.

1. Elementary German (6) I, II, III. Hoermann Discussion—5 hours: laboratory—two 2-hour sections. (Students who have successfully completed German 2 or 3 in the 10th grade and are in high school may receive unit credit for this course on a P/NP grading basis only. If a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary German (6) I, II, III. Hoermann Discussion—5 hours: laboratory—two 2-hour sessions. Prerequisite: course 1.

3. Intermediate German (6) I, II, III. Hoermann Discussion—5 hours: laboratory—two 2-hour sessions. Prerequisite: course 2. Class discussions of events and life in Germany—present and past. Reading of modern short stories with inductive review of grammar.

4. Intermediate German (4) I, II. The Staff Recitation—3 hours. Prerequisite: course 3. Course 4 may be taken concurrently with 6A. Review of practical principles by means of written exercises, expanding of vocabulary through readings of modern texts.

6A. Spoken German (2) I, II, III. The Staff Discussion—2 hours. Prerequisite: course 3. Courses 4 and 6B may be taken concurrently with or subsequent to 6A. Conversational practice based on everyday vocabulary of modern spoken German. Topics vary from course 6A. (P/NP grading only.)

10. Basic Reading German (4) I. Hoermann Discussion—3 hours: translation project—1 hour. Intensive course for non-majors to provide reading proficiency with texts containing basic sentence patterns and standard general vocabulary. Completion of three-course sequence. 10 and 20 are segment of 21 (H, N, or S) satisfies Letters and Science College foreign language requirement. Students who have successfully completed the second or more advanced level of high school course work in the 10th or higher grade may receive unit credit for this course on a P/NP grading basis only.

11H, 11N, 11S. Reading German (4) II. Hoermann Lecture—1 hour: discussion—2 hours: translation project—1 hour. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10, with specialized focus for upper division and graduate students in arts and humanities (11H), natural sciences (11N), or social sciences (11S). Reading selections will be appropriately representative. (P/NP grading only.)

12H, 12N, 12S. Advanced Reading German (4) III. Hoermann Lecture—1 hour: discussion—2 hours: translation projects—1 hour. Prerequisite: successful completion of course 11H, 11N, or 11S, with specialized focus on more advanced texts. Outside reading and translation projects in student's fields of specialization constitute the central element of the course. (P/NP grading only.)

48. Myth and Saga in the Germanic Cultures (3) III. Hoermann Lecture—3 hours. Knowledge of German not required. Reading in English translation from the North Germanic, the Volsung and Sigurír-Steighel cycles, and the Gudrun lays; literary mythology in German. Wagner's "Ring" and "Götterdämmerung" cycle. May be counted toward major in German. Offered in odd-number years.

50. Survey of German Culture in English Translation (2) F. Feitler Lecture—2 hours. Knowledge of German not required. Characteristic themes in the mainstream of German culture, from medieval intellectual and artistic achievements to the modern period. Study of major trends in art and literature.

51. Masterworks of German Literature in English Translation, I (3) I. Hoermann Discussion—2 hours. Knowledge of German not required. Representative masterworks in English translation, beginning with such heroic epics as the Nibelunglied and courtly romances such as Parzival and Tristan and Isolde, through the baroque period, Enlightenment, Storm and Stress, Weimar Classicism, and ending with literary fairy tales of Romanticism (1830).

52. Masterworks of German Literature in English Translation, II (3) II. Hoermann Discussion—2 hours. Knowledge of German not required. Representative masterworks in English translation, beginning with the psychological realism of Büchner's Woyzeck, progressing through Nietzschean and Expressionist, culminating in works by Kafka, Kafka, Brecht and Brecht, and terminating with existential and absurdist perspectives (1930 to present).

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

106A. Advanced German Conversation (2) I, II. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

106B. Advanced German Conversation (2) II. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

106C. Advanced German Conversation (2) III. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

107. Composition and Expression (4) I, II, III. The Staff Discussion—3 hours. Prerequisite: course 6B or equivalent. Prerequisite: course 10 or equivalent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.
102. Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours. Written reports. Prerequisite: course 101 or consent of instructor. Exercises in short essay writing with an aim toward refinement and expansion of vocabulary. Discussion based on readings in a variety of German texts.

103. Advanced Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours. Written reports. Prerequisite: course 102 or consent of instructor. Advanced essay writing and discussion of selected texts.

104A. Translation (4) I. The Staff (Chairperson in charge) Discussion—3 hours. Written reports. Prerequisite: course 103 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

149. Advanced Translation (4) I. The Staff (Chairperson in charge) Discussion—3 hours. Written reports. Prerequisite: course 104A or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

150. German Phonology/Morphology (4) I. Berware Discussion—3 hours. Written or oral report. Prerequisites: course 1, Linguistics 1 recommended. Modern German phonetics and the structure of the phonological system. Elementary morphological analysis. Offered in odd-numbered years. (Same course as Linguistics 105.)

160. History of the German Language (4) I. Berware Discussion—3 hours. Written reports. Prerequisite: course 105 or the equivalent. Survey of the development of the German language and its structure in historical perspective. Offered in even-numbered years. (Same course as Linguistics 106.)

167. German Syntax (4) I. Berware Discussion—3 hours. Written or oral reports; problem sets. Prerequisite: course 106 or the equivalent, or consent of instructor. Linguistics 1 recommended. An examination of major problems in describing Modern German sentence structure; competing theories of syntax as applied to German.

168. Varieties of Modern German (4) I. Berware Discussion—3 hours. Written or oral reports; problem sets. Prerequisite: course 107 or the equivalent. Relationship of standard High German to modern dialects; uses of modern German in various fields such as advertising, politics and ideology.

169. Business German (4) I. Henderson Lecture/Lecture Discussion—4 hours. Course 108 or consent of instructor. Specialized advanced language course using Business-oriented material and publications as the basis for discussions, role-play, reports, compositions, and translations.

110. Older German Literature in English Translation (4) I. McConnell Discussion—3 hours. Written reports. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Course intended for non-majors. Offered in even-numbered years. Study of principal works in English translation by one or more major authors such as Grimm, Goethe, Lessing, Schiller, Heine, Büchner, Hauptmann, Thomas Mann, Brecht, and Kafka. Content will alternate from quarter to quarter. Offered in even-numbered years.

112. Speciale Topic in German Literature (4) I. Berware Discussion—3 hours. Written reports. Knowledge of German not required. Analysis of significant themes in German literature, myths, legends and fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature. Offered in odd-numbered years.

113. Goethe's Faust (4) I. Neren Lecture—3 hours. Oral reports. Knowledge of German not required. Course intended for non-majors. The Faust tradition: from the legendary contemporary of Luther, the popular chuepbooks, up to Goethe's greatest classic, Part I and II. Offered in odd-numbered years.

114. Hermin Hesse (4) I. Neren Lecture—3 hours. Additional readings and written reports. Knowledge of German not required. Course intended for non-majors. A study of the main ideas and issues of the principal novels, with emphasis on the author's daimion and his NOTE: For key to footnote symbols, see page 124.
German; History

German Literature from 1815 until the rise of nationalism with special emphasis on a developing concept of realism and its reflection in representing works by authors from Germany, Austria, and Switzerland.

282. Survey of Twentieth-Century German Literature (4) III. Merges
Seminar—3 hours; written reports—1 hour. A survey of the main trends and principal works or topical elements of twentieth-century German literature from Naturalism (also known as Symbolism: Rilke, Hofmannsthal), Neue Sachlichkeit to literary developments after 1945 in East Germany, Switzerland, Austria and West Germany.

325. Middle High German Literature (4) III. McEvoy
Seminar—3 hours, report and term paper. Prerequisite: course 202 or consent of instructor. Extensive reading of Middle High German texts in the original language. Examinations: linguistic and literary problems. May be repeated for credit with change of subject matter and consent of instructor.

288. The Renaissance and Reformation in German Literature (4) I. Scherer
Seminar—3 hours. The parodic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.

289. German Literature of the Storchen (3) III. Schwab
Seminar—3 hours. The "Storkbaedel" and the vying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

290. The Enlightenment in German Literature (4) II. Nerjes
Seminar—3 hours. The revolt against the excesses of the "Storkbaedel," and the evolution of a new literature based on reason and will. May be repeated for credit with consent of instructor.

291. Sentimentality and "Shun and Drang" in German Literature (3) II. Nerjes
Seminar—3 hours. Written report. Reaction to overemphasis on Reason: the heroes of Hamann and Herder and the works of poets such as Lenz, H. W. von Schiller and Goethe. May be repeated for credit with consent of instructor.

293. The Classical Age of German Literature (4) I. Nerjes
Seminar—3 hours. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor.

294. The Romantic Period in German Literature (4) III. Tietel
Seminar—3 hours. Inquiry into the aesthetic and humanistic qualities of the life of great literature, including the work of the great Romantic poets. May be repeated for credit with consent of instructor.

296. Twentieth-Century German Literature (4) II. Merges
Seminar—3 hours. Consider the role of the Heilprin-German generation, symbolism, surrealism, and the influence of these movements on the contemporary scene. May be repeated for credit with consent of instructor.

297. Special Topics in German Literature (4) II. The Staff
Seminar—3 hours. Written report. The course will be concerned with various special topics in German Literature, which may cut across the more usual period and genre rubrics. May be repeated for credit. Actual content will vary from year to year.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only)

300. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Discussion: directed reading. (SU grading only)

Professional Courses

300A. The Teaching of German (1) I. Henderson
Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants. (SU grading only)

300B. The Teaching of German (1) II. Henderson
Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants. (SU grading only)

The Major Program

This major is designed to develop critical intelligence and to foster an understanding of ourselves and our world through the study of the past — both remote and recent. This Department offers a variety of approaches to history, each emphasizing basic disciplinary skills: weighing evidence, analyzing historical problems, and presenting conclusions with clarity and logic. The Department thus can give basic support to the education of all undergraduates, whatever their major.

History is also a practical major if one is considering a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these related fields are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in many history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A student electing a major in History may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly on the history of one geographic area or time period of their choosing. The purpose of Plan II is to encourage interested students, including those preparing for graduate work in history, to enroll in a seminar to undertake independent work, and to study the history of any area or geographic field. Plan III is designed to enable students to study in depth the field of twelfth-century history, whose common problems of political conflict, social development, and cultural creativity cut across the several geographical fields of concentration which the department now offers.

History

A.B. Major Requirements:

Preparatory Subject Matter (Plans I, II, and III) ............................................. 20
Five lower division courses including at least two from each of the following lists: ............................................. 20
a. Western Civilization: History 44, 45
   4C, 1, 2, 3, 10, 30
b. Asian Civilization: History 9A, 9B
   7, 7A, 17B, 22, 27A, 27B, 72A, 72B
Depth Subject Matter—Plan I ............................................. 40-41
At least six upper division courses from one of the fields of concentration listed below include a two-quarter sequence of courses ............................................. 24
At least three upper division courses from one of the other fields listed ............................................. 12
At least one course from the following: History 101, or 102 (in field of concentration), or 103 (in field of concentration) ............................................. 4-5
Total Units for the Major, Plan I ............................................. 60-61

Depth Subject Matter—Plan II ............................................. 42
At least four upper division courses from one of the fields of concentration listed below include a two-quarter sequence of courses ............................................. 16
At least three upper division courses from one of the other fields listed ............................................. 12
History 101 ............................................. 5
History 102 in field of concentration ............................................. 5
History 103 in field of concentration ............................................. 4
Total Units for the Major, Plan II ............................................. 82
American History and Institutions. This University requirement can be satisfied by passing any one of the following courses in History: 17A, 17B, 27A, 27B, 27C, 27B, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 177, 179, 180A, 180B, 183A, 183B. The upper division courses may be used only with the consent of the instructor. (See also page 82.)

Courses in History

Lower Division Courses

1. The Bible and Ancient History (4) I, II. Schwab
   Lecture—3 hours; discussion—1 hour. Examination of the Judeo-Christian tradition as it met ancient Near Eastern and classical ideas and institutions through New Testament times. Emphasis on the Bible as a historical document and on historical-critical interpretation of scriptures.

2. Ancient Civilizations (4) III. Fleischer
   Lecture—3 hours; discussion—1 hour. Growth of ancient civilizations from the Sumerians to the fall of the Roman Empire.

3. Cities: A Survey of Western Civilization (4) II. Willis

4A. History of Western Civilization (4) I, II. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance.

4B. History of Western Civilization (4) I, II, III. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century.

4C. History of Western Civilization (4) II, III. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present.

7. Latin American Civilization (4) III. Bauer
   Lecture—3 hours; discussion—1 hour. Introduction to Latin America from the Mayas, Incas and Aztecs to the present. Presents a micro-cosmic picture of a single individual (ranging from an Aztec peasant to Eva Peron) each week drawn from documentary and photographic evidence. Supplementary readings explain the individual's social context and significance.

8A. History of East Asian Civilization (4) I. Price
   Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided.

9B. History of East Asian Civilization (4) II, III. Kinmonth
   Lecture—3 hours; discussion—1 hour. Surveys traditional Japanese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided.

10. World History of the Twentieth Century (4) II, I. Brower
    Lecture—3 hours; discussion—1 hour. History of the world in the twentieth century, emphasizing major powers and their leaders (Wilson, Lenin, Hitler, Roosevelt, Stalin, Mao, Nehru, Nasser, Castro).

15. Introduction to African History (4)
    Lecture—4 hours; term paper. Exploration of the long-range historical context as background to current trends in Africa. This survey includes the early development of African civilizations throughout the twentieth-century colonization by Europeans.

17A. History of the United States (4) I, II, III. The Staff
    Lecture—3 hours; discussion—1 hour. Growth of the American people from colonial times through the Civil War.

18B. History of the United States (4) I, II, III. The Staff
    Lecture—3 hours; discussion—1 hour. American people from Reconstruction to the present.

18C. Introduction to United States History Through Film (4) I, II, III.
    Lecture-discussion—4 hours; use of films. Introduction to American history using approximately nine films with parallel reading materials for selected periods of the American Indian, the Civil War, the Great Depression, the culture of success. Topics and films may vary.
22. Violence and Law in America (4) Ill. Calhoun Lecture—2 hours; discussion—2 hours. Movements of protest for social control from the revolutionary period to the present.


27B. Afro-American History (4) II. Trotter Lecture—3 hours; discussion—1 hour. History of black people in the United States from Reconstruction to the present.

30. Russian Cultural History (4) Ill. Cremney Lecture—3 hours; discussion—1 hour. Survey of Russia's history over the last thousand years as reflected in the lives of her people through their written works, art, and music.

72A. Social History of American Woman and the Family (4) Ill. Rogen Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family from colonial America until the late nineteenth century emphasizing changes resulting from the secularization, commercialization, and industrialization of American society.

72B. Social History of American Woman and the Family (4) Ill. Rogen Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family from colonial America until the late nineteenth century emphasizing changes resulting from the secularization, commercialization, and industrialization of American society.


89. Quacernity and Pseudoscience in America (4) Ill. Sherrill Lecture—2 hours; tutorial supervision and discussion. History of pseudoscience in America: witchcraft, medical quackery, spiritualism, spiritualism hoaxes, technological frauds, literary and art forgeries, UFOs, paranormal claims, astrology, psychic phenomena. Emphasis upon explanations for the existence of deception and pseudoscience.

90A. Modernization of China (4) II. Liu Lecture—2 hours; tutorial supervision and discussion. Recent developments in China. Reading and discussion of aspects of modern China. Background on the contemporary scene is stressed.

90B. Modernization of Japan (4) III. Kimmich Lecture—2 hours; tutorial supervision and discussion. Reading and discussion of aspects of modern Japan. Background on the contemporary scene is stressed.

99. Directed Group Study (1-5) I, II, III. The Staff (Chairperson: charge)
Prerequisite: consent of instructor. Primarily for lower division students. (PIN grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson: charge)
Prerequisite: consent of instructor. Primarily for lower division students. (PIN grading only.)

Upper Division Courses

101. Introduction to Historical Thought and Writing (5) Ill. Hagen Lecture—4 hours; term paper. Prerequisite: consent of instructor. Study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organizing and presenting data in historical writing.

102A-P. Undergraduate Proseminar in History (5) I, II, III. The Staff Seminar—3 hours; term paper. Designed primarily for history majors. Intensive reading, discussion, research and writing in selected topics in the fields of history: (A) Ancient; (B) Medieval; (C) French Renaissance and Reformation; (D) English; (E) French; (F) German; (G) Russia; (H) China to 1800; (I) China since 1800; (J) Britain; (K) Latin America since 1815; (L) American History to 1787; (M) Industrialization in the United States since 1866; (N) Japan; (O) Africa; (P) Christianity and Culture in Europe, 500-1500. May be repeated for credit. Limited enrollment.

103. Topics in Historical Research (4) I, II, III. The Staff (Chairperson: charge)
Seminar—3 hours; individual consultation with instructor; term paper. Prerequisite: consent of instructor. Individual research resulting in a research paper on a specific topic in one of various fields of history. May be repeated for credit.

111A. Ancient History (4) I. Spyrakos Lecture—3 hours; discussion or paper (student option). History of ancient Near East and of their historical legacy to Western world.

111B. Ancient History (4) II. Spyrakos Lecture—3 hours; discussion or paper (student option). Political, cultural, and intellectual study of Greek world from Minoan-Mycenaean period to end of Hellenistic Age.

111C. Ancient History (4) III. Spyrakos Lecture—3 hours; discussion or paper (student option). Development of Rome from earliest times, Rise and fall of the Roman Republic, Empire to 476 A.D.

115A. History of West Africa (4) I. Brandley Lecture—3 hours; written reports. Prerequisite: coursework 44A, 44B, 44C recommended. Introductory survey of the peoples of West Africa and the Congo region from the earliest times to the present.

115B. History of East and Central Africa (4) II. Lecture—3 hours; written reports. Prerequisite: coursework 115A recommended. Introductory survey of the history of East and Central Africa from 1000 AD to the present. This course is part of an interdisciplinary East African sequence which includes Anthropology 1398 (fall), History 1158 (winter) and Political Science 138 (spring).

115C. History of Southern Africa, Swaziland, Lesotho, and Botswana from 1500 to the Present (4) I. Lecture—3 hours; written reports. Prerequisite: courses 115A and 115B recommended. Introductory survey of the history of Southern Africa, Swaziland, Lesotho and Botswana from 1500 to present.

116. African History: Special Themes (4) I. Lecture—3 hours; term paper. Prerequisite: coursework 115A and 115B recommended. Themes of African history, such as African states and empires, trade and slavery, relationships of Egypt to rest of Africa, Bantu origins and migrations, and French colonial policies.

121A. Medieval History (4) I. Bowser Lecture—discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century.

121B. Medieval History (4) I, II. Bowser Lecture—discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century.

121C. Medieval History (4) I, II. Bowser Lecture—discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance.

130A. Christianity and Culture in Europe: 500-1500 (4) I. Fleischer Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlooks on life, politics and economics.

130B. Christianity and Culture in Europe: 1450-1650 (4) I, II. Fleischer Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlooks on life, politics and economics.

130C. Christianity and Culture in Europe: 1650-1800 (4) I, II. Fleischer Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlooks on life, politics and economics.

147C. European Intellectual History, 1800-1870 (4) I. Lunn Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to scientific liberalism and nationalism to social Darwinism. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and Flaubert.


151A. English: The Middle Ages (4) I. Lecture—3 hours; term paper. European thought and culture since World War II. Coverage includes: literature and politics; Communism and Western Marxism; Fascism; Exile; Surrealism; Structuralism; Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Mercure, Foucault, Woolf and de Beauvoir.

168. From Cradle to Coffin: The Life Cycle in Nineteenth-Century Europe (4) I. Lecture—3 hours; term paper. Family life and work experiences of Europeans in the age of the Industrial Revolution (1750-1900). Compares the childhood, adolescence, courtship and marriage, work patterns, leisure activities, and old age of workers, peasants and the middle classes.

171. English: The Middle Ages (4) I. Lecture—3 hours; term paper. European and English culture in the Middle Ages. Study of medieval civilization, law, literature, and art in the context of the Church, feudalism, and medieval society.

171A. English: The Middle Ages (4) I. Lecture—3 hours; term paper. European and English culture in the Middle Ages. Study of medieval civilization, law, literature, and art in the context of the Church, feudalism, and medieval society.

234
170C. The Early National Period, 1789-1815 (4) III. Jacobson Lecture—3 hours; term paper. History of the political and social history of the American republic from the establishment of the Constitution through the War of 1812 and its consequences.

171A. The Jacksonian Era (4) Calhoun Lecture—3 hours; political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850.

171B. U.S. Civil War: Politics and Society (4) Calhoun Lecture-discussion—3 hours; term paper. The American Civil War, its causes, and its consequences. (Pre-requisite: course 176 or 176A)

172. History of the South, 1860-1870 (4) III. Lecture—3 hours; term paper. History of the South from a regional perspective. Includes: the Confederate economy, the Reconstruction of the South, and the political and social consequences of the Civil War.

173. U.S. Military and Naval History: The Nineteenth Century (4) III. Calhoun Lecture-discussion—3 hours; scheduled research paper consultation. Evolution of techniques and organizations. Major campaigns of the Civil War, the Spanish-American War, and World War II.

174B. America in War, Prosperity and Depression, 1914-1945 (4) Lecture—3 hours; term paper. America’s participation in World War I, the Great Depression, and the New Deal.

174D. Selected Themes in Twentieth-Century American History (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 17Ab or equivalent. Students choose four themes from a list of options: (a) American democracy and the state; (b) social change and social policy; (c) American foreign policy; (d) American cultural life.

175A. Intellectual History of the United States (4) III. Smith Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: course 17A or 17B or the equivalent; or course in modern political theory, philosophy of science, or sociological theory. American intellectual thought from the period of the Renaissance to the present.

177. Social and Cultural History of the United States (4) III. Roosen Lecture—3 hours; term paper and oral report. Study of social and cultural forces in American society since the Civil War with emphasis on social structure, immigration, urbanization, labor organization, racial and national groups, social reform movements and changes in social values.

178C. Social and Cultural History of the United States (4) II. Marchand Lecture-discussion—3 hours; written and oral reports. Prerequisite: course 17Ab or equivalent. Themes include: class and social mobility, the rise of popular culture, and the impact of technology on American society.

179. Black History Since 1900 (4) III. Trotter Lecture—3 hours; discussion—1 hour. Prerequisite: courses 17A, 17B, 27A, 27B; strongly recommended. Examination of the political, social, and cultural history of black people in the United States from 1900 to the present.

180. American Colleges and Universities (4) I. Smith Lecture—3 hours; term paper. A survey of American higher education from colonial times to the present, emphasizing its role in shaping American society.

182. The Working Class in American Society (4) I. Brody Lecture—3 hours; written reports. Prerequisite: course 17A recommended. American labor from the mid-nineteenth century to the present. Social, economic, and political factors that have shaped the working class.

184B. Growth of American Politics to 1815 (4) I. Goodman Lecture—3 hours; extensive reading and supervised writing. The development of American politics from colonial times to 1815.

186. Growth of American Politics, 1815-1890 (4) I. Goodman Lecture—3 hours; extensive reading and supervised writing. Continuation of course 184B.

188C. Growth of American Politics, 1890 to the Present (4) III. Goodman Lecture—3 hours; extensive reading and supervised writing. Continuation of course 186.

189A. The Frontier Experience: Trans-Mississippi West (4) III. Jacobson Lecture—3 hours; written and oral reports. Historical perspective on the development of the West.

190A. History of Science in America (4) II. Sherwood Lecture—3 hours; research paper. Survey of the development of American science, emphasizing the influence of technology, economics, and social factors on the development of scientific thought and practice.

191A. History of Technology in America (4) II. Sherwood Lecture—3 hours; research paper. Study of American technology, emphasizing the role of technology in shaping American society and culture.

191B. History of Agriculture in the United States (4) I. Shidler Lecture—1 hour; discussion—1 hour. Prerequisite: junior or senior standing. History of American agriculture from the 1600s to the present, with emphasis on technological change and its impact on society.

191C. History of Agriculture in the United States (4) II. Shidler Lecture—1 hour; discussion—1 hour. Prerequisite: junior or senior standing. History of American agriculture from the 1600s to the present, with emphasis on technological change and its impact on society.
History of Art
See Art

Home Economics
(College of Agricultural and Environmental Sciences)

The Major Program
The Home Economics major, through the study of the humanities, the biological, physical and social sciences, and specialized subject matter, provides an excellent background for professional home economists. Employment opportunities exist in governmental, industrial, and community agencies dealing with social services, private industry, extension services, and teaching at the secondary and community college levels after completion of a one-year credential program. The major encompasses the broad field of family and consumer sciences combining laboratory work with academic theory in such areas as human (child) development, food science, nutrition, and textiles. Graduates are qualified to enter graduate programs in Child Development and Textiles, or with additional courses in biological sciences, the program in Food Science or Nutrition.

This major also provides academic preparation for those who plan to pursue a teaching credential.

Home Economics
B.S. Major Requirements:
(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable. Courses without parentheses are required.)

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology, cultural or general sociology</td>
<td>6-8</td>
</tr>
<tr>
<td>Biological science (Biology, Zoology)</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry, including organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Economics (Economics 1A, 1B, 2A, 2B)</td>
<td>10</td>
</tr>
<tr>
<td>Physiology (Physiology 1 or 2)</td>
<td>4-5</td>
</tr>
<tr>
<td>Psychology (Psychology 1)</td>
<td>4</td>
</tr>
<tr>
<td>Statistics (Statistics 1 or 2)</td>
<td>4-5</td>
</tr>
<tr>
<td>Textiles and clothing</td>
<td>7</td>
</tr>
<tr>
<td>Science (General Science)</td>
<td>7</td>
</tr>
</tbody>
</table>

Home Economics Education
See Agricultural and Home Economics Education

Horticulture (A Graduate Group)
George C. Martin, Ph.D., Chairperson of the Group
Group Office, 1045 Wickson Hall

Faculty. The faculty includes departmental members of Environmental Horticulture, Pomology, and Viticulture and Enology.

Graduate Study. The Graduate Group in Horticulture offers programs of study leading to the M.S. degree under the two master's degree options: thesis or comprehensive examination.

Preparation. A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes course work in general botany, chemistry, physics, statistics, genetics and introductory plant physiology. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail and may be obtained from the Group Office.

Graduate Advisers. Information relative to advisers available in each of the three departments above may be obtained from the Department of Pomology or the Group Office.

Related Courses. Pertinent graduate courses in horticulture may be found by reviewing the Catalog under the departmental categories of Environmental Horticulture, Pomology, Viticulture and Enology, Plant Science, and Plant Physiology.

Human Development
(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Applied Behavioral Sciences.

The Major Program
Human Development is an appropriate undergraduate major if you want to explore the developmental process in humans throughout the life cycle. Concentrating on the periods between birth and young adulthood, cognitive and personality/social development are studied from various perspectives. The emphasis is on the interrelationship of the person, the family, and the community. It is an appropriate major for those planning to pursue advanced degrees in the behavioral sciences and offers courses useful for professionals who will later pursue careers in education, child guidance, social welfare, health science related fields, or research in human development.

Human Development majors observe infants, children, and adults in a variety of settings. You may also participate in study projects with people from different socioeconomic and cultural backgrounds. Functions of a variety of institutional settings (schools, hospitals, mental health clinics, and group homes). Students who anticipate exploring the biological aspects of Human Development should include in their preparatory courses work in the prerequisites for upper division biological sciences courses.
Human Development

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs
Preparatory Subject Matter

3-42
Anthropology (210, 211)

7-12
Biology (Biological Sciences 1 or 101)

4-5
Genetics (100, 116)

4
Human Development 101

3-4
Psychology (Psychology 2, 101, 110)

4-5
Psychology 1 and 15

8
Statistics

3
Human Development 30A-30B

Note: courses recommended are Biological Sciences 1, Genetics 116, and 117.

Depth Subject Matter

51-52
Human Development 100A, 100B, 100C, 110, 16

Social-cultural processes (Human Development 102, 103)

4
Assessment (Human Development 120, 121)

4
Cognitive processes (Human Development 101, 132)

3-4
Exceptional children (Human Development 126, 131)

4
Practicum (Human Development 140A, 141, 142)

4
Additional courses in Human Development or related courses from list of restricted electives as determined in consultation with faculty advisor

16

Breadth Subject Matter

20
English or rhetoric, to include at least one upper division course (see College requirements, page 71)

12
American history or political science

8

Unrestricted Electives

56-71

Total Units for the Major

180

Major Advisor. J. N. Welker.

Related Major Program. See the major in Applied Behavioral Sciences (page 143).

Graduate Study. See page 95.

Courses in Human Development

Questions pertaining to the following courses should be directed to the instructor or to the Department Office, Behavioral Sciences, 119 Academic Office Building 4 (752-2244).

Lower Division Courses

12. Human Sexuality (2) I, III. The Staff (Bachled in charge) Lecture—2 hours. Vocabu- lary; structure and function of genital system; sexual response; menstruation; fertility; birth control; pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communication; attitudes and values; sexual dysfunction; venereal disease. (P/NP grading only.)

15. Family and the Life Cycle (4) II. Weiser Lecture—3 hours; discussion—1 hour. Introduction to scope and methods of Human Development focusing on aspects of social relations, sex roles, sexual (sociality) in families throughout lifecycle; consideration of implications on socialization (e.g., minority status, child care, alcoholism); exploration of forces of strength and help. Not open for credit to students who have completed courses 100A, 100B or 110.

30A-30B. Observational Techniques and Case Study of a Young Child (2-111) II, III, III. Welker Lecture—2 hours; laboratory—2 hours (30A); seminar—1 hour (30B); Psychology 1 and consent of instructor. Observational techniques. Intensive case study of an individual child aged 6 months to 5 years; analysis and use of observational data. (Deferred grading only, pending completion of sequence.)

98. Directed Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.)

98. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

100A. Infancy and Early Childhood (4) I. Weiker Lecture—3 hours; discussion—1 hour. Field observations of preschool children. Introductory psychological and biological factors influencing the development of young children. Biological, physical, emotional, and social development of infants. (P/NP grading only.)

100B. Middle Childhood and Adolescence (4) II. Harper Lecture—4 hours; 3 brief observations of school-age children. Prerequisites: consent of instructor or equivalent; introduction to biology. Analysis of the interplay between biological and social-cultural factors in the emotional, cognitive and social development of children through middle childhood. (P/NP grading only.)

100C. Adulthood (4) II. Harper Lecture—3 hours; discussion—1 hour. Prerequisite: Introduction to psychology. Biological, cognitive and social psychological aspects of adult development.

101. Cognitive Development (4) I, II. Kraft Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or Psychology 112. Theories of cognitive development including developmental views of perception, learning, memory, concept formation, and language.

102. Social and Personality Development (4) II. Harper Lecture—3 hours; discussion—1 hour. Prerequisite: introduction to psychology, courses 100A-100B recommended. Theories of the development of a child’s personality through his interaction with adults. Emphasis on development of interpersonal and culturally valued skills.

103. Cross-Cultural Study of Children (4) I. Werner Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S.

104. Contemporary American Family (4) I, II. Crookston Lecture—4 hours. Prerequisite: introductory psychology. Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interactions.

125. Research Methods in Human Development (4) I. The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: courses 100A-100B or equivalent; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.

126. Emotionally Disturbed Children (4) III. Bachled Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or consent of instructor. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.

127. Developmental Disabilities (4) I. Barton Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Analysis of special learning disabilities, etiology, diagnosis, education and socialization. Introduction to community resources.

128. The Gifted (4) I, II. Kraft Lecture—3 hours. Prerequisite: courses 100A-100B or consent of instructor. Conceptualization, identification and education of the intellectually and creatively gifted individual.

140A. Laboratory in Early Childhood: Communication and Interaction (4-6) I, II, III. Welker Laboratory—12 hours. Prerequisite: course 30A or equivalent for Human Development majors; non-majors and all students electing 5 or 6 units must have consent of instructor. Communication and interaction modes with children aged 6 months through five years of age. Linkage of communication theory with behavior.

140B. Laboratory in Early Childhood: Child-Care Programs (4) I, II, III. The Staff (Chairperson in charge) Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course 140A and consent of instructor. Interaction with 3- to 6-year-old children in preschool program. Linkage of child development theory with behavior. Sect. 1, infancy; Sect. 2, program planning and analysis. May be repeated for credit with a change in section.

141. Field Studies with Children and Adolescents (4-6) I, II, III. Bryant; II, Werner; III, Crookston. Lecture—2 hours; discussion—2 hours; laboratory—6 hours. Prerequisite: course 100B or equivalent and consent of instructor.

Study of children’s affective, cognitive and social development in the context of family/school environments, hospitals and foster group homes. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

142. Field Studies with Exceptional Children (4-6) III. Bachled Discussion—1 hour; field study—6-12 hours. Prerequisite: consent of instructor and one course from courses 130, 131, or 132 may be taken concurrently. Field study with children who are identified as developmentally disabled, emotionally distressed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

150. Supervision and Administration of Early Childhood Education Programs (4) I, II. Welker Lecture—4 hours. (Prerequisite: course 140A or prior experience in an early childhood education program. History of early childhood programs in California: federal, state and local regulations; school district and state budget limitations for; funds and budgets; policy making mechanisms; professional and legal responsibilities; staff development; and professional and ethical issues; offered in odd-numbered years.

190C. Introductory Research Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: involvement in ongoing research. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers and projects are presented in class. Projects developed out of class are presented and evaluated. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Infant Development (3) I. Crookston Seminar—3 hours. Prerequisite: graduate standing and consent of instructor. Analysis of theory and research in infant development. Emphasizes prenatal and perinatal influences, temperament differences, attachment, cognitive development, the family context, at-risk infants, interventions and research methodology. Offered in even-numbered years.

211. Physiological Correlates of Behavioral Development (3) II. Harper Seminar—3 hours. Prerequisite: consent of instructor. An overview of the mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral development. Focus on parallels between processes of organismic development and behavioral development in children and intra-human mammals.

213. Cross-Cultural Study of Children (3) I, II, III. Students—3 hours. Prerequisite: current theory and research concerned with ethnic and social class differences in children’s development. Methods of cross-cultural research, patterns of child rearing, achievement motivation, cognitive and social development among children in the developing countries and ethnic subcultures in the U.S.A.

214. Clinical Child Development (3) I. Bryant Seminar—3 hours. Prerequisite: consent of instructor. Clinical child development based on developmental competencies model rather than medical-psychoanalytic model. Theory and research focusing on acquisition of interpersonal skills (e.g., social sensitivity) and individual differences. Opportunities, environments, and relationships encouraging interpersonal growth and satisfaction emphasized.

221. Psychological Assessment of Children (4) I. Barton Lecture—2 hours; discussion—2 hours. Prerequisite: course 121 or consent of instructor. Study of children’s behavior using examination, analysis and evaluation of perceptual-motor, cognitive, affective, and social development. Problems in assessment of exceptional children considered. Assignments focus on preparation of a comprehensive report on one child.

231. Issues in Cognitive and Linguistic Development (3) III. Kraft Seminar—3 hours. Prerequisite: consent of instructor. Clinical child development based on developmental competencies model rather than medical-psychoanalytic model. Theory and research focusing on acquisition of interpersonal skills (e.g., social sensitivity) and individual differences. Opportunities, environments, and relationships encouraging interpersonal growth and satisfaction emphasized.

237. Parent-Child Interaction (3) III. The Staff Seminar—3 hours. Prerequisite: consent of instructor. Upper division course on the family recommended. Current theory and research. Emphasis on parent behavior in other animal and culture groups. Child-rearing practices, the child’s perception of parents, the differential influence of
**Individual Major**

*College of Agricultural and Environmental Sciences, Engineering, and Letters and Science*

**The Major Program**

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisers and appropriate college committees. This major enables a student to pursue a specific interest which cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals and provide, where appropriate, a basis for the applicant's career objectives as well as meet University and College academic standards.

Proposals for individual majors must be submitted before the fourth quarter prior to graduation for students registered in the Colleges of Agricultural and Environmental Sciences and Letters and Science, and before the third quarter prior to graduation for students in the College of Engineering. Specific requirements for each college are shown below. Application forms are available in program offices.

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**College of Agricultural and Environmental Sciences**

(Advising Office)

Program Office, 122 Hoagland Hall (752-0610)

**B.S. Major Requirements:**

**Preparatory Subject Matter: (variable)**

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

**Depth Subject Matter: 45**

An individualized program of 45 upper division units taken from two or more areas of study (at least one of the areas must be the College). At least 30 of the 45 units must be taken from courses provided by the College.

**Unrestricted Electives: (variable)**

Total Units for the Degree: 180

Additional requirements:

At least 54 of the 180 units required for graduation must be upper division. The College also requires that at least 10 of these units must be in English and/or Rhetoric courses that emphasize written or oral expression (see page 71).

**Major Adviser:**

H.O. Walker (Land, Air and Water Resources).

The course of study must be developed in consultation with the Major Adviser, 122 Hoagland Hall, and two or more faculty members prior to final review by the Individual Major Committee for the College.

Students applying for an Individual Major will be admitted into the Exploratory Program.

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**Immunochemistry (A Graduate Group)**

Eli Benjamini, Ph.D., Chairperson of the Group

Program Office, 3146 Medical Sciences I (752-3156)

**Faculty:**

The faculty includes members from several colleges and the Schools of Medicine and Veterinary Medicine.

**Graduate Study:**

The Graduate Group in Immunochemistry offers programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunochemistry. The Master's degree is offered under the two master's degree options: thesis or comprehensive examination.

**Preparation:**

Applicants for candidacy to these programs should have completed undergraduate preparation in general biology, general bacteriology or microbiology, zoology or botany, general genetics, mathematics, general physics, chemistry, and biochemistry.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunochemistry, development of immunogenetics, and in addition to these general requirements, more specialized preparation in at least one of the following is required: (a) microbiological specialties (bacteriology, virology, parasitology, medical microbiology); (b) zoological specialties (comparative anatomy, endocrinology, embryology, protozoology, histology, cytology, taxonomy, physiology); (c) medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, radiology, epidemiology); (d) biochemistry/biochemistry specialties (biologically active molecules, control mechanisms); (e) genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

**Graduate Adviser:**

Contact the Group Office.

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NOTE: For key to footnote symbols, see page 124.
Integrated Studies; International Agricultural Development

Student Proposal
A student submits to the Dean's Office his or her major proposal and, on review, discussing educational purposes and professional objectives, along with faculty letters of recommendation. After initial review, the Faculty Committee on Individual Majors evaluates the proposal and provides final action.

Major Advisers (selected by student); Principal Adviser: a faculty member in a teaching department or program in the College of Letters and Science in major field of emphasis. Secondary Adviser: a faculty member from secondary area of interest.

Honors Program:
Toward the end of the junior year, students potentially eligible for highest honors at graduation (see page 93), may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a thesis prospectus that has been agreed upon by the student and faculty adviser. The prospectus must be presented to the Committee during the first quarter of the senior year. Graduation with highest honors will be conditional upon both the maintenance of the required grade-point average and the completion of the senior thesis project. The Committee will consider alteration of the student's original major proposal to allow up to 3 units of independent study during each of the last two quarters of the senior year for work on senior honors thesis.

Courses in Integrated Studies
Lower Division Courses
1A, 1B, 1C, 1D, Ideas and Issues in the Sciences (4) I, II, III, III, The Staff (Greider in charge)
Lecture—4 hours. Exploration of major developments in the natural sciences and social sciences. Emphasis on the interaction of the sciences. Themes and fields vary from year to year. For 1983-84 the themes are: "The Environment: Present and Future." Field selected are drama, history, literature, and twentieth-century Western European, Asian, and American culture.

5, Colloquium (1) I, II, III, The Staff (Greider in charge)
Discussion—1 hour. Literature, films, and readings on the interaction between the arts and sciences. May be repeated with different field. (P/NP grading only.)

8, Seminar (1) I, II, III, The Staff (Greider in charge)
Lecture—1 hour. Preparation of a research report. Literature, films, and readings on the themes for the year. May be repeated with different field. (P/NP grading only.)

Integrated Studies
(College of Letters and Science)
Kenneth R. Greider, Ph.D., Program Director
Program Office, 816 Sprague Hall (752-3377)

Committee in Charge
Daniel R. Brower, Jr., Ph.D. (History)
Gordon J. Edlin, Ph.D. (Genetics)
Donald Gibbons, Ph.D. (Oriental Languages and Civilizations)
Kenneth R. Greider, Ph.D. (Physics)
Chairperson
Bruce Hackett, Ph.D. (Sociology)
Nora A. McGuinness, M.A. (Integrated Studies)
*C. Thomas Salle, Ph.D. (Mathematics)
Alan A. Stambusky, Ph.D. (Dramatic Art)
Daniel Wick, Ph.D. (Integrated Studies)

Faculty
Daniel R. Brower, Jr., Ph.D., Professor (History)
Gordon J. Edlin, Ph.D., Professor (Genetics)
Donald Gibbons, Ph.D., Associate Professor (Oriental Languages and Civilizations)
Kenneth R. Greider, Ph.D., Professor (Physics)
Bruce Hackett, Ph.D., Associate Professor (Sociology)
Nora A. McGuinness, M.A., Adjunct Lecturer
*C. Thomas Salle, Ph.D., Professor (Mathematics)
Alan A. Stambusky, Ph.D., Professor (Dramatic Art)
Daniel Wick, Ph.D., Lecturer

The Program of Study
Integrated Studies is a General Education residential program which introduces freshman students to a variety of disciplines in humanities, natural sciences, and social sciences, as these disciplines relate to a common historical period or a common theme. The program encourages cross-disciplinary interaction between students and faculty. The major planning committee in charge of the program meets each quarter, and is responsible for all aspects of the program. The course content includes classes in English, history, literature, philosophy, art, music, and social sciences.

International Agricultural Development
(College of Agricultural and Environmental Sciences)

The Major Program
Today there is a need for trained individuals who can translate and apply recently developed agricultural knowledge and technology to problems of food production, nutrition, health, income generation, marketing, and asset redistribution in less developed nations. Students interested in contributing to the solution of these problems associated with world hunger and health, as well as growth with equity, may wish to investigate the major in International Agricultural Development. Courses in International Agricultural Development are taught by faculty with extensive experience in developing nations.

The International Agricultural Development major provides opportunities to develop competence in a technical field in agriculture or a social science specialization, and, in addition, to acquire those special qualities of mind and spirit requisite for effective performance in underdeveloped and developing areas of the world. For a career in International Agricultural Development, you must be perceptive, sensitive, tolerant and understanding, and possess knowledge of the social-political-economic-cultural relationships which characterize developing societies and economies. Graduates concerned with issues and problems in international development may find job opportunities in government service, in private voluntary organizations, with commercial and consultant firms, and in multinational development companies working overseas.

International Agricultural Development

B.S. Major Requirements:

1. Social Sciences core
   **Social sciences core**
   Physical science (Chemistry 1A, 1B) .................. 10
   Mathematics (Mathematics 101; Mathematical Science and Management 150) .................. 7
   Biological science (Biological Sciences 1, Plant Science 2, Animal Science 1, Nutrition 1, Botany 2, Zoology 2) .................. 12-13
   English (see College requirement, page 71) .................. 8
   Social sciences (Applied Behavioral Sciences 19, Anthropology 2, Political Science 2, Sociology 1, History 4C) .................. 12

2. Natural Sciences and Physical Sciences core
   Chemistry (Chemistry 1A, 1B, 8A, 8B) .................. 16
   Physics (Physics 1A or 2A) .................. 6
   Mathematics (Mathematics 101; Mathematical Science and Management 150) .................. 7
   Biological science (Biological Sciences 1, Plant Science 2, Animal Science 1, Nutrition 1, Botany 2, Zoology 2, Zoology 2L, Bacteriology 2 and 3, Genetics 100A-100B) .................. 15
   English (see College requirement, page 71) .................. 5

3. Depth Subject Matter
   **Depth Subject Matter**
   International Agricultural Development 100A-100B, plus at least one course from 101, 102, 103, 141, 155, 199 .................. 7
   Agricultural economics and economics (Economics 1A-1B) and one upper division, course relevant to development (Economics 100, 110B, 115A, 115B, 116, 118, 119, Agricultural Economics 100A, 100B, 113 or 116, 117, 125, 140, 147, 148, 151, 155) .................. 15
   For students who wish to specialize in agricultural economics: Agricultural Economics 106, or Statistics 102; or Agricultural Science and Management 150) .................. 18

4. Total Units
   42-44
Primary Field of Specialization: Natural Sciences or Social Sciences. Courses chosen by student, with an advisor in that specialization, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.

Natural Sciences:
Student should include some coursework in social sciences appropriate to the geographic area of personal interest (e.g., anthropology, geography, history or political science areas studies courses).

Unrestricted Electives: 26-29
Students not possessing a reading/speaking ability in a foreign language are encouraged to use these electives for language study or to afford an intensive language school.

Total Units for the Major: 180

Specialization Advisers
A listing of faculty in the various areas of specialization and with interests in International Agricultural Development is available from the Major Adviser.


Graduate Study. A program of study and research leading to the M.S. degree is available in International Agricultural Development. Detailed information on the graduate study may be obtained by writing to the Coordinator of Graduate Recruitment (I.A.D.), Graduate Division, UC Davis.

Graduate Advisers: D.E. Hansen (Agricultural Economics), L.E. Gravetti (Nutrition).

Related Courses. See Agricultural Economics 125, 148, 255C; Agronomy 21, 111; Animal Science 160; Anthropology 221; Economics 115A-115B, 116, 215A-215B-215C; Geography 142; Nutrition 20; Political Science 185; Sociology 144; Vegetable Crops 150.

Courses in International Agricultural Development
Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, 101 or 103 Academic Office Building 4 (752-2244).

Lower Division Courses
   III. The Staff
   Lecture—3 hours. Food requirements versus self-realization as the impetus for population growth; the interaction of changing human goals and new technology through successive stages in economic development; agriculture's contributions to development.

29. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

Upper Division Courses
100A. Tropical Agriculture (3) I. The Staff
   Lecture—3 hours. Prerequisite: a minimum of 15 units of lower division courses in animal and avian sciences, biological sciences, and soil, plant, and water sciences. Introduction to origin and evolution of tropical agriculture: physical and climatic factors; tropical soils structure and function; tropical diseases; irrigation; erosion and desertification; tree crops, irrigation methods; traditional and modern cropping systems; plant protection and pest management.

100B. Tropical Agriculture (3) II. The Staff (Thompson in charge)
   Lecture—3 hours. Prerequisite: course 100A. Introduction to tropical agronomy; aquaculture; animal production and management systems both traditional and modern, interface of tropical agriculture with human nutrition and health, traditional agricultural calendars, and multiple cropping systems.

101C. Crop Production under Tropical Conditions (4) II. Mikelsen (Agronomy and Range Science)
   Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2. Climatic and soil adaptation; variety and varietal improvement in annual and perennial crops; pests, diseases, and their control; fertilization and other management practices.

102. Livestock and Poultry Production in Developing Countries (3) I. Vohra (Avian Sciences)
   Lecture—3 hours. Prerequisite course 100B. Animal production and problems of specific countries in Asia, Africa, and South America. Consideration of feed resources, pests, diseases, and their control; kinds of animals, domestic, wild and fish sullied to these areas; uses of animals for draft and food.

110A. Agricultural Development: Micro (3) I. The Staff (Thompson in charge)
   Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. The process of agricultural development and the role of government in its management. Focuses on the understanding of the behavior of farmers as members of communities.

110B. Agricultural Development: Regional (2) I, II. The Staff (Thompson in charge)
   Lecture—3 hours. Prerequisite: course 10A. The process of agricultural development and the role of analysis in its management. Focuses on rational and international level views.

141. Technology for Agriculture in Developing Regions (3) I. Chancellor (Agricultural and Resource Economics)
   Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture. Man, animal, and engine-powered devices. Energy requirements, size-scale, costs, support infrastructure development, and productivity potentials. Same course as Agricultural Engineering Technology 141.)

190. Proseminar in International Agricultural Development (3) III. Thompson (Applied Behavioral Sciences)
   Lecture—1 hour; seminar—2-12 hours. Prerequisite: consent of instructor. Coordination of concepts, principles, and information drawn from technical agriculture and the social sciences presented in the context of economic development. Special emphasis on the problems of program design and implementation.

195. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
   Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

196. Field Study in Mexican Agricultural Development (3) I. Hansen (Agricultural Economics)
   Field trip—8 days, seminar—4 hour sessions. Prerequisite: prior enrollment with consent of instructor required. Knowledge of Spanish not required. Observation of agricultural programs, social and economic issues in Mexico. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   (P/NP grading only.)

Graduate Courses
200. Analysis of Agro-Ecosystems for Agricultural Change (4) III. Raines (Agronomy and Range Science, Plant Growth Laboratory)
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A-100B or the equivalent and consent of instructor. Ecosystems analysis applied to major world agriculture ecosystems as a basis for the design and management of agro-ecosystems for improved agriculture.

International Agricultural Development
201. Analysis of Farming Systems (4) I. The Staff (Graduate Group Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or consent of instructor. Analysis of farming systems as basis for understanding farmer behavior, designing improved farming systems, and contributing to design of agricultural policies; investigation of farming practices in a variety of settings and of experiences elsewhere to change farming practices.

202. Social Systems and Agricultural Development (4) I. The Staff (Graduate Group Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Prerequisite: upper division coursework in economic development, cultural anthropology, sociology, or political science (especially comparative politics or public administration), or consent of instructor. Social and cultural factors in agricultural and rural development; adaptation of rural people to development processes; agrarian movements as engines of political mobilization; evaluation of theories of rural development; application of social analysis to design and implementation of rural and agricultural policies and programs.

203. Management Systems for Agricultural Development (4)
   II. The Staff (Graduate Group Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 200, 201, or 202 (preferably 200 or 201), or consent of instructor. Contexts of agricultural and rural development; strategies for program implementation; planning, staffing, and financing agricultural development; processes and structures of implementation; delegation, decentralization, role of project management, and dispersal.

204. Directed Group Study (1-5) I, II, III. The Staff (Graduate Group Chairperson in charge)
   Selected topics relevant to advanced study in International Agricultural Development. (P/NP grading only.)

205. Research (1-12) I, II, III. The Staff (Graduate Group Chairperson in charge)
   (P/NP grading only.)

International Agricultural Development (A Graduate Group)
Donald Nielsen, Ph.D., Chairperson of the Group
Office, 113 Veihmeyer Hall (752-0695)
Faculty. The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the School of Veterinary Medicine.

Graduate Study. The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. Many of its faculty members have had worldwide experience in international development.

The philosophy guiding the IAD program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirty different specializations are offered. In addition, they should have insight into individual and group motivations and be able to discern ways to initiate changes.

The IAD program provides a multidisciplinary education designed in recognition of these needs. It guides students to the knowledge, skills, and abilities needed to study, assist, or manage agricultural development projects in rural life in developing countries. Students are prepared to accomplish technological and biological improvement in agricultural methods and to encourage social innovations where appropriate.

Graduate Advisers. Contact the Group Office.
International Relations

(College of Letters and Science)

Paul E. Zinner, Ph.D., Program Director
Program Office, 351 Voorhis Hall (752-3063)

Committee in Charge
Conrad J. Bahre, Ph.D. (Geography)
Daniel R. Brower, Jr., Ph.D. (History)
David J. Boyd, Ph.D. (Anthropology)
William K. Domke, Ph.D. (Political Science)
Donald Gibbs, Ph.D. (Diplomatic Languages and Civilizations)
W. Eric Gumaroff, Ph.D. (Economics)
James P. Hawley, Ph.D. (Sociology)
Paul E. Zinner, Ph.D. (Political Science), Chairperson

The Major Program

Cultural, economic, and political ties bind the world together more closely today than ever before. Problems of security, human rights, energy, and mineral resources, and the environment are increasingly confronted at a global, rather than a national level. The challenge of world politics and the growth of international business have created dynamic opportunities for individuals with a background in international affairs. With its theoretical models and real-world application, the study of International Relations has become an exciting, rapidly expanding, and highly relevant interdisciplinary major.

The International Relations Program at UC Davis provides a comprehensive approach to the study of today's complex world. This flexible and diverse undergraduate major is the only one of its kind in the nine-campus University of California system.

Graduation with a degree in International Relations requires completion of introductory courses in political science, economics, and history. Upper-division work is composed of a "core" of classes (including a seminar in the senior year) required of all majors, and an additional set of courses chosen from one of three emphasis groupings or "clusters": political, economic, or regional. The degree requires competency in English and a working knowledge (approximately 26 units of coursework credits or the equivalent) of one other modern language. The latter must be a language of major significance in International Affairs. Students may substitute another foreign language only with the International Relations Program Committee approval.

One program of special interest to International Relations majors is the Education Abroad Program ("International""). Students of international affairs have found EAP an invaluable experience, providing insights into the life and culture of individuals in another country.

Students may obtain academic credit for internships under the sponsorship of the International Relations Program Committee. The work-team program assists students in obtaining internships for academic credit related to their field of study. Legislative, legal, and business internships have proved to be the most popular among International Relations students. The "Davis in D.C." program arranges summer internships in Washington, D.C.

International Relations gives 191 student a wide range of opportunities for advanced study and for careers in agencies of the federal government—within the U.S. of abroad, state agencies, international or nongovernmental organizations, foundations, newspapers and companies with interests in international business, trade or finance. The stringent language requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

International Relations

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>25-31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>Political Science 3</td>
<td>4</td>
</tr>
<tr>
<td>Geography 10</td>
<td>3</td>
</tr>
<tr>
<td>History 4C</td>
<td>4</td>
</tr>
<tr>
<td>Political Science 1-2</td>
<td>4</td>
</tr>
<tr>
<td>One course selected from Anthropology, History 48, 7, 94, 96, 10, 15, 17B. Political Science 1, 2 4</td>
<td></td>
</tr>
<tr>
<td>Recommended: one course in statistics (e.g., Economics 12, International Relations 92) 4</td>
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<tr>
<td>26-26 units (or equivalent) in one modern foreign language 4</td>
<td></td>
</tr>
</tbody>
</table>

Total Units for the major 73-99

Course in International Relations
Upper Division Course

192. International Relations Internship (1-19) I, II, III. The Staff (Committee Chairperson in charge) 3-3-36 hours (to be arranged). Prerequisite: upper division standing and consent of instructor. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only)

Italian

(College of Letters and Science)

Department Office, (French and Italian), 513 Sproul Hall (752-0630)

Faculty

Alfonso De Petris, Dottore in Filosofia, Professor
Dennis J. Dutschke, Ph.D., Associate Professor
Gustavo Foscarini, Associate Professor
Maria I. Manolini-Manes, Ph.D., Professor

The Major and Minor Programs

The major in Italian is intended to provide a solid language background which will enable the student to pursue specific international job opportunities or to develop an appreciation for Italian language and culture. The program of Italian studies at UC is small and geared to the individual needs of the student. A full range of courses is offered which satisfies the humanities and the arts area requirement. The use of Italian is stressed on all levels and a knowledge of the language is required for literature courses which are taught only in Italian. Also offered are literature courses in translation which are intended for those students not majoring in Italian. A course on Italian culture and civilization is also taught in English. Practical experience in education is provided through a teaching program offered in conjunction with the Davis Unified School District; students majoring in Italian are able to teach the language at the high school, under the supervision of a University faculty member.

A degree in Italian provides a well-rounded liberal arts background for graduate studies in the humanities and for a wide range of careers in such areas as civil service, business, travel, library science, and education. Above all, however, it gives the student an opportunity to read some of the greatest literature ever written and to study a country and a people which have a uniquely rich culture and history.

A minor in Italian is available to those aware that a knowledge of foreign languages is of vital importance in today's increasingly international world. In every sector of society, language skills enhance our chances of getting jobs and successfully keeping them. In a more general sense, our understanding and appreciation of other cultures is dependent on our ability to perceive them clearly; there is no better means of perceiving a foreign culture than through its own language. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live (for brief or longer periods of time) abroad or on the foreign offices of American companies or American companies with interests in the foreign market need qualified people who are also fluent in a foreign language.

242
Italian
A.B. Major Requirements:

Preparatory Subject Matter: 3-4 units
- Italian 1, 2, 3, 10A or 10B (or the equivalent) - 0:21

Depth Subject Matter: 8 units
- Italian 101 and 102 - 8
- Italian 103, 104, or 105 (or the equivalent) - 8
- Italian 106, 107, 108, or 109 (or the equivalent) - 8

Upper Division courses in literature or the language: 28
Must include at least one course from each of the following literary periods:
(a) Early Italian, (b) Renaissance and Baroque, (c) Eighteenth through Twentieth Centuries.
A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or courses in related fields such as history, art, literature, and music.

Total Units for the Major: 36-57

Recommended:
One year of college Latin or a Romance Language.

Major Adviser: A. Dell'Arte.

Minor Program Requirements:

Italian: 20 units
Language, Italian 101, 102 - 8
Literature, 4 units chosen in consultation with major adviser - 12
One course chosen from each of the following three areas: (a) Early Italian Literature, (b) Renaissance and Baroque, and (c) Eighteenth through Twentieth Centuries. (One of the above courses may be replaced by course 107 or by a course of literature in translation offered by the Department)

Prerequisite Credit: Credit will not normally be given for a course if it is prerequisite to a course already successfully completed. Exceptions can be made only by the Department Chairperson.

Honors and Honors Program: The honors program comprises two quarters of study under course 194H, which will include a research paper and 8 units of comprehensive examination. See also pages 63 and 63.

Teaching Credential Subject Representative: A. Dell'Arte. See page 99 for the Teacher Education Program.

Courses in Italian

Lower Division Courses:

Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian (II) 1 I. I. III. The Staff Discussion - 5 hours; laboratory - 1 hour. Basic Italian vocabulary and structure, aimed at enabling the student to understand and use standard Italian. (Students who have successfully completed C - 2 or better, Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no credit is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Italian (II) 1 I. I. III. The Staff Discussion - 5 hours; laboratory - 1 hour. Prerequisite: course 1. Continuation of course 1.

3. Intermediate Grammar (3) I. I. III. The Staff Discussion - 5 hours; laboratory - 1 hour. Prerequisite: courses 1 and 2 or the equivalent. Continuation of courses 1 and 2, and basic language preparation.

4. Italian Conversation (3) I. I. III. The Staff Discussion - 5 hours; laboratory - 1 hour. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only.)

5. Italian Conversation (3) II. III. The Staff Discussion - 5 hours; laboratory - 1 hour. Prerequisite: course 4 or the equivalent. Course designed to offer practice in reading and speaking Italian. May be repeated once for credit. (P/NP grading only.)

5A. Italian Conversation (3) I. I. III. The Staff Discussion - 5 hours; laboratory - 1 hour. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only.)

10A. Intermediate Italian (3) I. The Staff Lecture-discussion - 5 hours; prerequisite: course 3 or the equivalent. Reading and discussion of Italian short stories, newspaper articles, etc., providing an introduction to contemporary Italian society, culture, and thought. (P/NP grading only.)

10B. Intermediate Italian (3) I. The Staff Lecture-discussion - 5 hours; prerequisite: course 10A. Continuation of course 10A. Considered the minimum prerequisite for participation in Education Abroad Program.

25. Italian Literature in Translation (3) III. The Staff (Chairperson in charge of course) Lecture-discussion - 5 hours; discussion - 2 hours. Course intended to acquaint the non-major with representative examples of Italian literature. Selected topics will include major authors, genres, literary periods, and special themes.

96. Directed Group Study (1-6; 1 I. II. The Staff Primarily intended for lower division students. (P/NP grading only.)

Upper Division Courses:

101. Advanced Conversation, Composition, and Grammar (4) I. De Petris Lecture-discussion - 3 hours; weekly essays. Prerequisite: course 10B or consent of instructor.

102. Advanced Conversation, Composition, and Grammar (4) I. De Petris Lecture-discussion - 3 hours; weekly essays. Prerequisite: course 101 or consent of instructor.

107. Survey of Italian Culture and Institutions (4) III. Foscarini Lecture-discussion - 3 hours; term paper. Prerequisite: course 100 or consent of instructor. Course offers a survey of Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, art, philosophy, and cultural institutions. To be taught in English.

109. The Image of Man in the Italian Renaissance (4) I. De Petris Lecture - 3 hours; term paper. Prerequisite: course 108 or consent of instructor. Course offers an examination of the concept of man and the Renaissance. To be taught in English.

113A. Italian Literature before the Renaissance; from St. Francis to Petrarch (4) I. Dell'Ora Lecture-discussion - 3 hours; term paper. Prerequisite: course 113 or consent of instructor. Study of the origins of Italian literature through the Middle Ages and the classical period.

115A. Italian Literature of the Renaissance and the Baroque; from Humanism to Machiavelli (4) I. De Petris Lecture-discussion - 3 hours; term paper. Prerequisite: course 115 or consent of instructor. Study of the origins of Italian literature through the Middle Ages and the classical period.

116A. Italian Literature of the Renaissance and the Baroque; from Humanism to Machiavelli (4) I. De Petris Lecture-discussion - 3 hours; term paper. Prerequisite: course 115 or consent of instructor. Study of the origins of Italian literature through the Middle Ages and the classical period.

116B. Italian Literature of the Renaissance and the Baroque; from Boccaccio to Manetti (4) I. De Petris Lecture-discussion - 3 hours; term paper. Prerequisite: course 115 or consent of instructor. Study of the origins of Italian literature through the Middle Ages and the classical period.

118. Italian Literature of the Eighteenth Century (4) I. De Petris Lecture-discussion - 3 hours; term paper. Prerequisite: course 117 or consent of instructor. Course offers an examination of the influence of modern Italian literature on the work of Goldoni, Balbieri, and Vico.

119. Italian Literature of the Nineteenth Century (4) I. De Petris Lecture-discussion - 3 hours; term paper. Prerequisite: course 118 or consent of instructor. Course offers an examination of the influence of modern Italian literature on the work of Goldoni, Balbieri, and Vico.

120A. Italian Literature of the Twentieth Century: The Novel (4) I. Dutschke Lecture-discussion - 3 hours; term paper. Prerequisite: course 119 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the works of Svevo, Levi, Moravia, Pease, and Masi.

120B. Italian Literature of the Twentieth Century: Poetry and Drama (4) I. Dutschke Lecture-discussion - 3 hours; term paper. Prerequisite: course 119 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the works of Svevo, Levi, Moravia, Pease, and Masi.

129B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) I. Dutschke Lecture-discussion - 3 hours; term paper. The Renaissance in Italy and its relationship to English literature. To be taught in English.

139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) I. Dutschke Lecture-discussion - 3 hours; term paper. The Renaissance in Italy and its relationship to English literature. To be taught in English.

149. Special Study for Honors Students (3; 3 I I. III. The Staff Prerequisite: open only to honors students. Guided research leading to 15-20 hour paper.

197C. Community Teaching in Italian (1-6) I. II. III. Foscarini Lecture-discussion - 1 hour; laboratory - 4 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for a maximum of 15 units.

198. Directed Group Study (1-4; 1 I I. III. The Staff (De Petris in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-6; 1 I. II. III. The Staff (De Petris in charge) Prerequisite: consent of instructor. Directed individual study for advanced undergraduate students. (P/NP grading only.)

Japanese

See Oriental Languages and Civilizations
Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)

Kenneth K. Tanji, M.S., Chairperson of the Department

Department Office, 139 Hoagland Hall (752-1406)

Faculty

Hoagland Hall Faculty Office
139 Hoagland Hall (752-1406)

Daniel A. Aldrich, Ph.D., Professor (Soil Science)
Eugene L. Begg, B.S., Adjunct Lecturer (Soil Morphology)
Francis E. Broadbent, Ph.D., Professor (Soil Microbiology)
Richard G. Burau, Ph.D., Professor (Soil Science, Environmental Toxicology)
J. Carroll III, Ph.D., Associate Professor (Meteorology)
Kinsell C. Coulson, Ph.D., Professor Emeritus (Geology, Geophysics)
Robert G. Dicicchini, Ph.D., Associate Professor (Resource Sciences)
Richard D. Grotjahn, Ph.D., Assistant Professor (Soil Science)
Frank F. Harradine, Ph.D., Professor Emeritus (Soil Science)

Miguel A. Marinho, Ph.D., Professor (Water Science, Civil Engineering)
Robert J. Miller, Ph.D., Adjunct Lecturer (Water Science)
Donald R. Nielsen, Ph.D., Professor (Soil Science, Water Science)
William O. Pruitt Jr., M.S., Adjunct Lecturer (Water Science)
Frank E. Robinson, Ph.D., Adjunct Lecturer (Water Science)

Anne J. Schneider, J.D., Visiting Lecturer (Water Science)
Verne H. Scott, Ph.D., Professor (Water Science, Civil Engineering)
Wendy Kuhn-Silk, Ph.D., Associate Professor (Water Science)
Kenh K. Tanji, M.S., Professor (Water Science)
Wesley W. Wellander, Ph.D., Assistant Professor (Water Science and Agricultural Engineering)

Major Programs. Majors offered in the field of resource sciences are Environmental Science, Resource Sciences, and Water Science.

Advising Center is located in 122 Hoagland Hall (752-1669).

Courses. See courses listed under Atmospheric Science, Resource Sciences, Soil Science, and Water Science.

Graduate Study. Graduate work offered in the area of resource sciences is Atmospheric Science, Soil Science, and Water Science. Detailed information can be obtained from graduate advisors for these areas and the Announcement of the Graduate Division.

Landscape Architecture

(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Environmental Design.

The Major Program

This major prepares students for entrance into the profession of landscape architecture. Landscape architects are primarily involved in the planning and design of land areas where human use requires adaptation or conservation of the environment. The curriculum balances creativity, visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem-solving relating to design of parks, urban open spaces, energy-efficient neighborhoods, land reclamation projects, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. A process-oriented approach to design is stressed and environmental and community values are emphasized. Graduates may find jobs in private landscape architectural firms or public agencies and corporations employing landscape architects. The Landscape Architecture major provides the student with excellent preparation for graduate school or career development in a wide range of environmental and design-related fields.

Landscape Architecture

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

Preparatory Subject Matter 49-57

Biological sciences (Biological Sciences 1, 10) 4-5
Botany (Botany 2, Plant Science 2) 4-5
Chemistry (Chemistry 1A, 10) 4-5
Physics (Physics 1A, 2A, 10) 3-4
English (English 1, 2, 20, 103) 4
Public speaking (Rhetoric 1, 3) 4
Two-dimensional design (Engineering 4) 3-4
Three-dimensional design (Art 5, 112, 121A, 121B) 4
Earth sciences (Geology 1, 2, Soil Science 10) 3
Economics (Economics 147, 148) 4-5
Computer science (Mathematics 19, 29A) 3
Mathematics (Mathematics 16A, 36, Statistics 13, Agricultural Science and Management 150) 3-4
Social science (Anthropology 2, Geography 2, 3, 5, Psychology 1, 16, Sociology 1) 3-8
Humanities elective 3

Depth Subject Matter 74-78

Introduction to landscape architecture 3
Landscape architecture studio: Introduction, recreational open space, site planning (Landscape Architecture 112, 113) 12
Landscape graphic communication (Landscape Architecture 129) 4
Advanced communication for landscape architecture (Landscape Architecture 134) 4
Introduction to landscape construction, site engineering, construction details and drawings (Landscape Architecture 131, 132, 133, 134) 15
History of landscape architecture (Landscape Architecture 135) 3
Introduction to environmental plants (Environmental Horticulture 6) 3
Taxonomy and ecology of environmental plants (Environmental Horticulture 106) 4
Arboriculture (Environmental Horticulture 133) 4
Plant selection for environmental design (Environmental Horticulture 155) 3
Landscape planting design (Environmental Horticulture 156) 4
Landscape architecture studio: planning and analysis, urban and community design (Landscape Architecture 181, 182) 8
Senior project in landscape architecture (Landscape Architecture 193) 4-8
Proseminar, three quarters (Landscape Architecture 190) 3

Breadth Subject Matter 10-21

Environmental sciences, two quarters (Earth 400, 401) 4-8
Ecology (Environmental Studies 100, 110, 114A, 114B, Botany 117, Entomology 104, Zoology 125) 3-5
Environmental awareness (Psychology 144) 4
Related disciplines elective 3-4
Course to emphasize a discipline peripheral to landscape architecture (Environmental Planning and Management 110, 116, 122, 127, Environmental Studies 126, 161, 171, Agricultural Economics 18, Civil Engineering 1, Design 6) 1

Unrestricted Electives 24-41

Total Units for the Major 180

1Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Law, School of

Florian Bartosic, B.C.L., LL.M., Dean of the School
Bruce A. Wolk, J.D., M.S., Associate Dean of the School
Mary Jane Hamilton, J.D., Ph.D., Assistant Dean of the School
Mortimer D. Schwartz, J.D., LL.M., M.S., Associate Dean (Law Library)

Deane’s Office, 1011 Martin Luther King, Jr. Hall
(752-0243)

Faculty
Homer G. Angelo, J.D., LL.M., Professor
John D. Ayer, J.D., LL.M., Professor
Edward L. Barrett, Jr., J.D., Professor
Florian Bartosic, B.C.L., LL.M., Professor
Antonia E. Bernhard, J.D., Visiting Lecturer
Edgar Bodenheimer, J.U.D., LL.B., Professor
Alan E. Brownstein, J.D., Acting Professor
Carol S. Bruch, J.D., Professor
Paul W. Comiskey, J.D., M.A., Visiting Lecturer
Hamilton DeSaussure, LL.B., LL.M., Visiting Lecturer
J. C. Decoris, LL.B., Professor
H. C. Dunning, J.L., L.P., Professor
Daniel J. Diefstra, LL.B., J.S.D., Professor
Floyd F. Fereen, L.L.B., Professor
Daniel W. Fessier, J.D., LL.M., Professor
Susan F. Frank, J.D., Professor
Michael T. Garcia, Visiting Lecturer
Gary S. Goodpaster, J.D., Professor
Theodore W. Graham, J.L.B., Visiting Senior Lecturer
Sarah D. Gray, Ph.D., Associate Professor
Robert W. Hillman, J.D., Acting Professor
James E. Hogan, L.L.B., Professor
Margaret Z. Johs, J.D., Visiting Lecturer
Emma M. Jordan, J.D., Professor
Friedrich K. Jungers, J.D., Professor
Leslie A. Kurz, J.D., M.A., Acting Professor
Cecilia L. Lannon, J.L., Visiting Lecturer
Pierre R. Loiseaux, L.L.B., LL.M., Professor
Jean C. Love, J.D., Professor
Karen F. Mah, J.D., Associate in Law
John B. Oakley, J.D., Acting Professor
Raymond I. Paris, J.D., LL.M., S.J.D., Professor
Rex R. Perach, J.D., Acting Professor
John W. Pouls, J.D., Professor
Edward H. Rabin, L.L.B., Professor
Michael Sarris, J.D., Visiting Lecturer
Mortimer D. Schwartz, J.D., LL.M., M.S., Professor
Richard A. Seltzer, J.D., Acting Professor
Luis G. Sherman, J.D., M.A., Visiting Lecturer
Floyd D. Shimomura, J.D., Acting Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Visiting Lecturer
Martha S. West, J.D., Acting Professor
Bruce A. Wolk, M.S., Professor
Janet L. Wight, J.D., Visiting Acting Professor
Richard C. Wydick, LL.B., Professor

Courses of Instruction. The following courses for students enrolled in the School of Law are set up for the semester-system basis only. Instruction dates can be found on page 111. The symbols are (I) for Fall Semester and (S) for Spring Semester.

Latin

See Classics

NOTE: For key to footnote symbols, see page 124.
221. Business Organizations (3) (I) Feistler
Discussion—3 hours. Building upon the concepts developed in Business Organizations I, the focus of this practi-
tioner-oriented offering is upon the legal problems sur-
congering the governance of the modern business enterprise 
—such as the issue of corporate governance. Comparative atten-
tion is given to the traditional and statutory and judge-made 
principles within the different economic systems. At the
same time, a comparative and international analysis of the 
role of corporate governance is undertaken.

222. Federal Taxation I (4) (I) White; II, Walk
Discussion—4 hours. A study of the statutory, judicial, and
administrative material concerning federal income taxes.

223. Trusts, Wills and Decedents’ Estates (I) (3) (I) French; II, \nWilton
Discussion—3 hours. Study of the law of wills and trusts.
Course coverage includes: intestate succession; wills; con-
tracts to make wills; will substitutes; intestacy tests; 
testamentary classes; intestacy rules; the Rules of Appor-
tion, and the Rule Against Perpetuities; and introduction to 
charitable trusts.

224. Estates and Gift Taxation and Planning (4) (I) Green
Discussion—4 hours. Prerequisite: courses 221 and 245.
Probate course concerning preparation and administration of 
estates plans.

225. Marital Property (3) (I) Johns; II, Bruch
Discussion—3 hours. The California community property system and division of marital property, including 
marital personal property and related contracts, marriage dissolution and nullity, property, support, and tax consequences of marriage dissolution; marital property settlements.

226. Communications Law (2) (I) discussion—2 hours. Course will survey legal issues associated with the mass media. Topics covered will in-
clude libel and invasion of privacy, the regulation of broadcasting, free press/fair trial, and cable television, and the effect of the new technologies.

227. Criminal Procedure (3) (I) Goodpaster; II, Barnett
Discussion—3 hours. The police function; arrest, search and seizure, electronic surveillance, entrapment, police 
interrogation and confessions, lineup, the exclusionary rule, 
and search problems in post-arrest phases of the criminal process.

228. Business Planning (3) (I) Hilman
Discussion—3 hours. Prerequisite: courses 220, and either courses 213 and 214 or 218 and 219. Consideration of 
selected problems in business planning.

229. Corporate Takeovers (2) (I) Yfantis
Discussion-seminar—2 hours. Prerequisite: courses 213 and 
214 and 219. Corporate takeovers and their impact on the
business community. Factors pertaining to corporate takeovers. Concern with the acquisition techniques employed by the offerors and with the strategies of the target companies.

230. Family Law (Short Course) (2)
Discussion—2 hours. Legal aspects of marriage, the family 
and dissolution. Among the subjects covered are support, 
custody, guardianship, paternity, illegitimacy, adoption, 
birth control, summons, neglection and dependency. Family 
law reform in the United States and elsewhere and recent 
California developments will be included.

231. Legal Writing (3) (I) Iriomoru
Discussion—2 hours. Basic principles of effective writing. 

232. Real Estate Finance (3) (I) Ratlin
Discussion—3 hours. Examination of the problems in the 
acquisition, financing and development of real estate, and 
remedies in the event of default.

233. Philosophy of Responsibility and Punishment (2) (I) 
Saravay—2 hours. Introduction to some basic problems of 
criminal justice, among them the following: (1) the relation 
between freedom of the human will and the enforcement of 
laws and regulations; (2) the nature of the criminal law; 
(3) the determinism of the lawmen; and (4) the reasons for 
the practice of punishment.

234. Family Law Practice (3) (I) Larnon, Mah
Seminar—2 hours; clinic—1 hour. Prerequisite: course 
225, and course 230 or 272 (concurrently). Combined semi-
nar and clinic to provide marital law counseling under the 
direct supervision of the instructor. Clinical participation 
required twice during semester. Students also participate in 
weekly 2-hour seminar which will cover a wide range of 
topic areas pertaining to family law practice. Limited enrol-
llement (SU grading only).

235. Administrative Law (3) (I) Shimomura
Discussion—3 hours. Control of the administrative opera-
tions of government, both regulatory operations such as 
health, liquor, and other administrative proceedings; social 
services; and other social welfare operations. This course 
will be taught by administrative agencies, principles governing the 
exercise of those powers and the remedies of persons 
aggrieved by administrative action will be examined. Cali-
fornia as well as federal administrative law will be treated.

236. Securities Regulation (2) (I) Hilman
Discussion—2 hours. Prerequisite: course 213 and 214, or 
course 215. The primary focus is to familiarize 
students with laws and regulations, federal and state, rela-
tive to the issuance and trading in corporate securities. 
This includes material pertaining to the scope of the term 
"securities", the registration of securities, intrastate and private 

237. Commercial Paper (2) (I) Jordan
Discussion—2 hours. A course in commercial paper cover-
ing Articles 3 and 4 of the Uniform Commercial Code. This
238. Income Taxation of Partnerships and Subchapter S Corporations (2) Discussion—2 hours. Prerequisite: course 220. Study of Federal and State income taxes. Focus on the organization and taxation of partnerships and S corporations created by death or retirement of partners, sale of partnership interest, and distribution of partnership assets.

239. Admiralty Law (2) Discussion—2 hours. Focus on the legal principles and commercial transactions governed by admiralty law, including the interpretation and application of maritime law to transactions involving ships and other merchant vessels.


243. Real Estate (2) Discussion—2 hours. Introduction to the legal principles and commercial transactions governing real estate, including the interpretation and application of the Real Estate Settlement Procedures Act, Real Estate Settlement Act, and Real Estate and Trust Act.

244. Environmental Law (2) Discussion—2 hours. Introduction to the legal principles and commercial transactions governing environmental law, including the interpretation and application of the Comprehensive Environmental Response, Compensation, and Liability Act, Federal Water Pollution Control Act, and Federal Pollution Control Act.

245. Corporate Law (2) Discussion—2 hours. Introduction to the legal principles and commercial transactions governing corporate law, including the interpretation and application of the Delaware General Corporation Law, Federal Bankruptcy Act, and Federal Bankruptcy Law.


248. Comparative Law (2) Discussion—2 hours. Comparison of the legal principles and commercial transactions governing the jurisprudence of different countries and the interpretation of the law of different nations.

249. Jurisprudence (2) Lecture—2 hours. Study of the theoretical foundations of law, including the interpretation and application of the theories of natural law, legal positivism, and critical legal studies.

250. Jurisprudence (2) Seminar—2 hours. Seminar course covering the principles of jurisprudence, including the interpretation and application of the theories of natural law, legal positivism, and critical legal studies.

251. Labor Law (4) Discussion—4 hours. Study of the legal principles and commercial transactions governing the regulation of labor relations, including the interpretation and application of the National Labor Relations Act, Federal Labor Relations Act, and Federal Civil Service Act.


Law, School of

ions, and comparative industrial democracy ("paternalism"). The work councils, codetermination and self-management.

Limited enrolment.

272. Family Law (Long Course) (3) I. Bruch

Discussion—3 hours. Designed for the student with a substantial background in Law and an interest in Family Law. It covers in depth material offered in the basic (short) course and in addition teaches the child and education.

274. Unfair Trade Practices (2) I. Kurz

Discussion—2 hours. Study of unfair competition and the protection of intellectual property. Among the topics covered are trade secrets, patents, trademarks, misleading and deceptive advertising, and copyright law. It covers in depth material offered in the basic (short) course and in addition teaches the child and education.

275. Sentencing and the Correctional Process (2)

Discussion—2 hours. Prerequisite: course 227 recommended. From pre-sentence report through trialability of ex-offenders; not on prison rights; but rather it is on the law's role vis-a-vis sentencing alternatives.

Guest speakers and field trips. Sentencing simulations and a paper may be required in lieu of a final examination.

276. Juvenile Justice Process (2)

Discussion—2 hours; field trips. Legal and philosophical bases of juvenile justice process; police investigations, apprehension and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile conferences and interviews; on the emerging role of counsel at each phase of the proceedings; guest speakers and field trips.

277. American Indian Law (2) I. Barrett

Discussion—2 hours. Study of the distinctive legal doctrines relating to Indians, Indian tribes, and Indian reservations. Major focus will be on the governmental powers of federal and state authorities over Indians and non-Indians residing on or doing business on Indian reservations. Casebook will be used; examination given.

Union Authority and Individual Rights (2) I. Barrett

Discussion—2 hours. Introduction to the role of law in union democracy, including the legal bases for judicial intervention in internal union affairs, compulsory unionism, the union shop and the accreditation of collective bargaining agents, members' meetings, proceedings, membership, elections, trusteeships, racketeering and political activities.

Employment Relations in the Public Sector (2) I. West

Seminar—2 hours. Prerequisite: course 221 or consent of instructor. Study of the individual and collective rights of public employees, both statutory and constitutional. Emphasis will be placed on California’s public sector collective bargaining statutes, comparing their negotiation and enforcement to the federal and private sector development.

Limited enrolment.

280. Legal Writing Seminar (1) I. Wyckoff

Seminar—1 hour. How to write a variety of legal documents in plain English. Writing exercises and outside readings will be assigned weekly. Each student will complete an individual writing project in lieu of a final examination. Limited enrolment.

281. Children and the Law (2) I. Wright

Seminar—2 hours. Seminar will focus on the economic and social relationships between children and their parents. Attention will be given to family life, legitimacy, and custody; parental and child support obligations; management of children’s estates through guardianship and custodial arrangement; family income-splitting arrangements; tort actions and liabilities based on the child-parent relationship; and parental authority over the child’s social and moral development. The option of a course paper in lieu of a final examination will be available.

282. Environmental Law (3) II. Dunring

Discussion—3 hours. Introduction to statutory administrative and common law of energy resources, including regulation of electric and gas utilities. Water, coal, oil, natural gas, uranium, solar and geothermal fuel cycles will be considered, as will legal aspects of energy conservation.

283. Remedies (3) II. Brownstein

Discussion—3 hours. Study of common law remedies: damages, specific performance, injunctions, and restitutionary relief. Focus of course will be on the efficacy, fairness, and practicability of the alternative remedies available to the parties and the courts.

284. Advanced Criminal Procedure (3) I. Goodey

Discussion—3 hours. Essential to those who wish to handle criminal cases. Course covers the rules and procedures relating to the police court, trial, and judicial review of criminal cases. In particular it treats prosecutorial discretion, search and seizure, indictment, discovery, joinder and severance, contemporaneous objection to a jury trial, bail, trial, sentencing issues including death penalty matters, double jeopardy, appellate review and habeas corpus.

285. Environmental Law (3) II. Dunring

Discussion—3 hours. Introduction to law dealing with environmental protection. Emphasis will be placed on the context of general environmental protection legislation as it is established nationally and in California. Emphasis will be given to protection of air and water resources, the prevention and control legislation is placed upon the Clean Air Act, the Environmental Quality Act. Emphasis will be given to pollution control legislation is placed upon the Clean Water Act, the Environmental Quality Act and hazardous wastes (including "Superfund").

286. Economics and the Law (2)

Seminar—2 hours. Examination of a number of legal issues utilizing economic analysis to include: the economic impact of different liability rules; economic considerations in contract law; some economics of pollution control; and the conduct of the antitrust laws. No prior background in economics necessarily.

287. Public Land Law (2)

Discussion—2 hours. Legal aspects of federal land management, including the history of public and private law, authority over federal lands and specialized law dealing with particular natural resources and uses found on federal lands (mining, logging, oil and gas, wildlife, recreation and preservation).

288. Advanced Constitutional Law Seminar (2) I. Brownstein

Seminar—2 hours. In-depth analysis of the case law interpreting the equal protection clause with special emphasis on different theoretical approaches which attempt to explain and direct judicial decisions in this area. Problems relating to intermediate-level scrutiny, legislative and judicial approaches, recent cases and the role of particular attention. If time permits, the form and scope of remedies available to courts to respond to equal protection violations will be discussed.

289. Law and Poverty (2)

Discussion—2 hours. Selective study of the processes, institutions, laws and practices which produce, maintain, exacerbate, remediate, or otherwise affect the conditions of being poor, together with an examination of the role of the law and the lawyer in ending poverty, its sustaining conditions, and effects.

290. Criminal Justice Administration Seminar (2)

Seminar—2 hours. Prerequisite: course 227 recommended. Consideration of current reform efforts in criminal justice administration. Emphasis will be on the post-trial process. Seminar will be concerned with emerging issues such as pre-trial detention, criminal discovery, and the charging process.

291. The Law of the Seas, Outer Space, and Polar Regions (2) I. DeGausser

Seminar—2 hours. A survey of the status of transnational treaties. Class will examine the legal principles, treaties (such as the draft Law of the Sea convention and several space treaties) relevant case law, and divergent national approaches to the exploitation, use, and development of these areas. Under emerging, and to some extent traditional, international law, states are excepted from appropriation by any nation. Moreover, some legal regimes for the oceans, outer space, and the polar regions contain common legal principles: states having become increasingly used by humankind under the thrust of advanced technology, and population growth. The resulting interaction between national laws and international law promises to create a new discipline for lawyers, which this course will seek to identify and describe the emerging legal problems.

292. Immigration Law and Procedure (3) I. Smith

Seminar—3 hours. Course will survey a brief history of the U.S. immigration and policy and comparing the policies of other countries; use of primary and secondary sources and immigration law; federal agency international relations (Justice and State Department); entry of nonimmigrant (temporary) visitors and immigrants into the United States; the worldwide quota and preference systems; family and employment immigration requirements; critical to access favored immigrant status; deportation procedures; discretionary relief available to persons otherwise subject to deportation; available defenses to deportation, judicial proceedings; re-entry and asylum law; administrative appeals; federal and state judicial relief; citizenship; and naturalization. Students may also participate in mock deportation and asylum hearings.

293. Legal Aspects of International Efforts to Preserve the Earth and Space (3) I. Angelo

Seminar—3 hours. Focus is on understanding that environmental problems cross national boundaries, participants will examine the imperfect international and emerging network of international treaties. Participants will be directed to research sources on items of special interest to them, such as the United Nations Environment Program which has established the Global Environment Conference, the recently concluded Law of the Seas Convention, remedied for trans-frontier pollution, international energy transactions, international environmental treaties, and programs, such as in the European Community, Asia, and Africa.

294. Non-Profit Corporate Enterprise (1) I. Fessler

Seminar—1 hour. Seminar will focus upon corporations formed for the exclusive purpose of doing charitable work. It covers in depth material offered in the basic (short) course and in addition teaches the child and education.

295. Labor Arbitration (2)

Discussion—2 hours. Prerequisite: course 251. Study of the labor arbitration process and the manner in which various provisions of collective bargaining agreements are interpreted and applied.

296. Copyright and Entertainment Law (3) I. Kurz

Discussion—3 hours. First half of course will involve a detailed consideration of the copyright law with emphasis on its application to motion pictures, music, television, and theater. Second half of course will involve a study of other legal issues, including moral rights, ownership in works of authorship, and the protection of titles, characters, group names, and slogans, the rights of privacy and publicity, and the structuring of contracts in the entertainment field.

297. Pre-Trial Skills (2) I. Perschbach

Discussion—2 hours. Course uses a series of role-playing exercises and class discussion to introduce students to a set of non-trial skills basic to the practice of law. Course concentrates on client interviewing and counseling but also includes exercises in other pre-trial skills, including witness interrogation, strategies for developing pleadings, discovery and motion practice. Course is highly recommended for those students who expect to participate in clinical programs. (SU grading only.)

298. Group Study (1-4) I. II.

The Staff

Grup of students (not less than 4 nor more than 10) with common interest and studying a stated legal problem may participate in a group study. Group must be submitted to the student's office at least 4 weeks prior to opening of the semester in which the program is to begin; (3) the title of the group study must be approved by the faculty board and normally will be approved only prior to the semester for which it is approved; (4) the group must conduct a weekly seminar session to be arranged by them; (5) each member of the group must submit an individual paper or an approved alternative growing out of the seminar subject to the faculty review; (7) SU grading basis only unless the entire group requests letter grades in advance.

299. Research in Legal Problems (1-4) I. II.

The Staff

Students may receive credit for research projects, subject to the following regulations: (1) project may extend over no more than two semesters; (2) for the project and the list of members of the group must be submitted to the director of student affairs at least 4 weeks prior to opening of the semester in which the program is to begin; (3) the professor or member of the group must submit an individual paper or approved alternative to the faculty review; (7) SU grading basis only unless the entire group requests letter grades in advance.

Professional Courses

410A-410B. Moot Court Competition (1-1) I-II.

The Staff

Laboratory—2 hours. Participation as a partner in year-long moot court program. In first year student participates work on theoretical advocacy problems. In second semester participants research and write an appellate brief and then argue the case before a moot court. Students who have had course 411 or 415 may not receive credit for course 410A-410B. (SU grading only, pending completion of sequence.)

411. Oral Advocacy (1) I. The Staff

Laboratory—2 hours. Participation as a partner in year-long moot court program. Students who do not wish to enroll in year-long moot court program but who wish to improve their advocacy skills must enroll in the first semester of course 410A-410B. Students who have had course 410A-410B may not receive credit for course 411. (SU grading only.)

415. Evidence Laboratory (1) I. The Staff

Laboratory—2 hours. Participation as a partner in year-long moot court program. Students who do not wish to enroll in year-long moot court program but who wish to improve their advocacy skills must enroll in the first semester of course 410A-410B. Students who have had course 410A-410B may not receive credit for course 415. (SU grading only.)
413. Interschool Competition (1-3) I, II. The Staff
Prerequisite: course 410A-410B and consent of Moot Court Board (students representing the School in the interschool competition). Participation in interschool文书writing skill competition. Maximum of one unit may be received for any one interschool competition. Participation may be authorized by the faculty adviser and Moot Court Board, in consultation with the Board. The faculty advisers, in consultation with the Board, may condition the award of academic credit for any particular competition on the performance of additional work, as may be reasonable to justify the credit. (SU grading only.)

414. Moot Court Board (1) I, II. The Staff
Laboratory. Prerequisite: course 410A-410B or consent of Moot Court Board. Members of Moot Court Board may receive one credit for each semester of service on Board, up to a maximum of two. Credit awarded only after certification by Moot Court Board and approval of the faculty advisers to Moot Court Board. (SU grading only.)

416. Law Review Writer (1) I (2) II. The Staff
Writing of any material that appears in the student-edited, under the supervision of the editors of the Law Review. Minimum of 30 hours contributed to the Review’s publication is also required. Credit may be obtained only upon attending classes as a member of the Law Review, which requires that the student have made substantial progress toward completing a publishable article. Credit is awarded only after certification by the editor-in-chief of the Law Review and approval of the faculty advisers to the Law Review. One unit of credit is earned the first semester and two units the second. (SU grading only.)

417. Law Review Editor (2) I, II. The Staff
Editors must have completed a publishable article and must perform editing and substantial time commitment. Credit is awarded only after certification by the editor-in-chief of the Law Review and approval of the faculty advisers to the Law Review. Editors of the Law Review may receive two units for each semester of service as an editor, up to a maximum of four units. (SU grading only.)

420. Individual Clinical (1-12) I, II. The Staff
Clinical program. Prerequisite: relevant substantive and procedural courses recommended. Students may arrange individual clinical programs with practicing attorneys and law firms. The program is subject to approval of the Clinical Committee and under the sponsorship of individual faculty members. Described outline of the proposed clinical program, endorsed by the sponsoring faculty member, should be submitted to the Clinical Office one month prior to the beginning of the semester in which credit is requested. The clinical must be under appropriate legal supervision and designed to maximize educational benefits. With the exception of a clinical seminar away, a student may enroll in no more than six units of individual clinical study in any one semester or any one clinical placement. Four office hours are required per week. A full-time clinical student may be taken for 12 units; one course may be taken in conjunction with a clinical seminar away with the consent of the Dean, not exceeding more than 14 total semester hours during such a semester. Students engaging in individual clinical in subject matter areas covered by Formal Clinical Programs (e.g., criminal law, legislative, prison, immigration) must enroll in the Formal Clinical Program and attend the required seminars (See Law 234, 440, 480, and 480B). For non-Formal Clinical Program descriptions of the policies and procedures governing the design, approval, requirements and limitations of individual clinicals, please see the “Clinical Guidelines” obtainable from the Dean’s Office or clinical offices. (SU grading only.)

425. Judicial Clinicals (1-12) I, II. The Staff
Clinical Program—to be arranged. Prerequisite: relevant substantive and procedural courses recommended. Students must arrange individual judicial clerkship clinical programs with federal judges or judges of the Court of Appeals. Credit is awarded only after certification with the approval of the Clinical Committee and under the sponsorship of individual faculty members. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for Individual Clinicals (course 460). (SU grading only.)

440. Clinical Program in Immigration Law (4-12) I, II. Smith
Clinical program of Immigration Law. Client course will include seminar on immigration law practice, individual weekly case conferences with faculty supervisor and individual legal research. Students may represent clients administratively in immigration hearings in San Francisco. Limited enrollment. (SU grading only.)

450. Clinical Program in Environmental Law (2-6) I, II. Dunn.
Clinical Program. Practical experience in environmental law. Students will work under the direct supervision of a government or private agency engaged in some form of environmental law work for a minimum of 6 office hours per

week. (For purposes of this course, “environmental law” includes land use and natural resource means.) Students will also be required to prepare a bi-weekly journal note, commenting upon, and reflecting upon, their clinical experiences. May be repeated for a total of 6 units. (SU grading only.)

460. Clinical Program in the Legislative Process (2-4) II. Garcia
Clinical Program. Prerequisite: course 231 recommended. This program is designed to provide students with practical experience in the operation of a legislative or a legislative committee for 7 to 14 hours per week. The major thrust of the program is to enable students to become familiar with the give and take realities of the process of making laws as contrasted with the interpretation and enforcement. Journals and seminar attendance are required. (SU grading only.)

470. Clinical Program in the Administration of Criminal Justice (4-12) I, II. Garcia
Clinical program. Prerequisite: courses 275, 227 and 263A recommended. This program affords students an opportunity to gain practical experience working full or part time in a District Attorney’s in one of several counties surrounding the county for a total of 13 hours per week. Students enrolled in the program engage in the full range of activities associated with their offices with emphasis on observation and participation in fact-finding, interviewing, counselling, negotiation, motion practice, and trials under State Bar rules. Journal and seminar attendance are required. Limited enrollment. May be repeated for a total of 12 units. (SU grading only.)

480. Legal Problems of the Prison Inmate (2-4) I. Corniskey, Ilia
Clinical program: student/instructor case conference—1 session per week; evening seminar—1 session per week. Students help prisoners at Vacaville and Stockton prisons with civil and criminal law problems. Primarily responsible for handling the case from initial interview to completion. Weekly case conference with instructor; and weekly evening seminar. There is usually the opportunity to tour the prison and observe or participate in hearings before the Board of Prison Terms. Goals of course are basic knowledge of prison law and practical skills in handling a case for a prisoner client. Limited enrollment. May be repeated for a total of 8 units. (SU grading only.)

465. Instruction in Legal Research and Writing Skills (2) I, II.
The Staff
Prerequisite: course 207 or 208. Participation in an instructional and writing program for first-year students under the direction of the legal research and writing instructors. Participation in various aspects of the legal research program and once in the regular writing program. (SU grading only.)

Linguistics

Linguistics
(College of Letters and Science)
Lenora A. Timm, Ph.D., Program Director
Program Office, 912 Sproul Hall (752-1219)

Committee in Charge
Wilbur A. Bernwede, Ph.D. (German)
James Gallant, Ph.D. (Russian)
James Gallant, Ph.D. (French)
Winfried Schieller, Ph.D. (English)
Lenora A. Timm, Ph.D. (Linguistics), Chairperson
Robert Van Valin, Jr., Ph.D. (Linguistics)
Carolyn F. Wall, Ph.D. (Anthropology)

Faculty
Ronald A. Arbin, Ph.D., Associate Professor (Philosophy)
Janis R. Bastian, Ph.D., Associate Professor (Linguistics)
Wilbur A. Bernwede, Ph.D., Associate Professor (German)
Linnea C. Elri, Ph.D., Professor (Education)
James Gallant, Ph.D., Associate Professor (Russian)

Wayne Harsh, Ph.D., Professor (Linguistics, English)
Maria Roznovska-Manea, Ph.D, Professor (French)
Barbara J. Merino, Ph.D., Assistant Professor (Education)
Michael T. Mooney, Ph.D., Associate Professor (Rhetoric)
David L. Olmsted, Ph.D., Professor (Anthropology)
Daniel R. Reinhart, Ph.D., Associate Professor (Russian)
Winfried Schieller, Ph.D., Associate Professor (English)
Gwenivrin Schieller, Ph.D., Assistant Professor (Spanish)
Janet S. Shinnamoko, Ph.D., Assistant Professor (Cultural Studies)
Susan B. Shinnamoko, Ph.D., Assistant Professor (Rhetoric)
Lenora A. Timm, Ph.D., Associate Professor (Linguistics)
Maximor Torreblanca, Ph.D., Professor (Spanish)
Robert Van Valin, Jr., Ph.D., Assistant Professor
Carolyn F. Wall, Ph.D., Assistant Professor (Anthropology)
Benjamin E. Wallack, Ph.D., Professor (Social Anthropology)

The Major Program
The discipline of linguistics encompasses a broad spectrum of knowledge about human language. Linguistics focuses on the description of contemporary languages and the study of language change. It also has important applications within many other disciplines such as anthropology, biology, communications, education, language teaching, literature, philosophy, psychology, and sociolinguistics.
The major is designed to familiarize students with the methods of linguistic analysis at gradually acclerated levels of methodological and theoretical complexity through a sequence of "core" courses. Elective courses allow the student to explore areas which overlap linguistics.

Linguistics
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>24-34</td>
</tr>
<tr>
<td>Linguistics 1 or 135</td>
<td>4</td>
</tr>
<tr>
<td>Foreign language, 20 units of Greek or Latin</td>
<td>4</td>
</tr>
<tr>
<td>22 units of any other language</td>
<td>4</td>
</tr>
<tr>
<td>20 units of two different languages</td>
<td>20-30</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 units on a major, depth requirement</td>
<td>4</td>
</tr>
<tr>
<td>110 units on a major, depth requirement</td>
<td>4</td>
</tr>
<tr>
<td>110, 120, 130, 140</td>
<td>4</td>
</tr>
<tr>
<td>110, 120, 130, 140</td>
<td>4</td>
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</tbody>
</table>

Oriental Languages and Civilizations 100 or Anthropology 200 (see page 90 for
procedures governing undergraduate enrollment in a graduate course) 4

At least 12 upper division units from the following courses:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology 118, 120, Education</td>
<td>4</td>
</tr>
<tr>
<td>1178, English 105A, 105B, French 159, 160</td>
<td>4</td>
</tr>
<tr>
<td>Human Development 101</td>
<td>10</td>
</tr>
<tr>
<td>Italian 110</td>
<td>10</td>
</tr>
</tbody>
</table>
| 110, 135 (if not used as an alternative to course 2 above), any other 100 level courses not included in the 24-unit requirement above. Philosophy 137, Psychology 132, 180G, Rheinian 105, 107, Russian 160, Spanish 131, 132, 133, 136 The student should note that a number of these courses have prerequisites. Since it is usual to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a

Total Units for the Major 64-74

Courses in Linguistics

Linguistics (Graduate Group)

Minor Program Requirements:
The minor in Linguistics is designed to provide the student with a basic knowledge of linguistic analysis. It would be appropriate for students interested in any aspect of language use.

UNITS
Linguistics 105, 110, 113 or 140 16
Linguistics courses, chosen in consultation with an advisor 8

Minor Advisers. Same as Major advisers.

Graduate Study. The Linguistics Graduate Group offers study and research leading to the M.A. degree and the Ph.D. degree. Information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.


Courses in Linguistics

Lower Division Course
Lecture—3 hours; laboratory—1 hour. Introduction to the study of language, its nature, diversity, and structure.

Upper Division Courses

102. Historical Linguistics (4) I. Berne. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 110. Description and methods of the historical study of language; sound change, morphological change, syntactic change, semantic change. Offered in odd-numbered years, alternating with course 202.

105. German Phonology-Morphology (4) II. Berne. Discussion—3 hours; written or oral report. Prerequisite: German 4; course 1 recommended. Modern German phonology and morphology of the phonological system. Elementary morphological analysis. Offered in odd-numbered years. (Same course as German 105.)

106. Russian Linguistics (4) II. Berne. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 110. Survey of the development of the Russian language and its study in its historical perspective. Offered in even-numbered years. (Same course as German 106.)

107. Special Topics in English Language (4) I, Schleiner, Hanak. Seminar—3 hours; special project. Prerequisite: one course from English 12, 2, 3, 4A, 4B. Investigation of varied subjects in contemporary and historical English language studies. May be repeated for credit when a different topic is studied. (Same course as English 107.)

109. Phonetics (4) I, Wall. Lecture—3 hours; discussion—1 hour. Thorough grounding in articulatory phonetics with some attention to the foundations of acoustic phonetics. (Same course as Anthropology 109.)

110. Elementary Linguistic Analysis (4) II. Olmsted, Shibamoto. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to phonemic theory, morphophonemics, and morphemics. (Same course as Anthropology 110.)

111. Intermediate Linguistic Analysis (4) III. Olmsted. Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. Continuation of course 110. More advanced work in phonemics, morphophonemics, morphemics, and syntactics. (Same course as Anthropology 111.)

112. Comparative Linguistics (4) I. Olmsted. Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. Linguistic prehistory, historical linguistics, and reconstruction. (Same course as Anthropology 112.)

113. Cultural Linguistics (4) I, II. Olmsted. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Investigation of real and putative (e.g., bilingual) phenomena in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English. (Same course as Anthropology 113.)

114. The Ethnography of Speaking (4) Shibamoto, Wall. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Anthropology 2; Anthropology 4 or course 1. Social and linguistic aspects of verbal behavior. Participants, situations, and functions in Communicative Speech. Focus is on English. (Same course as Anthropology 114.)

115. Chicano Sociolinguistics (4) II. Timm. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Spanish 3 or the equivalent. Study of the varieties of Chicano Spanish spoken in the Southwest. Patterns of Spanish-English bilingualism; attitudes about Spanish and English; Chicano Spanish and the schools.

120. Semantics (4) II. Gallant, Manolou-Manea. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the study of meaning: the nature of the linguistic sign, the structure of the lexicon, and the semantics of sentences. Offered in odd-numbered years.

135. Perspectives on Linguistic Research (4) II. Timm. Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: upper division or graduate standing plus familiarity with at least one other language. Focus is on the field of linguistics and its relation to allied disciplines. Techniques of linguistic analysis will be presented and applied to natural languages. Only 2 units of credit will be granted to students who have taken course 1.

138. Language Development (4) II. Wall. Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Theory and research on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage.

139. Phonological Analysis (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Introduction to and application of phonological theory.

140. Grammatical Analysis (4) I. Van Valin. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to syntactic analysis; survey of types of syntactic and semantic phenomena in natural languages. Emphasis will be on developing skills and data analysis, rather than on investigating formal aspects of the theoretical framework to be employed.

146. The Indo-European Languages (4) II. Berne. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to the study of the Indo-European language family and its major grammatical features. Focus is on Indo-European versus other European languages.

150. Contrastive Analysis of Spanish and English (4) III. Torrelam, Timm. Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Spanish 3 or the equivalent. Comparison of the linguistic structures (phonology, morphology and syntax) of Spanish and English; learning problems of both native Spanish and native English speakers will be considered.

165. Introduction to Generative Grammar (4) II. Van Valin. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 140. Introduction to the theory of generative grammar focusing on key principles of linguistic theory, linguistic universals, word and sentence structure, relations between syntax and semantics.

192. Internship in Linguistics (1-12) I, II, III. The Staff (Timm in charge). Internship—3 to 6 hours; two written reports. Prerequisite: course 1 or the equivalent. Internship applying linguistic skills in a fieldwork setting in an area such as media, law, or industry, in approved organizations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

196. Stylistics (4) II. Wall. Seminar—3 hours; term paper. Prerequisite: English 105A. Analysis of linguistic stylistics; variations in specific works to be selected from the corpus of writings in English. (Same course as English 196.)

197. Tutoring in Linguistics (1-4) I, II, III. The Staff (Timm in charge). Prerequisite: upper division standing with Linguistics major and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) II, III. The Staff (Timm in charge). Prerequisite: senior standing in Linguistics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Timm in charge). (P/NP grading only.)

Graduate Courses


Special topics including the relationship of Gothic to Indo-European and to the other Germanic languages. Offered in even-numbered years.


255. History of the German Language (4) I. Berne. Seminar—3 hours. The development of the German language with emphasis on the early periods, from Indo-European to Middle High German. (Same course as German 255.)

215. Computational Linguistics (2) II. The Staff. Lecture—2 hours. Prerequisite: consent of instructor. The use of electronic computers and other computational devices in linguistic analysis, mechanical translation, and lexicography.

220. Romance Linguistics (4) I, Manolou-Manea. Seminar—3 hours. Prerequisite: one course from the following: courses 112, 138, 140. The development of the major Romance languages from Proto-Romance to the modern era. Selected topics in the structure of modern Romance languages. Option of focus on phonology, syntax or historical linguistics.

225. Modern Linguistic Theory (4) III. Van Valin. Seminar—3 hours. Prerequisites: courses 165 and 140. Survey of leading contributions to linguistic theory from de Saussure to the present.

250A-D. Topical in Linguistic Theory and Methods (4) I. The Staff. Seminar—3 hours; paper. Prerequisite: graduate standing and consent of instructor. Introduction to current research in various aspects of linguistics.

266. Directed Group Study (1-5) I, II, III. The Staff (Chairsperson in charge). Prerequisite: graduate standing. (SU grading only.)

286. Reading (1-12) I, II, III. The Staff (Timm in charge). (SU grading only.)

Professional Course

300. The Teaching of English as a Foreign Language (4) I, Schwabe. Lecture—3 hours; laboratory—3 hours. Prerequisite: English 105A or course 109. Methods of teaching English to nonnative speakers, stressing particularly recent linguistic methodology and techniques.

Linguistics (A Graduate Group)

Lanora A. Timm, Ph.D., Chairperson of the Graduate Group (752-6701)

Group Office, 912 Sproul Hall (752-1219/6701)

Faculty.
The Group includes faculty from nine departments in the College of Letters and Science.

Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. degree with emphasis in one of the following areas: (a) theoretical linguistics, (b) sociolinguistics, (c) classical language civilization, (d) psycholinguistics, (e) linguistic description (contemporary or historical) of a particular language or group of languages, and (f) Teaching English to Speakers of Other Languages (TESOL).

In general, the M.A. in Linguistics at UCSD is intended to serve as preparation for advanced graduate work at the Ph.D. level, as a supplement to studies in related fields—especially anthropology, psycho-coggy, philosophy, the various languages, or as a major component in the training for a professional career (such as TESOL, speech therapy, and foreign language teaching). The program is structured so as to place considerable emphasis on interdisciplinary studies, thereby increasing the breadth of the candidate's knowledge, and providing a wider and more flexible variety of options to pursue thereafter.

250
Preparation. Applicants to the program who do not have a bachelor's degree in Linguistics must complete the following courses in Linguistics from the undergraduate program: 108 (phonetics), 110 (elementary linguistic analysis), 111 (intermediate linguistic analysis), 102 or 112 (historical or comparative linguistics), 139 (phonological analysis), 140 (grammatical analysis), and 165 (introduction to generative grammar).

Requirements. Thirty units of upper division and graduate coursework above and beyond the courses listed under Preparation (above) are required; 16 of these units must be graduate units chosen from the following: Linguistics 202 (principles of historical linguistics), 225 (modern linguistic theory), Anthropology 220 (field methods in linguistics) and either Linguistics 220 or 250 or Anthropology 282 (Romance linguistics, topics in linguistic theory, or anthropological linguistics).

Additional requirements include (1) a reading examination in a foreign language, and (2) a thesis.

Graduate Advisers. P. Van Valin (Linguistics, 752-7555), J. Gellert (Russian, 752-3551), or the Group Chairperson.

Literature in Translation
The following courses are open to students throughout the campus. The readings can be in English. Refer to department listing for the course description.

Classics
40. Homer and the Tradition of Ancient Epic
41. Greek Tragedy
*139B. Greek Literature in Translation
*141. Greek and Roman Comedy
*142. Greek and Roman Novel

Comparative Literature
1. Great Books of Western Civilization: From Myth to Faith
2. Great Books of Western Civilization: From Faith to Reason
3. Great Books of Western Civilization: The Modern Crisis
4. The Short Story and Novella
5. Fairy Tales, Fables and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and their Transformations
10A-N. Masterpieces of World Literature
*13. Dramatic Literature
*15. The Spiritual Quest
*20. Man and the Natural World
135. Women Writers
136A-G. Special Topics in Comparative Literature
160A. The Modern Novel
160B. The Modern Drama
161A. Tragedy
*161B. Comedy
*161C. Tragicomedy
162A. Memory and Autobiography
164A. The Middle Ages
164B. The Renaissance
164C. Baroque and Neoclassicism
164D. The Enlightenment
166A. The Epic
166B. The Novel
167. Comparative Study of Major Authors
*168A-C. Modern Literary Movements and Styles
169. The Avant-Garde

Dramatic Art
20. Introduction to Dramatic Art
156. Theatre and Drama: Aeschylus to Machiavelli
157. Theatre and Drama: Shakespeare to Schiller
158. Theatre and Drama: Ibsen to Albee
159. Contemporary Experimental Theatre and Drama

East Asian Studies
1. Modern Chinese Literature

English
171A. The Bible as Literature: The Old Testament
171B. The Bible as Literature: Prophets and New Testament

French
*25. French Literature in Translation
*150. Masterpieces of French Literature

German
48. Myth and Saga in the Germanic Cultures
50. Survey of German Culture
51. Masterworks of German Literature I
52. Masterworks of German Literature II
110. Older German Literature
111. Studies in Major Writers from the Seventeenth to the Twentieth Century
112. Special Topics in German Literature
113. Goethe's Faust
114. Hermann Hesse
115A. German Literature since 1945
115B. German Literature since 1945

Italian
*25. Italian Literature in Translation
*139A. Early Italian Literature and Dante Alighieri
139B. Boccaccio, Petrarch and the Renaissance
*139C. Modern Italian Literature

Russian
30. Great Russian Writers
41. Survey of Nineteenth-Century Russian Literature
42. Survey of Twentieth-Century Russian Literature
121. Nineteenth-Century Russian Prose
123. Twentieth-Century Russian Prose
126. The Russian Theater
140. Dostoevsky
141. Tolstoy
150. Russian Culture
154. Russian Folklore

Scandinavian
110. Masterworks of Scandinavian Literature in Translation

Spanish
34. Mexico in its Literature
35. Survey of Mexican Culture
140. Order and Chaos: Latin-American Literature in Translation
150. Masterpieces of Spanish Literature

Literature in Translation, Mathematics

Mathematics
(College of Letters and Science)
Carlos R. Borges, Ph.D., Chairperson of the Department
G. Thomas Saille, Ph.D., Vice-Chairperson of the Department
Department Office, 565 Kerr Hall (752-0827)

Faculty
Henry L. Adler, Ph.D., Professor
Hubert A. Arnold, Ph.D., Associate Professor Emeritus
George A. Baker, Ph.D., Professor Emeritus
Dallan O. Banks, Ph.D., Professor
David W. Barnett, Ph.D., Professor
*Donald C. Benson, Ph.D., Professor
Carlos R. Borges, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor
Albert C. Burdette, Ph.D., Professor Emeritus
Guilband D. Chokan, Ph.D., Professor
Doyle O. Cutler, Ph.D., Associate Professor
James R. Diederich, Ph.D., Associate Professor
Allan L. Edelson, Ph.D., Professor
Curtis M. Fulton, Ph.D., Professor Emeritus
Robert D. Glaux, Ph.D., Professor
Shirley A. Goorman, M.S., Lecturer
Alan M. Hastings, Ph.D., Associate Professor
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Frederick A. Howes, Ph.D., Professor
*Kenneth J. Joy, Ph.D., Assistant Professor
*Kurt Kreith, Ph.D., Professor
Arthur J. Kremer, Ph.D., Professor
Melven R. Krom, Ph.D., Professor
Gary J. Kurowski, Ph.D., Professor
Peter Linz, Ph.D., Professor
Marc S. Mangel, Ph.D., Associate Professor
David G. Mead, Ph.D., Professor
E. O. Milton, Ph.D., Associate Professor
Donald N. Norton, Ph.D., Associate Professor
Washek F. Pfeffer, Ph.D., Professor
Richard E. Plant, Ph.D., Associate Professor
Edward B. Rostler, Ph.D., Professor Emeritus
G. Thomas Saille, Ph.D., Professor
Evelyn M. Silvia, Ph.D., Associate Professor
*Sherman K. Stein, Lect.D. (hon.), Ph.D., Professor
Robert W. Strongal, Ph.D., Associate Professor
Takayuki Tamura, D.Sc., Professor
Edward J. Tully, Jr., Ph.D., Associate Professor
Howard J. Weiner, Ph.D., Professor

The Major Programs
Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. The latter is especially recommended for students who intend to pursue mathematics at the graduate level. Under either degree program the student may prepare for various careers by an appropriate choice of elective courses.

Developing an ability to think and communicate in mathematical terms is the basic objective of both bachelor degree programs. This ability requires familiarity with the concepts and techniques of various branches of mathematics and is necessary for graduate study in mathematics as well as the successful pursuit of mathematically oriented careers. In particular, mathematics is an essential tool for people working in the physical sciences, and mathematics is now being widely applied to studies innext, and social sciences as well. Students with career oriented programs in applied mathematics should supplement their mathematics curriculum with courses in other departments which provide background in their proposed area of application. Mathematics provides an excellent background for entry into the Schools of Administration, Law, Medicine, or Veterinary Medicine and for graduate study in many other areas. Mathema-
Mathematics

is also fine preparation for employment immediately after graduation, since the completion of a mathematics major is taken by many employers as evidence that an applicant can think and learn, two attributes highly prized in an employee. Also, as more and more fields become quantified and scientific, a thorough background in mathematics will be required of persons to make meaningful contributions and to reach the top.

Mathematics

A.B. Major Requirements:

Preparatory Subject Matter

Mathematics 11 (or high school equivalent) 0-3
Mathematics 21A, 21B, 21C, 22A, 22B, 36 21
(Mathematically recommended that course 36 be taken during freshman year; it must be taken before Mathematics 108)
Mathematics 28A or Electrical and Computer Engineering 8 3
Depth Subject Matter

Choose according to Track selected (see Track 1: Physics A

Track 2: Statistics 13 or 102 3

Depth Subject Matter 36-45

Mathematics 101 or 108 should be taken prior to junior year. 115A 8
Choose one track from the following two: 3-8

Track 1: Secondary Teaching

Mathematics 141 141
Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 121A-121B or 127A-127B
(b) Mathematics 139A-139B or 151A-151B
(c) Mathematics 139A-139B or 151A-151B-151C
Additional upper division mathematics to total minimum of 45 upper division units (2-6)
Recommended: Mathematics 129A, 129B, 141, 143 5

Track 2: General Mathematics

Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 121A-121B or 127A-127B
(b) Mathematics 139A-139B or 151A-151B
(c) Statistics 130A-130B or Mathematics 131 or 131A-131B
Additional upper division mathematics to total minimum of 45 upper division units (11-15)
Recommended: Mathematics 129A, 129B, 140, 143, 168 5

Track 4: General Mathematics

Mathematics 115A, 141
Choose one course sequence from each of (a), (b), and (c)

(a) Mathematics 115A-115B or 139A-139B or 139A-139B-151A-151B
(b) Mathematics 115A-115B or 139A-139B or 139A-139B-151A-151B
(c) Mathematics 140 or 143
Additional upper division mathematics to total minimum of 45 upper division units (19-24)
Recommended: Mathematics 126, 185A, 185B, additional units in computer science

Total Units for the Major 54-76

Mathematics

B.S. Major Requirements:

Preparatory Subject Matter

Mathematics 11 (or high school equivalent) 0-3
Mathematics 28A or Electrical and Computer Engineering 8 3
Depth Subject Matter

Choose according to Track selected

Track 1: Mathematics 22C, Physics 8A, 8B, 8C 7-15
Track 2: Mathematics 22C, Physics 8A, 8B, 8C 7-15
Track 3: Mathematics 36, Physics 8A 9
Track 4: Mathematics 36, Statistics 13 or 102 9
Note: Strongly recommended that course 36 be taken during the freshman year; it must be taken before Mathematics 198.

Total Units for the Major 77

Recommended Language Preparation

Baccalaureate of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Depth Subject Matter Requirements

Certain mathematics-oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 45 units (or those with prior department approval). In general, 190C, 192, 197C, 197T, and 199 courses are not appropriate for application towards this requirement, and any exceptions must be approved by the Department's Undergraduate Curriculum Committee.

Statement of Objectives

As early as possible, but no later than the last quarter of the sophomore year, each prospective mathematics major should choose, in consultation with an adviser, one of the tracks as suggested by the adviser, prepare a statement of his or her mathematics objectives, and have a proposed program satisfying the requirements of the chosen track. The form to be used for this statement is available from the Department, and must be submitted in time to receive final approval prior to the last day of instruction of the first quarter of the junior year. Prospective mathematics majors transferring to the University at the upper division level should consult an adviser immediately upon arrival.

Major Advisers


Special Area Advisers


Information for Undergraduates

Students interested in the study of mathematics should obtain the Undergraduate Brochure, which is available at the Department Office. Assistance in planning an undergraduate major program in mathematics should be obtained from a major adviser. In addition, students seeking information pertaining to the application of mathematics to the biological or social sciences or computer science may contact the appropriate special area adviser.

Students desiring preparation towards an A.B. degree for secondary teaching or general mathematics, or a B.S. degree for graduate study, biological sciences, physical sciences, secondary teaching, or general mathematics should consult an undergraduate adviser.

Prerequisite Credit

No student may repeat a course, if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

Minor Program Requirements:

Mathematics

B.S. Major Requirements:

Preparatory Subject Matter

Minimum of two additional units selected from Mathematics 140, 170, 171, 173, 174, 175, 176 9
Additional six units of mathematics or computer science approved by the adviser 9
Total Units for the Major 77

B.S. Major Requirements:

Mathematics

Preparatory Subject Matter

Minimum of two additional units selected from Mathematics 140, 170, 171, 173, 174, 175, 176 9
Additional six units of mathematics or computer science approved by the adviser 9
Total Units for the Major 77

Teaching Credential Subject Representative: G. T. Salley. See page 99 for the Teacher Education Program.

Graduate Study

The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

Graduate Advisers

Courses in Mathematics

Lower Division Courses

B. Elementary Algebra (no credit). I, The Staff
Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (PINP grading only.) (There is a fee of $45.)

C. Trigonometry (no credit) I, II. The Staff
Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (PINP grading only.) (There is a fee of $30.)

D. Intermediate Algebra (no credit) I, II. The Staff
Lecture—4 hours. Basic concepts of algebra, designed to prepare the student for college work in mathematics, such as course 16A, or 21A. Fundamental theorems, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (PINP grading only.) (There is a fee of $15.)

10. Mathematics and Civilization (4) I, Klineh
Lecture—3 hours. Discussion—1 hour. Prerequisite: high school algebra and geometry. Historical account of role of mathematics in western civilization. Discussion of contemporary attempts to extend realm of mathematics beyond its established role as language of physical sciences and into human affairs. Course will include problem solving in areas of human concern.

11. Analytic Geometry (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry, and obtaining required score on Mathematics Diagnostic Examination. Analytic geometry in two dimensions; elementary functions. (Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses.)

15A. Short Calculus (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Mathematics Diagnostic Examination. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open to students who have received credit for course 21A.

16B. Short Calculus (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 16A or 21A. Integration; calculus for business and economic sciences; functions; applications. Not open to students who have received credit for course 21B.

18C. Short Calculus (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open to students who have received credit for course 21C.

Lecture—2 hours; laboratory—1 hour. Prerequisite: two years of high school algebra; introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Course not intended for students in physical sciences and mathematics. Students having had course 29A or Engineering 5 may not receive credit for this course.

21A. Calculus (4) I, II, III. The Staff
Lecture-discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry (preparation for calculus course 11) (may be taken concurrently); and obtaining required score on Mathematics Diagnostic Examination. Functions, limits, continuity. Slope and derivative; interpretation of derivative; related rates; optimization; top-down program design; structured programming; testing and documentation; writing efficient programs. Not open to students who have received credit for Computer Engineering 8.

21B. Calculus (4) I, II, III. The Staff
Lecture-discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of infinite integral; fundamental theorem of calculus; techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B.

21B. Honors Calculus (4) I, II. The Staff
Lecture—4 hours. More intensive treatment of material covered in course 21A. Continuation of course 21AH can continue with course 21B or the regular 21B.

21C. Calculus (4) I, II, III. The Staff
Lecture-discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of infinite integral; fundamental theorem of calculus; techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B.

21B. Honors Calculus (4) I, II. The Staff
Lecture—4 hours. More intensive treatment of material covered in course 21A. Continuation of course 21AH can continue with course 21B or the regular 21B.

21C. Calculus (4) I, II, III. The Staff
Lecture-discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of infinite integral; fundamental theorem of calculus; techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B.

21B. Honors Calculus (4) I, II. The Staff
Lecture—4 hours. More intensive treatment of material covered in course 21A. Continuation of course 21AH can continue with course 21B or the regular 21B.

21C. Calculus (4) I, II, III. The Staff
Lecture-discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of infinite integral; fundamental theorem of calculus; techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B.

21B. Honors Calculus (4) I, II. The Staff
Lecture—4 hours. More intensive treatment of material covered in course 21A. Continuation of course 21AH can continue with course 21B or the regular 21B.

21C. Calculus (4) I, II, III. The Staff
Lecture-discussion—4 hours. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of infinite integral; fundamental theorem of calculus; techniques of integration. Application to area, volume, arc length, average of a function, improper integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B.

108. Introduction to Abstract Algebra and Analysis (3) III. The Staff
Lecture—3 hours. Prerequisite: course 21C. Introduction to abstract mathematics, including the real number system, sets, mappings, mathematical induction, and algebraic structures.

112. Perspective Geometry (3) III. The Staff
Lecture—3 hours. Prerequisite: course 108. Analytic and synthetic methods applied to topics chosen from the following: projectivities, projective transformations, inversions, conics and conics. Offered in odd-numbered years.

114. The Theory of Convex Sets (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 21C, 22A, 106; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in even-numbered years.

115A. The Theory of Numbers (3) III. I. Alder
Lecture—3 hours. Prerequisite: course 108. Divisibility and related number-theoretic topics, selected topics from the theory of prime numbers.

115B. The Theory of Numbers (3) II. I. Alder
Lecture—3 hours. Prerequisite: course 108. Euler function, Mobius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years.

115C. The Theory of Numbers (3) III. I. Alder
Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in even-numbered years.

118. Metric Differential Geometry (3) III. The Staff
Lecture—3 hours. Prerequisite: course 29A; 22A, 22B, or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years.

118A. Partial Differential Equations: Elementary Methods of Solution (3) II. I. Oakley
Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Partial differential equations of mathematical physics, solution by separation of variables. Fourier series.

118B. Partial Differential Equations: Boundary Value Problems and Special Functions (3) III. I. Oakley
Lecture—3 hours. Prerequisite: course 118A. Classical boundary value problems, expansion by orthogonal functions, Sturm-Liouville theory, special functions.

119. Theory of Ordinary Differential Equations (3) I. Alder
Lecture—3 hours. Prerequisite: course 22A. Existence and uniqueness of solutions of ordinary differential equations, matrix solutions of linear systems; linearization of nonlinear equations, local behavior near a critical point and stability theory.

121A-121B. Advanced Calculus for the Sciences (3-3-3) I-II.
Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Multidimensional calculus, Fourier series, calculus of variations, special functions, distributions, integral transforms, estimates of numbers and inequalities. Interactions of science and engineering in science, engineering, and applied mathematical sciences.

121A. Introduction to Computer Organization (3) I. Glazman
Lecture—3 hours. Prerequisite: course 22A. I, II. Basic principles of computer organization, machine language, number representation, logic design, arithmetic processors, memory, input-output devices. Not open to students who have received credit for Electrical and Computer Engineering 171 and 176; students who have taken one of these courses may receive only 1 unit of credit for course 123.

125. Introduction to Mathematical Logic (3) I. Kern
Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in odd-numbered years.

126. Introduction to the Theory of Sets (3) II. I. Alder
Lecture—3 hours. Prerequisite: course 21C or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in odd-numbered years.

127A-127B-127C. Advanced Calculus (4-4-4) I-II-III.
Lecture—3 hours. Prerequisite: courses 21A and 21C or consent of instructor. Real number system, continuity, differentiation and integration on the real line, vector calculus and functions of several variables; theory of convergence.

128A. Numerical Analysis (4) I. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: course 26A or a knowledge of FORTRAN or ALGOL. Error analysis, approximation, interpolation, numerical differentiation and integration.
Medicine, School of

Herbert Bauer, M.D., M.P.H., Adjunct Lecturer (Community Health)
Blaine L. Beam, Ph.D., Professor (Medical Microbiology)
Charles J. Beauchamp, M.D., Associate Clinical Professor (Pediatrics)
Joseph Belber, M.D., Professor Emeritus (Internal Medicine)
William F. Bentnek, Ph.D., Professor (Biological Chemistry)
Eli Benjamini, Ph.D., Professor (Medical Microbiology)
Daniel R. Benson, M.D., Associate Professor (Orthopaedic Surgery)
Edmund M. Bernauer, Ph.D., Professor (Physical Medicine and Rehabilitation)
Leslie Bernstein, M.D., D.D.S., Professor (Otorhinolaryngology)
Klea D. Berfakis, M.D., Assistant Professor (Family Practice)
Kay H. Blacker, M.D., Professor (Psychiatry)
F. William Blaisdell, M.D., Professor (Surgery)
Hugo G. Bogren, M.D., Professor (Radiology, Internal Medicine)
Ronald T. Bogusky, Ph.D., Assistant Professor (Internal Medicine, Human Physiology)
Robert J. Belt, M.D., Professor (Internal Medicine)
William J. Bommer, M.D., Assistant Professor (Internal Medicine)
Nemat O. Borhani, M.D., Professor (Community Medicine, Health Education)
E. Menon Bradbury, Ph.D., Professor (Biological Chemistry)
Timothy Bray, M.D., Assistant Professor (Orthopaedic Surgery)
James H. Breeden, M.D., Assistant Professor in Residence (Internal Medicine)
Stanley A. Brown, M.D., Associate Professor (Orthopaedic Surgery)
Eugene Burbridge, M.D., Assistant Professor in Residence (Internal Medicine)
Peter M. Calk, Ph.D., Associate Professor (Human Physiology)
Robert A. Cannon, M.D., Assistant Professor in Residence (Pediatrics)
Robert D. Carrell, M.D., Ph.D., Professor (Pathology)
George H. Cardot III, D.V.M., Ph.D., Professor (Physical Medicine and Rehabilitation)
Richard C. Carlsen, Ph.D., Associate Professor (Human Physiology)
Marion A. Cars, M.D., Professor (Anesthesiology)
Anthony V. Carrano, Ph.D., Assistant Adjunct Professor (Pediatrics, Radiology)
James J. Castles, Jr., M.D., Professor (Internal Medicine)
Willard R. Centerwell, M.D., Professor in Residence (Radiology)
Robert S. Chang, M.D., D.Sc., Professor (Medical Microbiology, Family Practice)
Loring F. Chapman, Ph.D., Professor (Psychiatry)
Michael W. Chapman, M.D., Professor (Orthopaedic Surgery)
Satsya N. Crafterjee, M.D., Associate Professor (Surgery)
Bahram Chazalhi, M.D., Associate Professor (Neurosurgical Surgery)
Lee-Jing Chen, Ph.D., Associate Adjunct Professor (Internal Medicine, Biological Chemistry)
Anthony Cheung, Ph.D., Assistant Professor (Pediatrics)
Richard A. Choie, M.D., Ph.D., Associate Professor (Otorhinolaryngology)
Ronald Y. Chuan, Ph.D., Assistant Professor in Residence (Pharmacology)
Matthew H. Conners, M.D., Associate Professor (Pediatrics)
Guy Corkill, M.D., Professor (Neurological Surgery)
Kenneth M. Cox, M.D., Associate Professor (Medicine, Human Physiology)
Carroll E. Cross, M.D., Professor (Pediatrics, Human Physiology)

J. J. Cummiskey, M.B.B.C.R., Associate Professor in Residence (Internal Medicine)
Fitz-Roy E. Curry, Ph.D., Associate Professor (Human Physiology)
Amrstial Daje, M.D., Assistant Professor in Residence (Surgery)
Katherine Dakeley, M.D., Assistant Professor in Residence (Surgery)
Jerry L. Dakeley, Ph.D., Assistant Adjunct Professor (Biological Chemistry)
Avron Daniloff, M.D., Professor (Surgery)
Robert C. Davidson, M.D., Medical Director (Family Practice)
Harriett Davis, M.D., Professor (Anesthesiology)
Gerald L. Daniels, M.D., Professor (Radiology, Internal Medicine, Pathology)
Sally J. DeNardo, M.D., Associate Professor (Radiology)
Thomas A. Depuey, M.D., Associate Professor (Internal Medicine)
Robert L. Dobson, Ph.D., Adjunct Professor (Radiology)
Paul J. Donald, M.D., Associate Professor (Otorhinolaryngology)
Richard M. Donovan, M.D., Ph.D., Assistant Adjunct Professor (Internal Medicine)
Robert M. Dry, M.D., Clinical Professor (Psychiatry)
Pierre M. Dreyfus, M.D., Professor (Neurology)
Arthur B. Durkin, M.D., Associate Professor in Residence (Human Anatomy)
Robert Elton, M.D., Professor in Residence (Neurology)
John H. Eisele, M.D., Professor (Anesthesiology)
William G. Ellis, M.D., Associate Professor (Pathology, Neurology)
Allen C. Endres, Ph.D., Professor (Human Anatomy)
Richard K. Entinick, Ph.D., Assistant Adjunct Professor (Physical Medicine and Rehabilitation, Pharmacology)
Karen L. Erickson, Ph.D., Associate Professor (Human Anatomy)
James R. Etherton, Ph.D., Assistant Adjunct Professor (Internal Medicine, Biological Chemistry)
David Feigal, M.D., Assistant Professor in Residence (Internal Medicine)
Charles J. Fisheri, Jr., M.D., Assistant Professor (Internal Medicine)
Fay T. Fitzgerald, M.D., Associate Professor (Internal Medicine)
Mark P. Fitcher, M.D., Assistant Professor in Residence (Internal Medicine)
Neil M. Flynn, M.D., Assistant Professor in Residence (Neurosurgery)
William M. Fowler, Jr., M.D., Professor (Physical Medicine and Rehabilitation)
Charles E. Frants, Ph.D., Professor (Community Health)
Samuel W. Wright, M.D., Professor in Residence (Neurosurgery)
Charles F. Freeman, M.D., Professor in Residence (Surgery)
Robert P. Freedberg, M.D., Assistant Professor in Residence (Neurosurgery)
Dennis Fung, Associate Clinical Professor (Anesthesiology)
Andrew J. Gabrin, M.D., Ph.D., Professor (Radiology, Neurology)
Louis J. Gallia, M.D., Assistant Professor in Residence (Otorhinolaryngology)
Marie E. Garcia, R.N., Adjunct Lecturer (Family Practice)
Murray B. Gardner, M.D., Professor (Pathology)
Michael J. Garey, M.D., Assistant Professor (Psychiatry)
Michael C. Gekas, M.D., Ph.D., Assistant Professor in Residence (Internal Medicine, Biological Chemistry)
E. Eric Gerard, M.D., Professor (Internal Medicine, Human Physiology)
Jerry P. Gillespie, Ph.D., Professor (Human Physiology)
Robert E. Gillis, Jr., D.M.D., Adjunct Lecturer (Otorhinolaryngology)
Shri N. Giri, B.V. Sc., M.D., Professor (Pharmacology)
Boyd W. Goetzman, M.D., Ph.D., Associate Professor (Pediatrics)
Eli Gold, M.D., Professor (Pediatrics)
Evan M. Gold, M.D., Professor Emeritus (Internal Medicine)
Marvin Goldman, Ph.D., Professor (Radiology)
Eliot Goldstein, M.D., Professor (Internal Medicine, Human Anatomy)
Edward C. Gomez, Ph.D., Professor (Dermatology)
Byron J. Good, Ph.D., Assistant Professor in Residence (Psychiatry, Family Practice)
Mary Jo Good, M.A., Assistant Professor in Residence (Psychiatry, Family Practice)
James E. Goodnight, M.D., Associate Professor (Surgery)
Joe W. Gray, Ph.D., Assistant Adjunct Professor (Radiology)
Sarah D. Gray, Ph.D., Professor (Human Physiology)
Eugen G. Greco, M.D., Assistant Professor in Residence (Internal Medicine)
Jerry F. Green, Ph.D., Associate Professor (Obstetrics and Gynecology)
Todd M. Greil, M.D., Assistant Professor in Residence (Surgery)
Douglas S. Gross, Ph.D., Assistant Professor (Human Anatomy)
James M. Guernsey, M.D., Professor in Residence (Surgery)
Paul F. Gulyas, M.D., Professor (Internal Medicine)
Charles H. Halsted, M.D., Professor in Residence (Internal Medicine)
Claystonel C. Halsted, M.D., Associate Clinical Professor (Anesthesiology)
Anthony J. Hance, Ph.D., Associate Professor (Pharmacology)
Frederick W. Hanson, M.D., Professor (Obstetrics and Gynecology)
Paul G. Hattler, M.D., Professor Emeritus (Internal Medicine, Pathology)
Glen Haws, Ph.D., Professor (Family Practice)
Marguerite T. Helms, M.D., Professor in Residence (Radiology)
Gary L. Henderson, Ph.D., Associate Professor (Pharmacology)
Andrew G. Heptner, Ph.D., Professor (Human Anatomy)
Henry R. Herrera, M.D., Assistant Professor (Psychiatry)
John W. B. Hersey, Ph.D., Professor (Biological Chemistry)
Elizabeth Hetherington, M.D., Assistant Clinical Professor (Anesthesiology)
H. H. Hines, Ph.D., Assistant Professor in Residence (Radiology)
Paul D. Hoepfich, M.D., Professor (Internal Medicine, Pathology)
James W. Hofcroft, M.D., Professor (Surgery)
Michael J. Holland, Ph.D., Professor (Biological Chemistry)
Manfred A. Hollinger, Ph.D., Associate Professor (Physiology)
Thomas W. Hudson, M.D., Assistant Professor (Family Practice)
Glenn C. Hunter, M.D., Assistant Professor in Residence (Surgery)
Robert L. Hunter, Ph.D., Professor (Human Anatomy)
Arthur C. Huntley, M.D., Assistant Professor (Dermatology)
Edward J. Hurley, M.D., Professor (Surgery)
Roslyn R. Isseroff, M.D., Assistant Professor in Residence (Dermatology)
Andrew C. Jaccard, Ph.D., Assistant Adjunct Professor (Human Physiology)
Lucien R. Jacobs, M.B.B.S., Assistant Professor (Internal Medicine)
Gregory G. Jameson, M.D., Assistant Professor in Residence (Pediatrics)
Gloria Yu, M.D., Assistant Professor &
Residence (Pathology)
Jean A. Zehet, M.D., Lecturer Emeritus (Physical Medicine and Rehabilitation)
Vincent Ziboh, Ph.D., Professor (Dermatology)

Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also page 113.

Courses in the School of Medicine

Departmental Courses

New Grading Schedule (affecting new medical students only). Effective Fall Quarter 1979, medical material presented in the School of Medicine for the first time will be graded on the letter-grade basis. Medical students enrolled prior to Fall Quarter 1979 will continue to receive the H/U/S/U mode of grading on courses listed following. For further details on the new grading system, contact the School of Medicine.

Anesthesiology

Upper Division Course

420. Cardiac Anesthesia Conference (1, L, II, III, IV). The Staff (Estate in charge)
Discussion—1 hour. Prerequisite: internal medicine residents and faculty. Full-time clinical activity (3 days per week). Provides exposure to total anesthesia management, including application of pathologic and pharmacologic principles to preoperative, postoperative, and postoperative management of patients. Consideration of the management of all periods of anesthesia techniques, resuscitation, postoperative ventilation, resuscitation, and fluid-electrolyte therapy and pain problems. Students electing portions of the course for credit, must receive consent of instructor. Limited enrollment.

420. Anesthesiology Clinical Clerkship (2-12), L, II, III, IV. The Staff (Estate in charge)
Lecture—2 hours. Prerequisite: completion of the course for credit. must receive consent of instructor. Limited enrollment.

420. Resident Seminar (1, L, II, III, IV). The Staff (Estate in charge)
Lecture—1 hour. Prerequisite: degree in medicine or equivalent.

498. Individual or Group Study (1-6), L, II, III, IV. The Staff (Estate in charge)
Discussion—6 hours. Laboratory—2-10 hours. Prerequisite: internal medicine residents and consent of instructor. Directed reading and discussion among faculty members.
Professional Courses

468. Three-Dimensional Structure of the Human Brain (1) III. Poldora Lecture-laboratory-discussion consisting of two to three 2-hour sessions—20 hours minimum (intensive, somewhat flexible early-quarter scheduling); Goal course is the student retaining a clear, vivid, three-dimensional mental image of the major anatomical structures of the human brain. Phases: slide-illustrated lecture emphasizing function; gross dissection: build clay model of brain; identify structures on slides. (SU grading only for graduate students.)

490. Seminar (2) I, II, III. The Staff (Chapman in charge) Seminar—2 hours. Prerequisite: first, second-, and fourth-year students with consent of instructor. Group discussion and critique of current topics of importance and relevance to behavioral biology. (Same course as 290.)

496. Group Study (1-4) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: first-, second-, and fourth-year medical students, consent of instructor. Social, economic, and cultural aspects of medicine.

499. Independent Research Topics (0.5-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: first-, second-, and fourth-year medical students; consent of instructor. Individual research projects with members of departmental staff.

Biological Chemistry

Lower Division Course

92. Internship in Biological Chemistry (1-12) I, II, III. The Staff (Bradbury in charge) Work-study experience—3-36 hours; final report. Supervised work-study experience in biological chemistry and related fields. (PNP grading only.)

Upper Division Courses

192. Internship in Biological Chemistry (1-12) I, II, III, IV. The Staff (Bradbury in charge) Work-study experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work-study experience in Biological Chemistry and related fields. (PNP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Bradbury in charge) Prerequisite: consent of instructor. (PNP grading only.)

Graduate Courses

208. Biological Significance of Prostaglandin and Related Lipids (2) I. Zilch Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B or the equivalent. Quantitative estimations and biochemistry of prostaglandins, thromboxanes, prostacycins, platelet-release substances; biosynthesis from precursors fatty acids, metabolism and pathway inhibitors; nutritional effects on formation; physiological and pathophysiological functions in organs, tissues, and pathologic conditions. Offered in even-numbered years.

214. Contemporary Medical Biochemistry (1) I. The Staff (Matthews in charge) Lecture—1 hour; discussion. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance. No examination. (SU grading only.) (Same course as 414.)

216. Protein Structure (3) II. Beniaik, Dallas Lecture—3 hours. Prerequisite: Biochemistry and Biophysics 201A or consent of instructor. Course designed to acquaint students at graduate level with currently applied techniques employed in the determination of protein structure and significant results derived from them. Techniques which will be presented include amino acid sequence analysis, three-dimensional structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in odd-numbered years. (SU grading only.)

218A. Mammalian Endocrinology and Homeostasis (5) III. Walsh, Turgeon Lecture—5 hours. Prerequisite: Biochemistry 101A, 101B, Physiology 110; consent of instructor.Biochemical, physiological, and anatomical properties of endocrine system. Physiological and biochemical principles which regulate homeostasis especially in organ-organ interactions of metabolites and minerals. Reproductive endocrinology. (Same course as 418, Human Physiology 418.)

218B. Readings in Endocrinology (1) III. Walsh, Turgeon Seminar—1 hour. Prerequisite: course in molecular and cell biology or consent of instructor. Presentation by students of recent papers in endocrinology that reflect upon topics presented in course 218A. (SU grading only.)

226. Group Study (1-5) I, II, III, IV. The Staff (Bradbury in charge) Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

229. Research (1-12) I, II, III, IV. The Staff (Bradbury in charge) Prerequisite: consent of instructor. Major theories in clinical psychology, as related to research and clinical findings in pediatrics, child psychiatry, and child development.

233. Psychopathology (4) II. Reiner Seminar—4 hours. Prerequisite: grade of B or better in 218A. Major topics of clinical pathology of abnormal behavior, with emphasis on the reaction of various psychological and neurochemical status. (SU grading only.)

241. Medical Aspects of Basic Nutrition (2) III. Ricker, Halsted Lecture—20 hours total. Prerequisite: consent of instructor. Special emphasis on nutritional requirements and their relationship to health and disease. (SU grading only.)

Medical Science

246. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: medical students with consent of instructor. (SU grading only.)

249. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: medical students with consent of instructor. (SU grading only.)

Clinical Psychology

Graduate Courses

200. Theory of the Person-Adult (4) I. Abramowitz and Staff Lecture—2 hours; seminar—2 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Major theoretical perspectives will be emphasized in the study of personality. Emphasis will be placed upon the development of theoretical and conceptual structures which are most relevant to contemporary intervention techniques.

201. Observational Practicum (1-3) I, II, III. The Staff Discussion—2 hours, laboratory—2 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Students rotate through three major field placements: a child-family, an adult clinical, and a community setting. The purpose is to develop skills in observing human behavior, diagnosis and treatment, and evaluation. (SU grading only.)

202. Theories in Clinical Child Psychology (4) I. Steward Lecture—4 hours. Prerequisite: consent of instructor. Major theories in clinical psychology, as related to research and clinical findings in pediatrics, child psychiatry, and child development.

203. Psychopathology (4) II. Reiner Seminar—4 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Major theories in clinical psychology, as related to research and clinical findings in pediatrics, child psychiatry, and child development.

204. Theory and Treatment of Schizophrenia (3) I, II, III. Meadow and Staff Seminar—3 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Major theories in the etiology of schizophrenia and the chief methods of therapy.

205. Issues in Clinical Psychology (1-4) I, II, III. The Staff Lecture—14 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Detailed examination of theoretical issues, and evaluation of relevant research findings regarding community mental health. Focus on basic theoretical issues, methods and results of research in the field of mental health, with emphasis on specific issues in innovative programs.

206. Introduction to Community Psychology (4) III. The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: graduate students in Clinical Psychology or consent of instructor. Major topics included are: the social and psychological factors that influence mental health, the role of mental health services, and the impact of mental health on society.

207. Theories of Group Consultation (3) I, II, III. Seminar—3 hours. Prerequisite: course 206 (concurrently). Prerequisite: consent of instructor. A sociopsychological approach to the study of the group process, the group as an interactive system, and the role of group therapy in the treatment of psychiatric and social problems. (SU grading only.)

208. Group in Group Consultation (1-3) I, II, III. The Staff (Morrison in charge) Seminar—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. The seminar will focus on the structure and dynamics of small group interactions, and the role of group therapy in the treatment of psychiatric and social problems. (SU grading only.)

209. Developmental Theory of Jean Piaget (4) I, II, III. Steward Seminar—4 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. A practicum involving systematic observation, participation, and consultation in a variety of settings, focusing on various aspects of the development of the individual, group, and organization. Review of current concepts and their application to specific settings. (SU grading only.)

210. Design and Analysis in Clinical Research I (4) I. The Staff Lecture—4 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Basic statistical procedures, experimental design and correlational methods used in clinical research. Emphasis will be placed on methodologies having the broadest application to contemporary clinical investigation.

NOTE: For key to footnote symbols, see page 124.
211. Design and Analysis in Clinical Research II (4) II. The Staff (Abramowitz in charge) Lecture—2 hours; discussion—1 hour. Prerequisite: graduate student in Clinical Psychology; course 210 (or the equivalent) or consent of instructor. Specialized methods for research design and discussion of specific approaches. Course work will trace developmental path of women—from birth to death. Implications for psychotherapy and coping strategies will be discussed. (SU grading only.)

212. The Psychology of Women (3) III. Pernstein-Rockwell Seminar—2 meeting times or consent of instructor. Course work will trace developmental path of women—from birth to death. Implications for psychotherapy and coping strategies will be discussed. (SU grading only.)

213. Theories of Psychotherapy (1-4) I, III, III. The Staff—1 hour. Discussion—1.6 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Major theories of psychotherapy and their historical development will be the focus of study. Lectures and seminar discussions will be designed to acquaint the student with the theoretical rationale and personality change that will be studied. May be repeated for credit. (SU grading only.)

214. Psychotherapy Practicum (1-3) I, III, III. IV. The Staff Discussion—1.2 hours; clinical placements—6 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Supervision and discussion of clinical cases within the framework of specific models of psychotherapy may be repeated for credit. (SU grading only.)

215. Assessment Practicum (1-3) I, III, III. IV. The Staff—1 hour. Laboratory—2.9 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Students will select the specific tests they need training in and will get consent of the instructor offering supervision. Students will also have opportunities to develop interpersonal skills in the context of clinical observations and clinical discussions of the test results. May be repeated for credit. (SU grading only.)

216. Psychological Assessment I (3) III, III. Bell and staff Seminar—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. To help the student acquire critical knowledge of the methods and problems of psychological assessment with emphasis upon the theory of administration and interpretation of tests of intellectual and other "objective" personality measures. (SU grading only.)

217. Introduction to Projective Assessment (3) III, III. Bell and staff—1 hour. Seminar—3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. To help the student acquire critical knowledge of the methods of projective techniques with emphasis upon the theory of administration and interpretation of the Rorschach and TAT for children and adults. (SU grading only.)

218. Clinical Behavior Therapy (3) III, III, III. Hine—1 hour. Discussion—5.5 hours; case study or term paper. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Provides an overview of behavior therapy from the clinician's viewpoint, stressing the working philosophy of behavior therapy. Behavioral techniques surveyed include relaxation training, systematic desensitization, modeling, role-reversal, cognitive restructuring, self-empowerment, and self-control strategies. (SU grading only.)

220. Professional Development and Ethics (1-4) III. Rockwell—1 hour. Seminar—1.4 hours. Prerequisite: graduate student standing with consent of instructor. Course intended for future professional psychologists in order to examine areas of professional ethics, the social system and its impact on the professional, and the professionalization processes. (SU grading only.)

296. Research (1-12) I, III, III. IV. The Staff—1 hour. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (SU grading only.)

Community Health

Upper Division Courses

101. Perspectives in Community Health (3) III. Borhani and staff—1 hour. Lecture—2 hours; discussion—1 hour. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Examination of a comprehensive manner the relationships, obligations, and role and professional activities of various disciplines of health, education, and social work in the health care of the students with perspectives in medicine in society.

111. Introduction to Medical Ecology (3) I. Borhani—1 hour. Lecture—2 hours; discussion—1 hour. Prerequisite: upper division graduate student in health sciences, human ecology, or related areas. Focus on principles of medical ecology as they relate to the study of the distribution of human populations and the health and disease in human populations. The biological, physical, and social environments are examined to explain the causation, natural histories, and ecological correlates of human illness.

126. Introduction to Environmental Health (4) I. The Staff—Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or introductory course in biological science. Problems in environmentally dependent aspects of individual and public health. Diseases associated with pollution of air, water, soil, and food will be considered. Emphasis will be on preventive measures. (Same course as Environmental Studies 126.)

137. Contemporary Problems in Environmental Health (3) III. II. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: Community Health 126 or consent of instructor. Contemporary problems and issues in environmentally dependent aspects of health. Diseases and injuries from emerging agents, teratogens, pesticides, noise, radiation, consumer products, stress phenomena, and heavy metals are considered. (Same course as Environmental Studies 137.)

151. Information Systems (3) I. Walters—1 hour. Lecture—2 hours, laboratory—1 hour. Prerequisite: knowledge of programming in at least one high-level language, FORTRAN or ALGOL (preferred); upper division and graduate students only. To increase, through examples, projects and discussions, understanding of components of information systems, including hardware, software, economics and people, and to prepare the student to adapt to this understanding of the specific problems in creation, design and implementation of information systems. (SU grading only.)

160. Health Advocacy Course (1-5) I, III, IV. Coopers—1 hour. Lecture—2 hours or more. Prerequisite: upper division and graduate students only. Lecture—2 hours or more. Prerequisite: upper division and graduate students only. Discussion of contemporary issues and topics in community health. (PNP grading only.)

192. Extramural in Community Health Practice (1-5) I, IV. IV. The Staff—1 hour. Seminar—2 hours. Prerequisite: upper division standing and consent of instructor. Direct group study on selected topics related to community health. (PNP grading only.)

196. Directed Individual Study (1-5) I, IV. IV. The Staff—1 hour. Seminar—2 hours. Prerequisite: consent of instructor. Individual study under guidance of instructor. (PNP grading only.)

Community Health

Graduate Courses

101. Medical and Environmental Epidemiology (3) III, III. Borhani—Lecture—2 hours; discussion—1 hour. Prerequisite: medical, graduate or veterinary students, or consent of instructor. Lectures and laboratory exercises deal with the basic concepts of medical and environmental epidemiology. The relationship between infectious, noninfectious or environmental disease processes including the prevention and control of cancer, heart disease, and other diseases and their distribution. (SU grading only.)

202. Community and Preventive Medicine (1-9) I, III, III, IV. Borhani—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and discussions on basic principles of preventive medicine and community health.
Dermatology

460. Dermatology Clinical Clerkship (1-18) I, II, III, IV, Huntley
Inpatient-outpatient service—40 hours (clinical activity).
Prequisite: completion of three years of medical school; consent of instructor. Observation of patients in dermatology clinic at UCD Medical Center. Limited enrollment.

468. Special Topics in Clinical Dermatology (1-6) I, II, III, IV.
The Staff (Huntley in charge)
To be arranged—3-9 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients.

470. Special Topics in Cutaneous Biology (1-6) I, II, III, IV.
The Staff (Huntley in charge)
Individually arranged study of special topics in cutaneous biology selected by student and instructor.

Family Practice

Lower Division Courses
81. Preventive Health Care (2) II. Chang in charge. Rockwell, Jones (Student Health Center)
Lecture—2 hours; final examination. Students will learn pre-
ventive health habits and the importance of early detection and treatment.

92A. 92B-92C 92D-92F 92G-92H Internship in Family Practice (3-3-3-3-3-3)-I-II-III-V-VII-VIII. Scherger Clinics—four 8-hour sessions; clinic meeting/discussion—
hour; group competency—2-3 hours. Prerequisite: consent of instructor; open to lower division students. Helpful if student is bilingual in Spanish. Course provides exposure to family medicine. Prereq.

92K. Health Science Practicum (3-5) I, II, III, IV. Smith (Student Health Center)
Laboratory—12 hours. Prerequisite: consent of instructor. Introduction of lower division students to health professions and health care delivery system through experience in clin.

Upper Division Courses
110. Basic Office Skills for Primary Care Providers (1) I, White
Discussion—1 hour; laboratory—1 hour. Techniques of basic office skills, medical terminology and the Physician Assistants law in California. (P/NP grading only.)

119A-119B. Clinical Preceptorship for Mid-level Health Care Providers (FNP/PA) (variable 5-8) I-V, White
Lecture—1 hour; laboratory—16-24 hours (spread over two quarters). Prerequisite: student in Family Nursing Program/Physician Assistant Program; course 120A-120B (concurrently). Student with physician preceptor in patient care to develop clinical skills necessary to assess and manage patients with common medical problems seen in primary care. (Deferral grading only, pending completion of 119B.)

119C-119D. Clinical Preceptorship for Mid-level Practitioners (FNP/PA) (variable 5-8) I-V, White
Laboratory—16-24 hours (spread over two quarters). Prerequisites: courses 119A-119B, 120A-120B; course 120C-120D (concurrently). Concurrently with patient care under physician supervision developing skills in diagnosis and treatment of patients with medical problems commonly seen in primary care. (Deferral grading only, pending completion of 119D.)

120A-120B. Fundamentals of Medicine for Mid-level Health Care Providers (FNP/PA) (5-5) I-II. Morgan Lecture—5 hours. Prerequisite: registered student in Family Nursing Program/Physician Assistant Program. Study of anatomy, physiology, pathophysiology and clinical skills needed for assessment and management of common medical problems seen in patient care; approach to expi.

120C-120D. Fundamentals of Medicine for Mid-level Practitioners (FNP/PA) (5-5) III-IV. Morgan
Lecture—5 hours. Prerequisite: course 120A-120B Continuation of course 120A-120B. (Deferral grading only, pending completion of 120D.)

Dermatology

460. Dermatology Clinical Clerkship (1-18) I, II, III, IV, Huntley
Inpatient-outpatient service—40 hours (clinical activity).
Prequisite: completion of three years of medical school; consent of instructor. Observation of patients in dermatology clinic at UCD Medical Center. Limited enrollment.

468. Special Topics in Clinical Dermatology (1-6) I, II, III, IV.
The Staff (Huntley in charge)
To be arranged—3-9 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients.

470. Special Topics in Cutaneous Biology (1-6) I, II, III, IV.
The Staff (Huntley in charge)
Individually arranged study of special topics in cutaneous biology selected by student and instructor.

Family Practice

Lower Division Courses
81. Preventive Health Care (2) II. Chang in charge. Rockwell, Jones (Student Health Center)
Lecture—2 hours; final examination. Students will learn pre-
ventive health habits and the importance of early detection and treatment.

92A. 92B-92C 92D-92F 92G-92H Internship in Family Practice (3-3-3-3-3-3)-I-II-III-V-VII-VIII. Scherger Clinics—four 8-hour sessions; clinic meeting/discussion—
hour; group competency—2-3 hours. Prerequisite: consent of instructor; open to lower division students. Helpful if student is bilingual in Spanish. Course provides exposure to family medicine. Prereq.

92K. Health Science Practicum (3-5) I, II, III, IV. Smith (Student Health Center)
Laboratory—12 hours. Prerequisite: consent of instructor. Introduction of lower division students to health professions and health care delivery system through experience in clin.

Upper Division Courses
110. Basic Office Skills for Primary Care Providers (1) I, White
Discussion—1 hour; laboratory—1 hour. Techniques of basic office skills, medical terminology and the Physician Assistants law in California. (P/NP grading only.)

119A-119B. Clinical Preceptorship for Mid-level Health Care Providers (FNP/PA) (variable 5-8) I-V, White
Lecture—1 hour; laboratory—16-24 hours (spread over two quarters). Prerequisite: student in Family Nursing Program/Physician Assistant Program; course 120A-120B (concurrently). Student with physician preceptor in patient care to develop clinical skills necessary to assess and manage patients with common medical problems seen in primary care. (Deferral grading only, pending completion of 119B.)

119C-119D. Clinical Preceptorship for Mid-level Practitioners (FNP/PA) (variable 5-8) I-V, White
Laboratory—16-24 hours (spread over two quarters). Prerequisites: courses 119A-119B, 120A-120B; course 120C-120D (concurrently). Concurrently with patient care under physician supervision developing skills in diagnosis and treatment of patients with medical problems commonly seen in primary care. (Deferral grading only, pending completion of 119D.)

120A-120B. Fundamentals of Medicine for Mid-level Health Care Providers (FNP/PA) (5-5) I-II. Morgan Lecture—5 hours. Prerequisite: registered student in Family Nursing Program/Physician Assistant Program. Study of anatomy, physiology, pathophysiology and clinical skills needed for assessment and management of common medical problems seen in patient care; approach to expi.

120C-120D. Fundamentals of Medicine for Mid-level Practitioners (FNP/PA) (5-5) III-IV. Morgan
Lecture—5 hours. Prerequisite: course 120A-120B Continuation of course 120A-120B. (Deferral grading only, pending completion of 120D.)
Medicine, School of

400C. Introduction to Patient Evaluation (1.5) III. Morgan and staff
Lecture—1 hour, discussion—2 hours, and laboratory—22 hours (25 hours total). Prerequisite: medical students with a waiver from Student Promotion and Evaluation. Students will visit two preceptors in different sites to perform interviews and physical examinations on patients under the preceptor's supervision. Preceptor staff will study concepts of patient care and practice. Quarter III of Medical School curriculum.

401. Elective Preceptorship in Family Practice (2) II., III, IV.
Staff
Preceptorship—part-time (one 4-hour day per week; 2 weeks) or full-time (40-hour week per 1.5 units; 4 to 6 weeks per semester with consent of instructor). Preceptorship in family practice is one person as an introduction to clinical medicine.

402. Introductory Medical Spanish (1) III. Davidson
Discussion—2 hours. Prerequisite: medical students in good academic standing. Students learn vocabulary needed to conduct a basic medical history and physical examination.

407. Primary Care at Free Clinic (2) II., III, IV. Chang, Jones (Student Health Center)
Discussion—1 hour; laboratory—1 hour; practical—1 hour. Prerequisite: second-year medical students with consent of instructor. Diagnosis and treatment simple illnesses at Davis Free Clinic under supervision of instructors. Learn how to give medications by observing primary care at low-cost to patient and community.

410A-410B. 410C. Analysis of Health Care Delivery Systems (2-2.5) II., III, IV. Program Staff (Mitchell in charge)
Lecture—2 hours. Prerequisite: graduate student standing; admittance to M.H.S. degree program. (410A) Designed to provide an overview of health care delivery systems, including those responsible for delivering health care services and providing finance of services. (410B) addresses defining and meeting health service needs.

411A-411B. 411C. Family and Community Concepts (2-2.5) II., III, IV. Program Staff (Mitchell in charge)
Lecture—2 hours. Prerequisite: graduate student standing; admittance to M.H.S. degree program. (411A) designed to provide an overview of the family as a social entity and the family's role in the community. (411B) addresses impact of family and community on health and (411C) addresses alternative models for care.

412A-412B. 412C. Organizational Behavior and Organization Development in Health Care (2-2.5) II., III, IV. Program Staff (Mitchell in charge)
Lecture—2 hours. Prerequisite: graduate student standing; admittance to M.H.S. degree program. (412A) provides an introduction to the behavior of organizations in the health care delivery system. (412B) covers organizational development issues and problem solving. (412C) addresses inter-organizational conflict in health systems.

420A-420B. 420C. Advanced Clinically-Based Study (2-2) II., III, IV. Program Staff (Mitchell in charge)
Lecture—2 hours. Prerequisite: graduate student standing; admittance to M.H.S. degree program. (420A) provides an introduction to the behavior of organizations in the health care delivery system. (420B) covers organizational development issues and problem solving. (420C) addresses inter-organizational conflict in health systems.

423A-423B. 423C-423D. Current Topics in Health Care Delivery (II-III) II., III, IV. Mitchell
Literature research, community research, discussion, seminars combined—40-120 hours. Prerequisite: admittance to M.H.S. degree program. Supervised study of current topics in health care delivery through literature research, community research, and professional seminars. Prepares students for papers synthesizing and analyzing community results. Estimative course.

424A-424B. 424B. 424C-424D. 424E-424F. 424G. 424H. Primary Care at Clinica Tepal (3) 1-3-3-3-3-3-3-3 II., III, IV, III-III-IV-IV-IV-IV-IV, and 424I. Secondary Care Clinics—four 8-hour days, group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions, andコンテンツ/curriculum/teams with consent of instructor; pre-application program. Exposure to epidemic, and acute disease; team primary care ethics; and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only).

425A-425B. 425C-425D. 425E-425F. 425G-425H. 425I. Primary Care at Clinica Tepal (3) 3-3-3-3-3-3-3-3-3-3-3-3 II., III, IV, III-III, IV, IV
Clinics—four 8-hour days, group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions, and Consent/curriculum/teams with consent of instructor; pre-application program. Exposure to epidemic, and acute disease; team primary care ethics; and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only).

426A-426B. 426C-426D. 426E-426F. 426G. 426H. 426I. Primary Care at Clinica Tepal (3) 1-3-3-3-3-3-3-3 II., III, IV, III, IV, III, IV
Clinics—four 8-hour days, group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions, and Consent/curriculum/teams with consent of instructor; pre-application program. Exposure to epidemic, and acute disease; team primary care ethics; and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only).

Human Anatomy

Upper Division Courses

101. The Gross and Microscopic Structure of the Human Body (4) II. Hunter, Patterson
Lecture—4 hours. Prerequisite: Biological Sciences 1 or 10; Physiology 2-3, or Zoology 2-6, recommended. A study of the gross and microscopic structure of the human body with emphasis on function.

111. The Gross and Microscopic Structure of the Human Body (2) II. Hunter, Patterson
Laboratory—two 3-hour sessions. Prerequisite: course 101 (may be taken concurrently). Laboratory will be taught from problems, models and slides to give the students the opportunity to learn structure and function.

112. Internship in Morphology (1-2) II., III, IV, IV. Th. Staff (Enders in charge)
Work-study experience—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by personnel prior to period of work. Experience of supervised work study in research laboratories of members of the Department. (P/N grade only).

115. Directed Group Study I (1-5) II., III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/N grade only).

116. Supervised Study for Advanced Undergraduates (1-5) II., III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grade only).

Graduate Courses

200. Gross Anatomy (6) I. Kenney
Lecture—3 hours; discussion—1 hour; laboratory—10 hours. Prerequisite: graduate student status and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structural relationships through discussion and lecture and to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

201. Human Embryology (II) I. Hendrickx
Lecture—6 hours. Prerequisite: graduate student status and consent of instructor. Developmental anatomy of the human from fertilization to parturition including the origin of basic form of the embryo, development of the organ systems, and nature of normal and abnormal development.

202. Human Microscopic Anatomy (6) II. Enders
Lecture—3 hours; discussion—2 hours; laboratory—6 hours (including periodic reviews). Prerequisite: graduate student status; biochemistry, physiology (may be taken concurrently). Structure of cells and tissues will be studied from the original and at the cellular and subcellular level to that of organs relating structure to function of general and specific functions of the cells and organs in the human body.

203. Human Neuroradiology (6) III. Gross
Lecture—6 hours; laboratory—3 hours. Prerequisite: consent of instructor. Neuroanatomical anatomy of the nervous system to include its relationship to coverings, topography, and vascular support. Microscopic anatomy, pathways and internal organization of the nervous system.

204. Biology of Mamalian Gametes and Fertilization (2) II. Meisel
Lecture—1 hour; discussion—1 hour. Prerequisite: lecture courses in biochemistry, cell biology (or histology), and physiology (with some endocrinology; consent of instructor. Biochemical and ultrastructural aspects of normal mammalian gametes and fertilization. Emphasis on mechanistic essential for fertilization. Several background lectures will be followed by reading and critical analysis of relevant literature. Offered in odd-numbered years.

205. Advanced Human Neuroanatomy (3) I. Gross, V.K. Vlasov
Lecture—3 hours. Prerequisite: basic neuroanatomy course equivalent to course 203 (former course 201); consent of instructor. Detailed study of selected topics not included in course 203. Together these two courses will give students a comprehensive knowledge of neuroanatomy, stressing the anatomical basis for neural function and dysfunction. Offered in even-numbered years.

209. Comparative Biology of the Placenta (3) III. King
Lecture—1 1/2 hours; discussion—4 hours. Development and microscopic structure of the placenta and fetal membranes of major domestic and laboratory animal species and the human analyzed and related to the various functions of the placenta in supporting the fetus. Offered in odd-numbered years.

200. Seminar I, II, III. The Staff
Semina—1 hour. Prerequisite: consent of instructor. (SU grading only).
Graduate Courses

200D. Advanced General Physiology (3) I. Curry. Gaia Lecture—5 hours. Prerequisite: 200A. Lecture—3 hours; laboratory—105 hours (140 hours total). Prerequisite: consent of instructor. Physiological basis of living systems with emphasis on immunoregulatory permeability of characteristics at both the cellular and tissue level. Offered in even-numbered years.

213. Cellular Physiology of Excitable Membranes (4) I. Scooby. Lecture—2 hours; discussion—1 hour; 1 hour problem sets or written review per week. Prerequisite: advanced physics and calculus. Begins with electromechanics, this course uses elementary calculus and physics for lectures and problem sets on diffusion potentials, ionic conductance, theory of excitation in cardiovascular and neurologic systems. Offered by invited lecturers on their research interests. Offered in odd-numbered years.

231L. Renal Physiology Laboratory (3) I. Rabinowitz. Laboratory—3 hours. Prerequisite: 200D. Lecture—1 hour or equivalent; standing and consent of instructor. Experimental study of renal function in mammals including measurement of renal blood flow, filtration, glomerular filtration, tubular secretion and reabsorption, electrolyte and acid-base homeostasis, and physiopathology of the kidney in man. Offered in odd-numbered years.

231L. Renal Physiology Laboratory (3) I. Rabinowitz. Laboratory—3 hours. Prerequisite: 200D. Lecture—1 hour or equivalent; standing and consent of instructor. Experimental study of renal function in mammals including measurement of renal blood flow, filtration, glomerular filtration, tubular secretion and reabsorption, electrolyte and acid-base homeostasis, and physiopathology of the kidney in man. Offered in odd-numbered years.

260. Physiological Systems Analysis (5) I. Smith. Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 220A and 220B; 400A, 400B, 400C, or consent of instructor. Quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological control; application of these techniques to investigation of homeostasis.

261. Simulation of Physiological Systems (1-3) I, II, III, IV. Smith Laboratory—3-9 hours. Prerequisite: course 260 or equivalent; consent of instructor. Selected problems in simulation of physiological control systems. Simulations performed on current microcomputers using high level simulation languages. Problems may be selected from literature or from student's research, experimental testing of the simulation encouraged.

270. Pulmonary Function Evaluation (4) I, II, III, Cross Lecture—3 hours; laboratory—3 hours. Prerequisite: course 270 or equivalent and consent of instructor. (Same course as 460.)

275. Peripheral Circulation (3) I. Gray. Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 113, 111B, or the equivalent and consent of instructor. Course will consist of lectures and discussion sessions on the physiology of mammalian peripheral circulation including topics such as blood flow and pressure, oxygenation, and pharmacology of vascular smooth muscles, and regional circuits, microcirculatory control mechanisms, and dynamics of capillary transport. Offered in even-numbered years.

296. Group Study (1-12) I, II, III, IV. The Staff (Renkin in charge) Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12) I, II, III, IV. The Staff (Renkin in charge) Prerequisite: consent of instructor. (Same course as 296.)

400A. Hematopoetic Organ System: Hematopoietic and Lymphoid System (4) I. DeMaria. Lecture—25 hours; discussion—8 hours, laboratory—22 hours (55 hours total). Prerequisite: consent of Committee on Student Evaluation and Promotion. Foundation in hematology basic principles necessary for third- and fourth-year of medical school. Intensive effort on principles of investigation and diagnosis rather than the details of blood disease management. Principles of general oncology. (Quarter V of Medical School curriculum.)

400B. Pathophysiological Basis of Digestive Diseases: Gastrointestinal System (4,5) I. Primestone and staff Lecture—45 hours; discussion—6 hours (51 hours total). Prerequisite: consent of Committee on Student Evaluation and Promotion. Basic emphasis on pathophysiological basis of gastroenterological and hepatic disorders. Case discussions and symposia held primarily to exemplify basic principles covered by lectures. (Quarter V of Medical School curriculum.)

400C. Respiratory System: Pathophysiology of Respiratory System (4,5) I. Cross and staff Lecture—36 hours; discussion—16 hours; seminar—10 hours (82 hours total). Prerequisite: consent of Committee on Student Evaluation and Promotion. Designed to provide students with solid foundations in pathophysiological basis of the human respiratory system. (Quarter VI of Medical School curriculum.)

400D. Principles of Cardiovascular Medicine (4,5) I. DeMaria. Lecture—40 hours; discussion—9 hours, laboratory—2 hours (51 hours total). Prerequisite: consent of Committee on Student Evaluation and Promotion. Introduction to principles of diagnosis and management of cardiovascular disorders. (Quarter VI of Medical School curriculum.)

400E. Urinary System (3,5) III. Gulyassy, Lewis and staff Lecture—48 hours; discussion—12 hours; laboratory—27 hours (97 hours total). Prerequisite: consent of Committee on Student Evaluation and Promotion. Fundamental
aspects of (a) disorders of body water, electrolytes and acid-base balance; major categories and etiologic patterns of renal parenchymal diseases; (c) major congenital and acquired urologic diseases; (d) urinary tract infections. (Same course as Medicine 420.) (Quarter VIII of Medical School curriculum.)

436F. Endocrine Metabolic-Regulatory (4) III. Kumagai and staff

Laboratory—29 hours; discussion—22 hours; laboratory—6 hours (57 hours total). Prerequisite: consent of Committee on Student Evaluation and Promotion. Basic understanding of endocrine and metabolic processes in organs and tissues primarily involved in metabolic regulation and sufficient factual base so that clinical and laboratory findings, diagnosis and elementary management of patients with endocrinologic disorders can be rationalized. (Quarter VII of Medical School curriculum.)

481. Problems in Internal Medicine (6 or 8) I, II, III, IV. Hoppin
Clinical activity—full time (4 or 8 weeks). Prerequisite: satisfactory completion of third year of medical school, consent of instructor. Study of inpatients hospitalized on Medical Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, morning meeting with instructor, Monday through Friday; afternoon patient assignments. Teaches conferences and comprehensive radiology—pathology medicine seminars. Weekly allied specialty conference.

482. Extremity in Medicine (1-213) I, III, IV. Fitzgerald and staff

Extremity—full time (4, 8, or 12 weeks). Prerequisite: completion of third year of medical school, consent of instructor. Clinical activity—full time. Prerequisite: completion of third year of medical school, consent of instructor. MICU at UCD Medical Center, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every third. Limited enrollment.

484. Preceptorship in Medicine (1-168) I, II, III, IV. Kaiss
Preceptorship—full time (4, 8 or 12 weeks). Prerequisite: completion of third year of medical school, consent of instructor. Parenthood in medicine with Frederick K. Kaiss in his office and hospital practice of internal medicine in Rudolph, Idaho. Limited enrollment.

495. Internal Medicine and Subspecialties in Outpatient Clinical Care-Medical-Joint (1-168) I, II, III, IV. Ordonez and staff

Clinical activity—full time (4 or 12 weeks). Includes conferences and lectures. Prerequisite: completion of third year of Medical School. Participation with members of specialty (internal medicine) and subspecialty (cardiology, gastroenterology, endocrinology, pulmonary and immunology) resident trainees in medical evaluation, work-up, management and follow-up of patients in outpatient clinical setting. Limited enrollment.

472. Clinical Pharmacology and Toxicology (5-10) I, III. Winslow

Lecture—2 hours; seminar—3 hours; ward rounds—6 hours. Prerequisite: third and fourth-year medical students. Basic principles of pharmacology and toxicology will be related to diagnosis and treatment of drug induced problems as well as principles of therapy. (SGU grading only.)

498. Group Study in Internal Medicine (1-168) I, II, III, IV. The Staff (Silver in charge)

Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCD Medical Center or off campus by specific arrangement. (SGU grading only.)

Professional Course

480. Allergy Clinical Clerkship (3-18) I, II, III, IV. Gerthwin

Prerequisite: completion of two years of medical school and consent of instructor. Student will work with practicing allergist in daily work, including participation in weekly allergy clinic and teaching conferences. Study of the literature. Limited enrollment.

Professional Courses

401. Clinical Clerkship Cardiology-Kaiser (3-18) I, II, III, IV. The Staff (Chai in charge)

Clinical clerkship (4 weeks)—8 to 12 hours per week (15 hours total). Prerequisite: third and fourth-year medical students must obtain approval by Cardiology Division, Department of Internal Medicine, and the Dean’s Office. Emphasis placed on history taking and physical examination of patients with congestive and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. The role of ECG, PCG and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. Limited enrolment.

402. Cardiology Clinical Clerkship: Consult Service (3-18) I, II, III, IV. Cardiology

Inpatient-outpatient service (4 weeks)—full time (40 hours). Prerequisite: third and fourth-year medical students with advanced approval by Cardiology Division, Department of Internal Medicine, and the Dean’s Office. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. May be repeated for credit. Limited enrolment.

403. Management of Coronary Artery Disease: Coronary Care Unit (3-18) I, II, III, IV. Cardiology

Inpatient service—full time (4 weeks). Prerequisite: completion of second year of medical school and advance approval by Cardiology Division, Department of Internal Medicine, and the Dean’s Office. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. Includes acute coronary care, hemodynamic monitoring, stress testing, cardiac catheterization, pathologic correlation, approach to therapy, both medical and surgical, based on pathophysiological mechanisms. May be repeated for credit. Limited enrollment.

426. Cardiology Clinical Clerkship: Martinez VA Hospital (3-18) I, II, III, IV. Lecture—1 hour; conference—1 hour; clinical conference—20 hours. Prerequisite: fourth-year medical students with consent of instructor. Clinical studies in cardiology under supervision of a medical resident and attending physician. Active participation in seminars and conferences. Limited enrollment.

488. Special Group Study: EKG Unit (1-121) I, II, III, IV. The Staff (Chairperson in charge)

Special study—2 week sessions. Prerequisite: medical student with advance approval by monthly attending faculty. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion panel for credit. (SGU grading only.)

499. Research (1-121) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (SGU grading only.)

Internal Medicine—Emergency Medicine

Professional Courses

404. Emergency Medicine Clerkship (6 or 12) I, II, III, IV. Fisher

Clinical clerkship—full time (4 or 8 weeks). Prerequisite: completion of third-year basic medical and surgery clerkships. Clerkship provides clinical experience. Under supervision of the faculty, students see and evaluate patients. Students will be exposed to wide range of emergency room (ER) problems with goals of understanding the pathophysiology, diagnosis and management of important problem entities. (SGU grading only.)

410. Acute Care Clerkship (6-8) I, II, III

Lecture-discussion—clinical clerkship—30 hours (4 to 8 week clinical rotation). Prerequisite: third and fourth-year medical students. Limited to 40 or the equivalent third-year clerkship. At Acute Care Center, UCD Medical Center, students will perform initial evaluation of adults presenting with a wide variety of acute and critical illnesses. Emphasis will be on clinical medicine and treatment. (SGU grading only.)

455. Acting Internship in Emergency Medicine (6-12) I, II, III, IV. Fisher

Clinical clerkship—full time (4 to 6 weeks). Prerequisite: satisfactory completion of course 460. Internship provides clinical experience in emergency medicine. Students are assigned to the regular Emergency Department intern schedule and under the supervision of the faculty, evaluate and treat emergency room (ER) patients with responsibilities similar to an intern.

496. Research (6-12) I, II, III, IV. Fisher

Laboratory—40 hours; research—full time (4 to 12 weeks). Prerequisite: consent of instructor. Elective topic where topics may be selected in either basic or clinical research areas of Emergency Medicine. The goals are to further patient care practices in patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.

Internal Medicine—Endocrinology

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff (Kumagai in charge)

Prerequisite: consent of instructor. Endocrinology research. (SGU grading only.)

Professional Courses

400. Endocrinology Clinical Clerkship (5-18) I, II, III, IV. Kumagai and staff

Inpatient-outpatient clinical activity—full time (3 days per week). Prerequisite: completion of years 3 and 4 and consent of instructor. Participation with members of subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.

456. Endocrinology Clinical Clerkship (5-18) I, II, III, IV. The Staff (Kumagai in charge)

Prerequisite: consent of instructor. (SGU grading only.)

Internal Medicine—Gastroenterology

Professional Courses

480. Clinical Clerkship (3-18) I, II, III, IV. Inpatient-outpatient clinical activity—40 hours. Prerequisite: completion of years 3 and 4 and consent of instructor. Participation with members of subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with gastroenterologic disorders. May be repeated for credit.

482. Gastroenterology Clinical Clerkship (3-18) I, II, III, IV. Inpatient-outpatient clinical activity—40 hours. Prerequisite: completion of years 3 and 4 and consent of instructor. Participation with members of subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with gastroenterologic disorders. May be repeated for credit.

499. Research (1-12) I, II, III, IV. Pismten, Halsted, Trudeau, Jacobs

Prerequisite: medical student status; consent of instructor. Part-time participation in active clinical and basic research projects. Eimm will involve both patients and relevant laboratory procedures. Experience in research and clinical training under careful supervision. (SGU grading only.)

Internal Medicine—General Medicine

Professional Courses

480. General Medicine Consult (1-18) I, II, III, IV. The Staff (Division Chief in charge)

Inpatient-outpatient clinical activity—40 hours. Prerequisite: fourth-year medical students with consent of instructor. General medicine clerkship. Supervised opportunity to see entire spectrum of medical problems encountered by a general intern. Student spends time in General Medicine Service and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. Limited enrollment.
Internal Medicine—Hematology—Oncology

Upper Division Course

189. Research in Hematology—Oncology (1-5) II, III, IV. McKenzie and staff. Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

Graduate Courses

298. Topics in Hematology (1-4) II, III, IV. The Staff (Lewis in charge). Prerequisite: one year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematologic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students.

299. Research (1-12) II, III, IV. The Staff (Lewis in charge). Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

460. Hematology—Oncology Clinical Clerkship (6-18) II, III, IV. J.P. Lewis and staff. Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment.

462. Hematology—Oncology Clinical Clerkship (6-18) II, III, IV. Larkin and staff. Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Intensive clinical experience in hematology-oncology at Martinez VA Hospital, with emphasis on evaluating new patients, reading bone marrows, and administering chemotherapy. Weekly tutorial sessions with faculty and presentation of a comprehensive review of one topic. May be repeated for credit. Limited enrollment.

490. Practicum in Care for the Terminally Ill (6) II, III, IV. Watson-Williams. Discussion—10 hours; seminar—2 hours; hospice clinical activity—full time (4 weeks duration). Written report. Prerequisite: fourth-year medical student and an interview with program director. UCD Medical Center Sacramento Continuing Care Program provides supportive services to patients with terminal illness. This elective provides an opportunity to work in inpatient and outpatient services. The work is supervised by members of the medical staff under the direction of the attending physician.

498. Research (1-12) II, III, IV. The Staff (Lewis in charge). Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Nephrology

Professional Courses

460. Nephropathy and Fluid Balance (6-12) II, III, IV. Guayasay and staff. Clinical activity—full time. Prerequisite: completion of third-year of medical school; consent of instructor. Active participation in all clinical activities and conferences at UCD Medical Center and attendance at specific lectures covering the field of nephrology and fluid balance. Limited enrollment.

496. Research in Nephrology (6-18) II, III, IV. Guayasay. Research—to be arranged; term paper. Prerequisite: consent of instructor. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or urologic disorders in humans or animals. (SU grading only.)

Internal Medicine—Nutrition

Professional Courses

461. Nutrition Clinical Clerkship (4 or 6) II, III, IV. Hasselt and staff. Clinical activity—full time (4 or 6 weeks). Prerequisite: medical student with consent of instructor. In-depth experience in assessment and monitoring of nutritional support of adult patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of patients receiving the Nutrition Clinic with problems in undernutrition due to anorexia, gastrointestinal disease, ovariectomy (obesity), or hyperlipidemia. Weekly seminars requiring literature review.

499. Research in Nutrition (9-10) II, III, IV. Hasselt and staff. Prerequisite: medical student in good standing; consent of instructor. Participation in non-clinical or basic nutrition research. Student may devise own project depending upon time commitment.

Internal Medicine—Pulmonary Medicine

Professional Courses

460. Pulmonary Clinical Clerkship (3-18) I, II, III, IV. Litlington and staff. Clinical activity—full time. Prerequisite: Medical Sciences 431. Participation and rounds with Pulmonary Fellow(s) and consultation with staff at UCD Medical Center. Pulmonary function test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conference. May be taken at another medical center by arrangement with instructor. Limited enrollment.

462. Pulmonary Clinical Clerkship (3-18) II, III, IV. Krumpe and staff. Clinical activity—full time. Prerequisite: completion of second year of medical school and/or consent of instructor. Participation at the Martinez VA Hospital with members of the subspecialty service in initial clinical evaluation work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, Respiratory Care Unit, and pulmonary diagnostic processes. Limited enrollment.

464. Outpatient Program in Pulmonary Medicine (3 or 6) II, III, IV. Litlington and staff. Clinical activity—two 5-hour morning sessions. Prerequisite: completion of first year of medical school; consent of instructor. Attendance one morning at TB Clinic and one morning at Pulmonary Medicine Clinic at UCD Medical Center. Students will be responsible for intra- and interdepartmental patient care and their attendance at the outpatient medical clinic.

466. Clinical Introduction to Respiratory Disease (3) II, III, IV. Krumpe and staff. Clinical activity—3 hours. Prerequisite: first quarter of Medical School. Emphasis on skills of physical diagnosis and use of other diagnostic methods in respiratory disease at UCD Medical Center.

469. Research (1-12) II, III, IV. The Staff (Cross in charge). Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Rheumatology—Allergy

Lower Division Course

190. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin. Laboratory—1 hour. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the immune system in oncopotosis. (P/NP grading only.)

Upper Division Course

191. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin. Laboratory—1 hour. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the immune system in oncopotosis. (P/NP grading only.)

Graduate Courses

281. Clinical Immunology and Immunopathology (4) III, Gershwin, Robbins. Lecture—4 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 230, or consent of instructor. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infections, genetics, transplantation, allergy and autoimmunity. Offered in even-numbered years.

289. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV. Gershwin. Laboratory—1 hour. Prerequisite: consent of instructor. Library and/or lab work as required. (SU grading only for graduate students.)

299. Research in Autoimmune Disease (1-12) I, II, III, IV. Gershwin. Laboratory—1-12 hours. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of disease (including congenital thymic atrophy of rhesus, asplenic, and New Zealand mice) and the cellular immune responses of patients with systemic lupus erythematosus, Sjogren's syndrome, polymyositis and drug hypersensitivity. (SU grading only for graduate students.)
Medical Microbiology

Lows Division Course

81. Preventive Health Care (2) Lay. Charge in charge, Rock- well; Jones (Student Health Center). Lecture—2 hours; final examination. Students will learn preventive health care information that will enable them to become a healthly. Emphasis will be placed on sexually transmitted diseases, mental health and drug abuse. (PMP grading only.) (Same course as Family Practice 81.)

Upper Division Courses

107. Chemical and Cellular Immunology (4) Lay. Benjamin, Sclabinski. Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B or consent of instructor. Students will learn the chemical and cellular basis of immunity, immunologic reactions of antigens, antibodies, and cellular and antigen-antibody interaction; cellular basis of immunity; immunodeficiency and cellular aspects of hypersensitivity and related immunological phenomena. (Same course as course 407.)

115. Ecological Pathology (2) Lay. Thesis. Lecture—2 hours. Course will be devoted to the study of disease in the environment. Students will learn the role of environmental factors that affect the development and spread of parasitic agents.

120. Medical Mycology (2) Lay. Pappagianis. Lecture—2 hours. Course prerequisite: Medical Microbiology 120. Lecture—2 hours. Course prerequisite: Medical Microbiology 120. Students will learn the role of environmental factors that affect the development and spread of parasitic agents.

192. Internship in Medical Microbiology (1-12) Lay. I, II, III, IV. The Staff (Pappagianis in charge). Work experience—3-36 hours; final report. Prerequisite: upper division standing; permission of instructor. Directed reading and research in medical microbiology and related fields. (PMP grading only.)

199. Research in Medical Microbiology (1-5) Lay. I, II, III, IV. The Staff (Pappagianis in charge). Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. (PMP grading only.)

Graduate Courses

208. Frontiers in Immunology (2) Lay. I, II, III, Benjamin, Sclabinski. Lecture—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (SU grading only.) (Same course as 408.)

215. Medical Parasitology (2) Lay. Lecture—3 hours; laboratory—2 hours. Prerequisite: graduate standing and consent of instructor. Epidemiological and laboratory studies of protozoa, helminths, and arthropods of medical importance.

Current Concepts in Bacterial Ultrastructure (2) Lay. Benjamin. Discussion—2 hours; student presentations or term paper. Prerequisite: consent of instructor. Laboratory studies of Baltimore and Yersinia, helminths and arthropods of medical importance.

206. Current Concepts in Parasitology (2) Lay. Discussion—2 hours; student presentations or term paper. Prerequisite: consent of instructor. Laboratory studies of protozoa, helminths, and arthropods of medical importance.

206. Current Concepts in Parasitology (2) Lay. Discussion—2 hours; student presentations or term paper. Prerequisite: consent of instructor. Laboratory studies of protozoa, helminths, and arthropods of medical importance.

206. Current Concepts in Parasitology (2) Lay. Discussion—2 hours; student presentations or term paper. Prerequisite: consent of instructor. Laboratory studies of protozoa, helminths, and arthropods of medical importance.

206. Current Concepts in Parasitology (2) Lay. Discussion—2 hours; student presentations or term paper. Prerequisite: consent of instructor. Laboratory studies of protozoa, helminths, and arthropods of medical importance.

206. Current Concepts in Parasitology (2) Lay. Discussion—2 hours; student presentations or term paper. Prerequisite: consent of instructor. Laboratory studies of protozoa, helminths, and arthropods of medical importance.
420E. Organ Systems Medicine: Respiratory System (6)
Lecture—10 hours, discussion—5 hours, and laboratory—5 hours (4 weeks). Prerequisite: consent of instructor. Abnormal structure and function of the respiratory system in man are approached by study of appropriate clinical problems. Theoretical approaches are rationalized on basis of understanding of impaired function. May be repeated for credit with consent of Promotion Board.

420F. Organ Systems Medicine: Neurosensory (7)
Lecture—10 hours, discussion—6 hours, and laboratory—5 hours (5 weeks). Prerequisite: medical students with consent of instructor. Abnormal structure and function of the nervous system are approached by study of appropriate clinical and psychiatric problems including those relating to pain and sexual behavior. May be repeated for credit with consent of Promotion Board.

420G. Organ Systems Medicine: Integumentary System (3)
Lecture—12 hours, discussion—5 hours, and laboratory—5 hours (2 weeks). Prerequisite: medical students with consent of instructor. Abnormal structure and function of the integumentary system in man is approached by study of appropriate clinical problems. Therapeutic approaches are rationalized on basis of understanding of impaired function. May be repeated for credit with consent of Promotion Board.

420H. Organ Systems Medicine: Urinary System (6)
Lecture—10 hours, discussion—5 hours, and laboratory—5 hours (4 weeks). Prerequisite: medical students with consent of instructor. Abnormal structure and function of the urinary system in man are approached by study of appropriate clinical problems. Theoretical approaches are rationalized on basis of understanding of impaired function. May be repeated for credit with consent of Promotion Board.

420I. Organ Systems Medicine: Gastrointestinal System (6)
Lecture—10 hours, discussion—5 hours, and laboratory—5 hours (4 weeks). Prerequisite: medical students with consent of instructor. Abnormal structure and function of the gastrointestinal system in man are approached by study of appropriate clinical problems. Therapeutic approaches are rationalized on basis of understanding of impaired function. May be repeated for credit with consent of Provision Board.

421J. Organ Systems Medicine: Reproductive System (4)
Lecture—8 hours, discussion—4 hours, and laboratory—4 hours (3 weeks). Prerequisite: medical students with consent of instructor. Abnormal structure and function of the human reproduction system in man are approached by study of appropriate clinical problems. Therapeutic and diagnostic approaches are rationalized. May be repeated for credit with consent of Provision Board.

421A. Patient Evaluation (3)
Lecture—1 hour, discussion—1 hour. Prerequisite: medical student. Lecture series on physical diagnosis. Each student participates in one complete autopsy. May be repeated for credit with consent of Provision Board. (Deferrable grading only, pending completion of four-quarter course 421 sequence.)

421B. Patient Evaluation (3)
Lecture—1 hour, discussion—1 hour. Prerequisite: medical student. Lecture series on physical diagnosis. Each student participates in one complete autopsy. May be repeated for credit with consent of Provision Board. (Deferrable grading only, pending completion of four-quarter course 421 sequence.)

421C. Patient Evaluation (3)
Lecture—1 hour, discussion—1 hour. Prerequisite: medical student. Weekly meetings with a preceptor by group of two students. Students submit for appraisal complete histories and physical examinations. Each student participates in one complete autopsy. May be repeated for credit with consent of Provision Board. (Deferrable grading only, pending completion of four-quarter course 421 sequence.)

421D. Patient Evaluation (3)
Lecture—1 hour, discussion—1 hour. Prerequisite: medical student. Weekly meetings with a preceptor by group of two students. Students submit for appraisal complete histories and physical examinations. Each student participates in one complete autopsy. May be repeated for credit with consent of Provision Board. (Deferrable grading only, pending completion of four-quarter course 421 sequence.)

422. Pathology (6)
Lecture—10 hours, discussion—1 hour, laboratory—3 hours. Prerequisite: medical student. Provides fundamental preparation in general pathology, immunology and medical microbiology pertinent to health and disease in humans.

430. Principles of Pharmacology (4)
Lecture—3 hours, discussion—1 hour. Prerequisite: medical student. Concepts of pharmacology, including drug classification, pharmacologic principles and major classifications and pharmacology of drugs used in human therapy. To introduce concepts of human tissue structure and function. May be repeated for credit with consent of Promotion Board.

430. Required Surgical Clerkship (18) I, II, III. IV. Course Committee Chairperson
Clinical experience—full time (12 weeks). Prerequisite: medical students with approval of Student Evaluation and Promotion. Each student takes required (4 weeks) general surgery. Remaining time allotted between three and six weeks in two of the following disciplines: neurosurgery, orthopedic surgery, urologic surgery, ENT and eye surgery, anesthesiology, and general surgery.

431. Required Medical Clerkship (18) I, II, III, IV. Course Committee Chairperson
Clinical experience—full time (12 weeks). Prerequisite: medical students with approval of Student Evaluation and Promotion. Two 6-week periods, one each at UCSD Medical Center and at Martinie VA Hospital. Direct patient care under the direction of full-time volunteer faculty members. Nights and weekend on-call. Completion of 24 full write-ups on patients for whom student will take special responsibility.

432A. Required Obstetrics-Gynecology Clerkship (12) I, II, III, IV. Course Committee Chairperson
Clinical experience—full time (8 weeks). Prerequisite: medical students with approval of Student Evaluation and Promotion. Obstetric/gynecologic/obstetric experience in delivery room, nursery wards, operating room, patient care, nursing, family planning clinic, family practice, one week each of childbearing age. Seminar and conferences throughout period.

432B. Pediatric Clerkship (12) I, II, III, IV. Course Committee Chairperson
Clinical experience—full time (8 weeks). Prerequisite: medical students with approval of Student Evaluation and Promotion. Two 4-week periods, one in inpatient rotation (UCSD Medical Center or Travis AF). One in ambulatory experience (UCSD Medical Center). Assumptions of appropriate patient care responsibilities; participation in conferences/rounds and seminars during ambulatory rotation.

432C. Clinical Clerkship in Psychiatry (12) I, II, III, IV. Course Committee Chairperson
Clinical experience—full time (8 hours). Prerequisite: medical students with approval of Student Evaluation and Promotion. Students assigned to various mental health clinical settings following intensive orientation program. Focus on treatment of psychiatric problems encountered by physician in practice. Diagnostic, therapeutic, and interpersonal skills emphasized.

450. Introduction to UC Davis Medical Center (3) I. III. Rocklin Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (Grading only.)

488. Remedial Studies (6) V. O’Grady Prerequisite: medical student. Intended for students who failed the Spring National Board Examination. Independent study and remediation. (Grading only.)

490. Introduction to UC Davis Medical Center (1) I. III. Rocklin Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (Grading only.)

Neurology

Lower Division Course

189. Individual Special Study and Research (1-5) I, II, III, IV. The Staff (Scocoby chairs)
Prerequisite: consent of instructor. Individual special study in neurophysiology and biomedical engineering is offered to qualified students. Studies of single- and multi-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.)

Graduate Courses

290. Seminar in Selected Topics (1) I, II, III, IV. Scocoby Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (S/U grading only.)

296. Group Study (1-5) I, II, III, IV. The Staff (Drayfus in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (S/U grading only.)

299. Individual Special Study and Research (1-12) I, II, III, IV. Scocoby Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.)

Professional Courses

420. Neuromuscular Pathology (4.5) III. Gabor and staff
Lecture—40 hours; discussion—11 hours; laboratory—3 hours (53 hours total). Prerequisite: medical students with approval of Student Evaluation and Promotion. Course will focus on neuromuscular pathology. Lectures and case discussions of pathophysiology underlying neurological disorders including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebro-spinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neuropathy and trauma will be discussed. (Quarter VI of Medical School Curriculum.)

430. Clinical Neurology Clerkship (6) I, II, III, IV. Gabor and staff

431. Clinical Neurology Clerkship (6) I, II, III, IV. Remier and staff

432. Advanced Clinical Neurology (8) I, II, III, IV. Gabor and staff
Clinical activity—full time (4 weeks). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

433. Advanced Clinical Neurology (8) I, II, III, IV. Remier and staff
Clinical activity—full time (4 weeks at Martinie VA Hospital). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

440. Electroencephalography and Evoked Potentials (18) I, II, III, IV. Gabor, Searl Clincial activity—full time (12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electroencephalographic diagnosis including the use of the electroencephalogram and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

450. Child Neurology (6) I, II, III, IV. Dreyfus Clinical activity—full time (4 weeks). Prerequisite: four-week Neurology clerkship and/or consent of instructor. Student exposed to children with disorders of the nervous system, both inpatient and outpatient settings. Cases presented to a member of full-time faculty who will discuss clinical findings, differential diagnosis, management and therapy. Student encouraged to read pertinent literature.

453. Cortical Neurology (18) I, II, III, IV. Remier, Friedland, Knight Clinical neurological research—full time (12 weeks at Martinie VA Hospital). Prerequisite: course 451 or the equivalent; consent of instructor. Student will pursue small project in clinical neurologic research on higher cortical functions. Focus on scientific analysis of behavior in disease states.

467. Special Topics in Neurology (18) I, II, III, IV. The Staff Clinical activity—full time (12 weeks). Prerequisite: fourth-year medical student having completed four-week Neurology clerkship and/or consent of instructor. Students study areas of special interest in tutorial manner under supervision of member of faculty with expertise and interest in elected field. Students may elect tutorial clinical experience with member of staff.

468. Cognitive and Communication Disorders: Introduction to Cognitive and Communication Disorders (3) I, Wertz Lecture—3 hours; observation—1 hour. Prerequisite: consent of instructor. Introduction to cognitive and communication disorders. Includes a survey of dis-
orders subsequent to brain damage; management by neurology, nephrology, and speech pathology; and current research on appraisal, diagnosis, and treatment. Offered n the Martinez VA Medical Center. (SU grading only)

Conference, observation and data collection—3 hours. Prerequisite: consent of instructor. Independent study of neuropsychiatric communication disorders—aphasia, dementia, apraxia of speech, and apraxia. Designed for individual interest and includes discussion, directed reading, research design, data collection, and preparation of reports. Offered in the Martinez VA Medical Center. (SU grading only)

460. Clinical Neurology (3-18) I, II, III, IV, V. The Staff (Gabor in charge)
Clinical activity—full time (minimum of one-half quarter). Prerequisite: third-year medical student. Clinical activity—full time for third-year medical student with completion of a medical clerkship; consent of Chairperson. Clerkship in neurology to be arranged at another institution with accredited residency programs in neurology under proper supervision.

461. Special Clinical Elective in Neurology (9) I, II, V, III, IV, Dreyfus, Gabor, Sayal
Clinical activity—full time (4 to 12 weeks). Prerequisite: fourth-year medical students and third-year medical students with clerkship in medicine and pediatrics (from outside institutions). Student will function as attending on service. Emphasis on mastering neurologic examination and on introduction to neurologic evaluation, diagnosis, and therapy.

470. Elective in Pediatric Neurology (3)
Clinical activity—full time. Prerequisite: third- or fourth-year medical student. Inpatient and outpatient experience in diagnostic and management of neurological disorders in children. This elective may be combined with course 455, 498 or other electives which do not conflict with the scheduled activities. Limited enrollment. (Same course as Pediatrics 470.)

471. Research (1-12) II, III, IV, V. The Staff (Gabor in charge) Laboratory—2 to 4 hours. Prerequisite: consent of instructor; laboratory; investigation on selected topics. (SU grading only for graduate students.)

Neurosurgery
Graduate Courses

286. Diseases of the Nervous System (3) I, II, III, IV. The Staff (Wagner in charge)
Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: general pathology or special pathology in training in pathology, neurology and neurosurgery sciences; consent of instructor. Reaction of the nervous system to injury and infection; degenerative and vascular diseases of the nervous system; neoplastic disease in the nervous system. (Same with Pathology and Neurology.

Professional Courses

462. Clinical Neurosurgery (6-18) II, III, IV, V. Chehrazi, Corrill, Wagner, Youmans
Clinical activity—full time (3 days per week; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Admission and follow-up of neurosurgical patients; history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars.

463. Scientific Bases for the Surgical Treatment of Neurological Disease (6-18) I, II, III, IV, V. Chehrazi, Corrill, Wagner, Youmans
Clinical activity—full time (3 days per week; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Basic science and practical aspects of care of patients with neurological diseases will be covered through review of the medical literature, conferences, rounds, and attendance at operation and participation in care of patients.

464. Obstetrics and Gynecology

464. Obstetrics and Gynecology (2) I, II, III, IV. Manson
Clinical activity—full time (2 weeks). Prerequisite: by Committee on Student Promotion and Evaluation. Provides fundamental knowledge of obstetrics, gynecology, and their relationship with basic obstetrician; provides an understanding of treatment for eye problems. May be repeated for credit.

465. Obstetrics and Gynecology Clerkship (1-18) I, II, III, IV. Manson
Clinical activity—full time (18 hours per week). Prerequisite: fourth-year medical students. Students will function as attendings on the obstetric and gynecologic services. Consent of instructor. May be repeated for credit.

466. Obstetrics and Gynecology (4-18) I, II, III, IV. Manson
Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical students. Provides a broad understanding of the relationship of the female to pelvic disease and to her sexual identity.

467. Reproductive System and Periathology (2) I, II, III, IV. Newbauer, Wennberg
Lecture—30 hours total; discussion—30 hours total. Prerequisite approval by Committee on Student Promotion and Evaluation. Normal structure and function of reproductive system is presented. Abnormalities in periathology are approached by study of appropriate clinical problems. (Same course as Pediatrics 420.)

468. Elective Clerkship (4-18) I, II, III, IV. Newbauer and staff
Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; Medical Sciences 424A; consent of instructor. Active participation in inpatient and outpatient care at San Joaquin General Hospital. Attendance at specified conferences; student faculty member of inpatient conference. May be repeated for credit.

469. Elective Clerkship (4-18) I, II, III, IV. Newbauer and staff
Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; Medical Sciences 424A; consent of instructor. Active participation in inpatient and outpatient care at Planned Parenthood Association, Sacramento. Attendance at specified conferences; student faculty member of inpatient conferences. May be repeated for credit.

470. Obstetrics and Gynecology Clerkship (4-18) I, II, III, IV. Newbauer and staff
Clinical activity—full time (3 days per week). Prerequisite: third- and fourth-year medical students; Medical Sciences 424A; consent of instructor. Active participation in inpatient and outpatient care at Planned Parenthood Association, Sacramento. Attendance at specified conferences; student faculty member of inpatient conferences. May be repeated for credit.

Seminar—clinical activity—individually arranged. Prerequisite: two years of medical school; consent of instructor. Direct clinical contact with at least two adolescent pregnant patients provided. Emphasis on obstetric and psychological clinical issues of pregnancy, delivery, the peripartum and neonatal interval. Relevant literature will be reviewed.

472. Primary Care at a Community Woman's Clinic (1-3) I, II, III, IV. Hanson
Lecture training—weekend; clinical activity—full time, to alternate with discussion sessions. Prerequisite: third- and fourth-year medical students with full-time enrollment; consent of instructor. Provides students with exposure to episodic and ongoing care of family planning and gynecologic care in a community setting. Emphasis on continuity of care. Experience in diagnosis, treatment; counseling of patients and office and laboratory procedures. Limited enrollment. (SU grading only.)

473. Perinatal Medicine Clerkship (4-18) I, II, III, IV, V. Hansen, Hanson
Prerequisite: fourth-year medical students; consent of instructor. Management of consultation for such problems as toxemia, diabetes, hypertension, cardiac disease, premenstrual state, etc., and all types of intrapartum problems, as well as exposure to ultrasonography, amniocentesis and genetic counseling.

474. Research in Obstetrics and Gynecology (4-18) I, II, III, IV, V. FDA
Prerequisite: medical student with consent of instructor. Student will pursue a research project of his/her own choosing. Student participation in ongoing research projects recommended. (SU grading only.)

Ophthalmology

465. Basic Clinical Ophthalmology (4.5) I, II, III, IV, V, Kelner, Roth, May, Mannis
Clinical activity to be arranged (3 weeks). Prerequisite: third- and fourth-year medical students who have had Medical Sciences 420 (medical rotation in ophthalmology); consent of instructor. Provides an acquaintance with fundamentals of routine clinical ophthalmology.

470. Advanced Subspecialty Ophthalmology (9) I, II, III, IV, V. Kelner, May, Roth
Clinical activity—be arranged (6 weeks). Prerequisite: third- and fourth-year medical students who have completed Surgical Speciality Clerkship (2-week rotation in ophthalmology) and consent of instructor. Opportunity to participate in the disciplines of either neuro-ophthalmology/pediatric ophthalmology or diseases of cornea and external eye. Positions may be arranged in 3-6 units of either service home, or in combination as assigned by instructor. (SU grading only in effect.)

Prerequisite: medical student in good standing; consent of instructor. Investigation is in area of vitreous and retinal surgery. Student will complete indepth literature review in area of investigation, coordinate research procedures, assist with animal surgery and maintain data files. Individual creative thought strongly encouraged. Limited enrollment. (SU grading can be in effect.)

472. Group Study (1-3) I, II, III, IV, V. The Staff (Roth in charge)
Lecture—medical rotation in speciality of instructor. Directed reading and discussion. (SU grading only.)

473. Research in Ophthalmology (1-12) I, II, III, IV, Mannis, Kelner, Roth, May, Johnson
To be arranged—3 hours. Prerequisite: medical student with consent of instructor. Individual research on selected topics in optics and visual physiology or in cornea and external diseases. (SU grading only.)

Orthopaedic Surgery

Lower Division Courses

474. Basic Sciences for Undergraduates (1-4) I, II, III, IV. The Staff (Brown and Merritt in charge)
Prerequisite: lower division standing; basic chemistry; consent of instructor. Laboratory research on selected topics related to orthopaedics including fracture healing and fracture fixation. Biomechanics, biomaterials used in orthopaedics, and biological responses to biomaterials including allergy and infection. (P/NP grading only.)

Upper Division Courses

475. Special Studies for Undergraduates (1-3) I, II, III, IV, V. The Staff (Brown and Merritt in charge)
Prerequisite: upper division standing; basic chemistry; consent of instructor. Laboratory research on selected topics related to orthopaedics including fracture healing and fracture fixation. Biomechanics, biomaterials used in orthopaedics, and biological responses to biomaterials including allergy and infection. (P/NP grading only.)

Professional Courses

476. Sports Medicine: Medical Aspects of Sports Injuries (2) I, Chapman, Fowler (Physician Medicine and Rehabilitation in charge) Lecture—2 hours. Prerequisite: completion of Core A for medical students; upper division course in system physiology and anatomy for graduate students. A multidisciplinary course introducing the student to the pathophysiology of sports injuries, physical examination of the injured athlete, and the management of both sport and non-sport injuries, training and use of physical modalities will be discussed. (SU grading only for graduate students) (Same course as Physical Medicine and Rehabilitation 2041, 4013, Physical Education 2011.)

477. Basic Sciences of Orthopaedics (2) I, II, III, IV. Bargar Lecture—1 hour; laboratory—1 hour. Prerequisite: medical student; Medical Sciences 200, 200; consent of instructor. Embryology, histology, and general pathology as related to the practice of orthopaedic surgery. Laboratory preparation.

478. Skeletal System (2.5) Lecture—20 hours total; discussion—12 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides an understanding of the normal and abnormal skeletal system and joint development, physiology, and pathology. Clinical correlates are provided on a regular basis and emphasis placed on patient phenomena as it relates to bone and joint disease. (Quarter IV of Medical School curriculum.)
219. Introduction to Human Pathology (5) Lewis
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate student or consent of instructor. Study of human pathology with background in gross and microscopic anatomy, physiology, and biochemistry. Study of the processes, causes, and effects of disease, including inflammation, neoplasia, immunology, parasitism, degeneration, abnormalities of growth, and injuries due to environmental and toxic agents. Open only not intended for veterinary medical or medical students.

280. Advanced Group Study (1-5) I, II, III, IV. The Staff
Lecture—1-2 hours; discussion—1-2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Group study in a variety of advanced topics in general and special pathology.

289. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Independent research in the mechanisms of disease, the effects and causes of injury, neoplasia, neuropathology and comparative pathology. (SU grading only.)

Professional Courses

404. Forensic Pathology (2) I.
Lecture—1 hour; laboratory—8 hours. Prerequisite: medical student or consent of instructor. Systematic study of current forensic cases with emphasis on differential diagnosis, preservation of evidence, and forensic procedures. Introduction to histopathologic diagnosis, ballistics, and toxicology. Limited enrollment.

425. Brain- Cutting Conference (1-2) I, II, III, IV. Ellis
Prerequisite: third- and fourth-year medical students; consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed. (Same course as Neurology 405.)

467. Diseases of the Nervous System (1-3) I, II, III, IV.
Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: third- and fourth-year medical students or special training in pathology or neurologic sciences; consent of instructor. Study of human nervous system reactions to disease including infection, neoplasia and malaise; application of experimental models to human disease; and clinical correlations. Seminars emphasize microscopic findings in current cases; discussions include individualized experience in neuropsychologic testing. Given jointly with the Departments of Neurology and Neurosurgery.

485. Autopsy Case Studies (1-2) I, II, III, IV. Ruedner
Discussion—1-4 hours, laboratory—3-4 hours. Prerequisite: medical student or consent of instructor. Participation and/or performance, under supervision, of complete autopsies with correlation to clinical material, gross, microscopic and laboratory findings.

490. Neuropathology Conference (1) I, II, III, IV. Ellis
Seminar—1 hour. Prerequisite: medical students or consent of instructor; open for credit to medical students. Neuro-pathologic findings in current cases are compared with clinical findings and compared with previously reported cases. Given jointly with Departments of Neurology and Neurosurgery.

410. Introduction to Alcoholism (1) I, II, III, IV. Welling
Lecture—2 hours; discussion—4 hours, and clinical experience—36 hours (36 hours total, 1 week). Prerequisite: third- or fourth-year medical student; consent of instructor. Provides an introduction to pathology, diagnosis, and treatment of alcoholism through lectures, discussions, groups and direct clinical experience at local facilities. Limited enrollment.

411. General Pathology (3) III, IV.
Lecture—27 hours; discussion—2 hours, and laboratory—11 Hours (40 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to principles governing processes of human disease which cross organ-system boundaries, and to gross and microscopic examination of disease. Required for first medical students. (Quarter III of Medical Student curriculum.)

423. Systemic Pathology (7.5) IV. Cardov
Lecture—41 hours, discussion—23 hours, and laboratory—81 hours (146 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to principles governing processes of human disease which cross organ-system boundaries, and to gross and microscopic examination of disease. Required for first medical students. (Quarter IV of Medical School curriculum.)

424. Laboratory Medicine (2) III. Miller and staff
Lecture—12 hours, discussion—12 hours, and laboratory—11 hours (35 hours total). Prerequisite: medical student with approval by Committee on Student Promotion and Evaluation. Course provides a fundamental knowledge of the role and application of modern clinical laboratory medicine.
Emphasis upon optimization of selection of laboratory measurements, decision analysis, interpretation of laboratory results, solutions problems using laboratory measurement. (Quarter III of Medical School curriculum.)

434AG-435T. Pathology Specialty Training (1-18) IV, II, III, III.
Wellings and staff
Prerequisites: pathology intern or pathology resident; consent of instructor. Detailed presentation of anatomical and clinical pathology with emphasis on clinico-pathological correlations and application of basic medical methods in diagnosis and therapeutics. Primarily intended to prepare student for specialty practice in pathology, or for academic pathology. (SU grading only.)

460. Advanced Applied Anatomical Pathology (9) I, II, III, IV.
Gardner, French
Clinical clerkship—6 weeks full-time. Prerequisite: third- or fourth-year medical students; 460 consent of instructor. Designed to provide students with an intensive experience in clinical applied anatomic pathology. Partial selection of specimens, preparation of frozen sections and slide readings as well. Students attend surgical pathologic conferences and seminar sessions in which clinical correlation and diagnostic information is discussed. Limited enrollment. (SU grading can be in effect.)

465. Applied Clinical Laboratory Immunology (9) I, II, III, III. Miller
Clinical Clerkship—Full time (6 weeks). Prerequisite: third- or fourth-year medical students; course 460 or consent of instructor. Designed to provide students with an intensive clerkship experience in applied clinical laboratory immunol- emy. Emphasis upon laboratory techniques, procedures and interpretation of laboratory results. Students will be expected to participate fully in all laboratory operations including bench techniques, laboratory management and quality control. Limited enrollment. (SU grading can be in effect.)

466. Medical Jurisprudence (2) III. Gardner
Lecture—1 hour; discussion—1 hour. Prerequisite: upper division medical student standing. Explanation of the American legal and judicial system as it applies to the practice of medicine and physician-patient relationship. (SU grading only.)

480. Advanced Group Study (1-3) I, III, III, IV. The Staff
Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, and comparative pathology. (SU grading only can be in effect.)

490. Research (1-18) I, II, III, IV. The Staff
Prerequisite: medical student with consent of instructor. Research will generally involve some aspect of growth and development. (SU grading only can be in effect.)

Professional Courses

401. Preceptorship in Pediatrics (2) II, III, III, IV. Miller
Preceptorship—half time. Prerequisite: second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatrician's office. Participation in history-taking and physical examination will be at discretion of the student and independent on student's experience. Evaluation by student.

402. Clinical Experience in Private Practice (1-18) II, III, III, IV. Miller
Clinical activity—full time (4 to 12 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 432B; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor performing such tasks as history taking, physical examination, and patient management. (SU grading only.)

420. Reproductive System-Perinatology (2) II. Wernberg, Nis. Lecture—20 hours total; discussion—2 hours total. Prereq- uisite: approval by Committee on Student Evaluation and Promotion. Normal structure and function of reproductive system are presented by approach of study of appropriate clinical problems. (Same course as Obstetrics and Gynecology 420.) (Quarter VI of Medical School curriculum.)

404A. Inpatient General Pediatrics Clerkship Elective (1-18) I, II, III, III, IV. Smithwick
Clinical activity—full time (4 to 10 weeks). Prerequisite: third- or fourth-year medical students; Medical Sciences 432B; consent of instructor. Supervised experience in pediatric care on inpatient service at UCD Medical Center. Students function as interns with appropriate supervision by residents and attending faculty. Students work up one patient with another student. (No monetary compensation.) Limited enrollment.

406B. Outpatient General Pediatrics Clerkship (1-18) I, II, III, IV. Beauchamp
Clinical activity—full time (4 to 10 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 432B; consent of instructor. Supervised experience in pediatric care on outpatient service at UCD Medical Center. Students function as interns with appropriate supervision by residents and attending faculty. Students work up one patient with another student. (No monetary compensation.) Limited enrollment.

Clinical experience—full time (3 days per week). Prereq- uisite: second-year medical student or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of hematologic disorders in children. Laboratory experience is not required. Clinical investigation may be arranged. Limited enrollment.

462. Elective in Pediatric Endocrinology (1-18) I, II, III, III, IV. Connors
Clinical experience—full time (3 days per week). Prereq- uisite: second-year medical student or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

Clinical experience—full time (3 days per week). Prereq- uisite: third- or fourth-year medical student. Designed to offer a wide experience in diagnostic and therapeutic aspects of the medical and surgical high risk neonate. Lim- ited enrollment.

Clinical experience—full time (3 days per week). Prereq- uisite: third- or fourth-year medical student; courses 460A, 460B; consent of instructor. Supervised experience in a variety of pediatric subspecialty clinics including allergy, cardiology, endocrinology, hematology, neonatology, neurology, etc., and an option to spend one-half day per week with a local pediatrician. No examination.

466. Elective in Pediatric Cardiology (1-18) I, II, III, IV. Greenwald
Clinical activity—full time (3 days per week). Prerequisite: second-year medical student or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of cardiac disorders in children. Laboratory experience and participation in clinical investigation may be arranged.

Clinical activity—full time (8 units per half quarter). Prerequ- isite: students enrolled in School of Medicine; successful completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of pulmonary disorders in children. Limited enrollment.

468. Elective in Pediatric Nephrology (1-18) I, II, III, IV. Adelman
Clinical activity—full time (9 units per half quarter). Prereq- uisite: students enrolled in School of Medicine; successful completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. No examination.

469. Elective in Pediatric Infectious Diseases (1-18) I, II, III, IV. Halsted
Clinical activity—full time (3 days per week). Prerequisite: second-year medical student; Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious diseases of infants and children. Laboratory experience and participation in clinical investigation may be arranged. No examination. Limited enrollment.

470. Elective in Pediatric Neurology (3) I, II, III, IV. Clinical activity—one third time. Prerequisite: third- or fourth-year medical student. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. This elective may be combined with course 465, 469 or other electives which do not conflict with principal scheduled activities. Limited enrollment. (Same course as Neurology 470.)

471. Elective in Pediatric Gastroenterology (1-18) I, II, III, IV. Cox
Clinical experience—full time (3 days per week). Prereq- uisite: Medical Sciences 432B; consent of instructor. Inpa- tient and outpatient experience in diagnosis and manage- ment of gastrointestinal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. No examination. Limited enrollment.

472. Pediatric Diabetes and Endocrinology (6-9) IV. Sheikholes- lami
Lecture—2 hours; discussion—4 hours; laboratory—1 hour. Information is discussed about pediatric diabetes in students. Students stay at three-week camp for diabetic children. For ten days prior to camp lectures will be held on diabetes and acidosis, etc. Students will review progress of campers and present this to faculty for discussion.

473. The Role of the Pediatrician in Primary Prevention in Community Health (4) II, III, III, Echternach
Lecture—1 hour; seminar—1 hour; laboratory—6 hours. Prerequisite: UCD medical students and graduate stu- dents with consent of instructor. Study will be involved in a clinical course in the developmental process of the child and its family from pregnancy through first three years of life, and role of the pediatrician in primary prevention in community health.

474. Introduction to Human and Medical Genetics (2) I, II, III, IV. Centenarl
Lecture—2 hours. Prerequisite: first-year medical student with consent of instructor. Course deals with inheritance environment vs. heredity, case examples as models for genetic concepts in biochemical, population, cyto- and clinical genetics—to better understand the role of heredity throughout the various disciplines of medicine and the application of human genetics to medical practice. (SU grading only.)

490. Clinical Pediatrics (1-18)
Clinical activity; discussion. Prerequisite: an internship. Participation in all aspects of child care including inpatient care, outpatient clinics, and emergency room. Responsibility for day-to-day care of patients under supervision of pediatric residents and attending staff. (SU grading only.)

491. Clinical Pediatrics (1-18)
Clinical activity; discussion. Prerequisite: an internship. In- cludes a full-year of pediatric work in various settings including inpatient care, outpatient, emergency, pediatric care, and specific pediatrics (ward, emergency, surgery, intensive care, nursery, outpatient, clinical, and emergency room). Students will be directly supervised by pediatric residents and attending staff. (SU grading only.)

496. Research Topics in Pediatrics (1-18) I, II, III, IV. ---
Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspe- cialties (e.g., cardiology, immunology, neurology, gastroenterology, diabetes, neuromuscular, hematology, infectious diseases, etc.). Research topics will be assigned by faculty member. Independent research by student will be emphasized and long-term projects are possible. (SU grading only.)

Pediatrics
Upper Division Course

190. Special Study in Pediatric Research (1-5) I, II, III, IV. The Staff (Gold in charge)
Laboratory—3-15 hours. Prerequisite: undergraduate stu- dent with consent of instructor based upon adequate prepar- ation as determined by instructor. Opportunity to partici- pate in research projects of the supervising instructor. Approximate length varies with specific problem. Opportunity to learn a variety of laboratory tech- niques appropriate to the specific research endeavor. (PI grading only.)

Graduate Course

299. Pediatric Research (1-12) I, II, III, IV. The Staff (Miller in charge)
Prerequisite: graduate students who are candidates for a degree in some area of biology or behavioral sciences; consent of instructor. Research will generally involve some aspect of growth and development. (SU grading only.)

270
Pharmacology

Lower Division Courses

92. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Work experience—30 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship. Supervised work-study experience in pharmacology and related fields. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: lower division standing. Laboratory experience in pharmacology and related fields. (P/NP grading only.)

Upper Division Courses

100. Pharmacology for Educators (2) I, E. K. Killam
Lecture—2 hours. Prerequisite: consent of instructor. Survey of the principles underlying the action of drugs; consideration of the pharmacology of prescription and non-prescription drugs commonly used to treat medical conditions in children of school age; pharmacological aspects of drug dependency and related topics.

101. Introduction to Pharmacology (3) II, E. Enkin
Lecture—2 hours; discussion—1 hour; term paper on non-prescription drugs. Prerequisite: some knowledge of basic physiology and biochemistry. Survey course dealing with principles and selected topics in pharmacology, not intended to be comprehensive with respect to every class of drugs. Oriented specifically to the undergraduate.

102. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Work experience—39 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in pharmacology and related fields. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Advanced General Pharmacology (3) I, Chiang and staff
Lecture—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-112) or the equivalent (may be taken concurrently). May be taken concurrently in the History of Drugs course designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism, and the actions, use and toxicity of major classes of drugs.

200B. Advanced General Pharmacology (4) II, Starr and staff
Lecture—4 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-112) or the equivalent (may be taken concurrently). Core course in human pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of major classes of drugs.

200A-L. Advanced General Pharmacology (1-1) I, Holinger and staff; II, E. K. Killam and staff
Discussion—1 hour; laboratory—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-112) or the equivalent. Laboratory procedures in advanced pharmacology. Examination and discussion designed to follow subject-matter sequence of course 200A-200B.

201. Pharmacology of the Nervous System I: Transmitter Substances (2) I, Hance
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in odd numbered years.

222. Pharmacology of the Nervous System II: Hypnotics, Sedatives and Anesthetics (2) I, E. Killam
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of centrally-acting sedative hypnotic and anesthetic agents with emphasis on alterations in brain function. Offered in even numbered years. (SU grading only.)

200B. Principles of Pharmacology (5) I, West and staff
Lecture—36 hours total discussion—28 hours total (includes clinical correlations). Prerequisite: approval by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and actions, use and toxicity of major classes of drugs. (Quarter VI of the Medical School curriculum.)

472. Clinical Pharmacology and Toxicology (5-10) I, II, Winslow
Lecture—2 hours; seminar—3 hours; ward rounds—6 hours. Prerequisite: third- and fourth-year medical students. Basic principles of pharmacology and toxicology will be related to the diagnosis and treatment of drug induced problems as well as principles of therapy. (SU grading only.) (Same course as Internal Medicine 472.)

480. Seminar in Pharmacology for Medical Students (1-2) I, II, III, IV. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students. (SU grading only.)

488. Special Study for Medical Students (1-3) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Special study in pharmacology for medical students. (SU grading only.)

499. Directed Research for Medical Students (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (SU grading only.)

Physical Medicine and Rehabilitation

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. Reading conferences, field trips, laboratory experiences for upper division or master's degree candidates covering selected topics in rehabilitation and physical medicine, including biomechanics and biomedical engineering. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. Supervise independent study project and research for upper division students or graduate students. (P/NP grading only.)

Graduate Courses

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I, The Staff (Bermann, Physical Education, in charge)
Lecture—216 hours; discussion—16 hours. Prerequisite: prerequisite graduate students with upper division course in systemic physiology or anatomy. A multidisciplinary course introducing the student to pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (SU grading only.) (Same course as 601A, Physical Education 201A, Orthopaedic Surgery 401A.)

299. Selected Topics in Rehabilitation and Physical Medicine (1-5) I, II, III, IV. The Staff
Lecture-discussion and laboratory—1-15 hours; field work in rehabilitation centers and agencies. Prerequisite: consent of instructor. Open to graduate students. Group study in a variety of selected topics in Rehabilitation and Physical Medicine for Allied Health Science graduate students.

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Research on topics in the field of physical medicine and rehabilitation. (SU grading only.)

Professional Courses

401A. Sports Medicine: Medical Aspects of Sports Injuries (3) I, The Staff (Bermann, Physical Education, in charge)
Lecture—216 hours; discussion—16 hours. Prerequisite: medical students who have completed first year of medical school. Multidisciplinary course to introduce the student to pathophysiology of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. Examination. (Same course as 201A, Orthopaedic Surgery 401A, Physical Education 201A.)

440. Rehabilitation Medicine Clerkship (6) I, II, III, IV. Leberman
Lecture—5 hours; discussion—2 hours, and laboratory—33 hours. Clinical activity—full-time (4 weeks). Prerequisite: approval by Committee on Student Promotion and Evaluation. Review of rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and mus-
401. Social and Behavioral Medicine (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisites: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

402. Health and Social Behavior (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

403. Psychotherapy (2) (3) (2) III, Herrera Lecture—9 hours (9 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

404. Family Community Health Care (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

405. Biopsychosocial Aspects of Medical Care (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

406. Plastic Surgery (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

407. Microvascular Surgical Techniques in Plastic Surgery (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

408. Child Psychiatry: Principles and Practice (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

409. Family Therapy (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

410. Family Evaluation and Family Therapy (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

411. Community Psychiatry—Neighborhood Health Center (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

412. Liaison with Medical Services in Surgery (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

413. Crisis Intervention (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

414. Clinical Psychology (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

415. Medical Ethics (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

416. Medical Sociology (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

417. Mental Health (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

418. Family Therapy (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

419. Psychotherapy (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

420. Clinical Psychology (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

421. Medical Ethics (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

422. Medical Sociology (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

423. Family Therapy (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

424. Crisis Intervention (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

425. Medical Ethics (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

426. Medical Sociology (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

427. Family Therapy (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

428. Crisis Intervention (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

429. Medical Ethics (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.

430. Medical Sociology (2) (3) (2) III, Herrera Lecture—18 hours and seminar—9 hours (27 hours total). Prerequisite: Consent of instructor and completion of third-year in Medical School, Med 8920. Emphasis on the study of medical problems related to social and behavioral factors, and their application to common medical problems.
490. Group Study in Diagnostic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

RADIOLOGY—GENERAL

491. Research in Diagnostic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

RADIOLOGY—NUCLEAR MEDICINE

Upper Division Courses

101. Biomedical Radiochemistry (3) III. S. DeNardo, Mills Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical radiochemistry. Subject includes choice and purification of appropriate gamma and beta radioisotopes, compounding biomedical radioisotopes, and moderating radionuclides. (Same course as 401.)

196. Directed Group Study (1-6) I, II, III, IV. The Staff (S. DeNardo in charge) Lecture—1 hour; reading—2 hours. Prerequisite: upper division standing and consent of instructor. Selected reading in nuclear medicine. (P/N grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Stadnik in charge) Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing and consent of instructor. Students will learn the scientific approach and laboratory techniques pertaining to biological investigation in the Nuclear Medicine Laboratory. (P/N grading only.)

Graduate Course

290. Research: Special Study for Graduate Students (1-12) I, II, III, IV. The Staff (Director in charge) Prerequisite: graduate standing and consent of instructor. Supervised independent study and research for graduate students. (S/U grading only.)

Professional Courses

400. Introduction to Nuclear Medicine (3) I, S. DeNardo and staff Lecture—5 hours and discussion—2.5 hours (7.5 hours total). Prerequisite: medical student with approval by Committee on Student Promotion and Evaluation. Introduction to tracer principles and use of radioisotopes in medicine, including a discussion of technology of nuclear imaging. Normal scan examples presented. (Quarter V of Medical School curriculum.)

401A. Fundamental Nuclear Medicine (4) I, Mills and staff Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Course is intended to cover in a comprehensive didactic and practical fashion those fundamental and clinical sciences which are the basis for the practice of nuclear medicine and nuclear medical technology. (Quarter X of Medical School curriculum.)

401B. Fundamental Nuclear Medicine (4) II, S. DeNardo and staff Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Course is intended to cover in a comprehensive didactic and practical fashion those fundamental and clinical sciences which are the basis for the practice of nuclear medicine and nuclear medical technology. (Quarter XI of Medical School curriculum.)

410. Biomedical Radiochemistry (3) III. S. DeNardo, Mills Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate and medical students; consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biomedical radioisotopes, and moderating radionuclides. (Same course as 101.)

410. Advanced Medical Interview Techniques (4) I, II, III, IV. G. DeNardo Discussion—2 hours; laboratory—4 hours; patient record preparation. Prerequisite: completion of first year of medical school or the equivalent and/or consent of instructor. Review and advanced instruction in history taking techniques: to evaluate mutual expectations and barriers between physician and patient; to provide guidance in dealing with difficult medical patients; introductory training in group dynamics. Limited enrollment.

433. Clinical Clerkship in Nuclear Medicine (9 or 18) I, II, III, IV. S. DeNardo Lecture—full time (3 days per unit). Prerequisite: satisfactory completion of second year of Medical School or the equivalent; consent of instructor. Clerkship correlates radiotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. Limited enrollment with preference to students enrolling for 18 units.

488. Group Study in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Stadnik in charge) Prerequisite: consent of instructor.

489. Research in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Stadnik in charge) Prerequisite: consent of instructor.

RADIOLOGY—RADIOLOGICAL PHYSICS

Professional Course

405. Radiological Physics of Diagnostic Radiology (3) I, Selbert Lecture—3 hours; consent of instructor. Prerequisite: resident in Radiology and Nuclear Medicine, Veterinary Radiology, and medical students. Introductory course in the radiological physics of diagnostic radiology. Subjects discussed include elementary atomic physics production of x-rays, and the physics of diagnostic radiographic procedures. (P/N grading only for undergraduates.)

RADIOLOGY—THERAPEUTIC

Graduate Course

289. Independent Study and Research (1-12) I, II, III, IV. The Staff (Ravenoas in charge) Laboratory—9.12. Prerequisite: enrollment with Biophysics Group for Ph.D. candidates, and consent of group advisor and sponsor. Research under supervision of a member of the department (sponsor). Work must be appropriate to fulfill the requirements for the Ph.D. degree. (S/U grading only.)

Professional Courses

444. Clinical Clerkship Elective (9 or 18) I, II, III, IV. Orchardise Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of Medical School or the equivalent; consent of instructor. Students participate in daily treatment planning conferences where all new cases are discussed with the entire faculty of therapeutic radiology. Interviews and examinations for patients brought to the staff, and reports on selected reading relevant to cases seen. Limited enrollment.

490. Medical Literacy (2) III. Ravenoas, Monroe Lecture—1 hour, writing—1 hour. Prerequisite: consent of instructor. For medical students and hospital residents. Writing and interpreting papers, most examples from current medical literature.

498. Group Study in Therapeutic Radiology (1-12) I, II, III, IV. The Staff Prerequisite: consent of instructor.

499. Research in Therapeutic Radiology (1-12) I, II, III, IV. The Staff (Stadnik in charge) Prerequisite: consent of instructor. (S/U grading only for medical students.)

NOTE: For key to footnote symbols, see page 124.

Surgery

Upper Division Courses

192. Internship in General Surgery (1-12) I, II, III, IV. The Staff Work experience—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship; consent of preceptor. Supervision in general surgery and related fields. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff Prerequisite: advanced undergraduate student with consent of instructor. Independent research studies under direction of a faculty member. (P/N grading only.)

Professional Courses

419. Introduction to Clinical Surgery (1-6) I, II, III, IV. Ward Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the most common surgical diseases. Course will afford opportunity to review surgical patients and discuss them with members of staff.

421. Practical Laboratory Experience (2) I, II, III, IV. Holcroft and staff Discussion—1 hour; laboratory—3 hours. Prerequisite: third-year medical student; Medical Sciences 430 (concurrent); consent of instructor. Practical laboratory experience in clinical surgery and in surgical techniques used to obtain physiological information. (S/U grading only.)

460. Clinical Surgical Elective (6-18) I, II, III, IV. Ward and staff Clinical activity—full time. Prerequisite: fourth-year or third-year medical student; Medical Sciences 430. Involves preparation of patients, treatment, operative care, and postoperative follow-up. Services include Cardiopulmonary, Pediatric, Nutrition, Oncology, and Surgery Clinic.

461. Surgery Burn Unit Clerkship (9 or 9) I, II, III, IV. The Staff Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student functions as an extern in the eight-bed Burn Unit; learns principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

462. Surgery Trauma Service Clerkship (6 or 9) I, II, III, IV. Blascieki and staff Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student works as an extern on one of the two general surgery trauma teams, participating in resuscitation and management of critically ill patients. Team hours consist of 24 hours on, and 24 hours off.

463. Surgery Intensive Care Unit (6) I, II, III, IV. Holcroft and staff Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgical ICU. Student is supervised. Provides in-depth experience with management of critically ill patients.

464. General Surgery Clerkship: Kaiser Hospital (6 or 9) I, II, III, IV. The Staff Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student participates with University residents on the teaching services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical general surgical problems and participate in their care.

465. General Surgery Clerkship: Martinez VA Hospital (6, 9, or 12) I, II, III, IV. Guernsey, Ward Clinical activity—full time (4, 6, or 8 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Part of the General Surgical Residency Training Program with the University of California, Davis. The Martinez rotation has a large number of gastrointestinal and vascular surgical problems as well as broad surgical experience.

466. General Surgery Clerkship: Travis AF Base Hospital (6 or 9) I, II, III, IV. Gillmore, Ward Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Opportunity to participate on the surgical service of our affiliated Air Force Hospital. The program has a large number of general surgery problems and provides a broad clinical experience in surgery.
Medical Medicine, School of Medicine (Veterinary Medicine)

467. Surgical Oncology (6 or 9) I, II, III, IV. Goodright and staff
Clinical instruction—full time 14 or 6 weeks. Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student work as part of the Surgical Oncology team learning medical and surgical principles applicable to cancer. Participation in the care and repair of surgical oncologic patients and has the opportunity to learn medical, radiologic, and surgical approaches to cancer therapy.

475. Surgical Preceptorship: Off Campus (6-18) I, II, III, IV, Ward
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preparative, operative and postoperative care of surgical patients under the supervision of attending staff.

494. Fourth-Year Surgical Honors Program (18) I, II, III, IV. Wolfman
Prerequisite: completion of fourth year of Medical School with superior performance on Medical Sciences 430 and consent of instructor. To provide intensive and comprehensive training in surgery to students interested in postgraduate surgical career. would enable them to succeed during the internship and residency training. (SU grading only.)

498. Laboratory Research (1-12) I, II, III, IV, Ward and staff
Laboratory—3-18 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research on surgically related problems. Participation in projects in the following: burn, nutrition, oncology, transplant and others. (SU grading only.)

Urology

Professional Courses

400. Clinical Urology (1) I, II, III, IV. Palmer
Clinical activity—full time in the afternoon (6 weeks). Prerequisite: clinical medical students with consent of instructor. Introduction to ambulatory care of urologic patients. Includes basic therapeutic and diagnostic procedures and case material from private and public clinics. Management of urinary tract infection will be emphasized.

423. Urinary System (10) I, III, Lewis, Gulyassy Lecture—24 hours, discussion—18 hours, and laboratory 3 hours (32 hours total). Prerequisite: approved by Committee on Student Evaluation and Promotion. Fundamental aspects of (a) disorders of water, electrolytes and acid/base balances; (b) major categories and mechanisms of renal diseases; (c) major congenital and acquired urological diseases; (d) urinary tract infections. (Quarter VIII of Medical School Curriculum) (Same course as Internal Medicine 420E).

Urology Clinical Clerkship (5-18) IV, I, II, III, Palmer
Clinical activity—full time. Prerequisite: second-year medical student; physical diagnosis of the urological patient; consent of instructor. Clinical experience in diagnosis and treatment of urological disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. Limited enrollment.

408. Externship in Urology (5-18) I, II, III, IV. Palmer
Clinical activity—full time. Prerequisite: fourth-year medical students with consent of instructor. Under supervision, student acting as intern will assume full independent responsibility including admission history, physical examination, management of hospitalization, and participate in surgicopathological procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit.

499. Lecture in Urology (1) I, II, III, IV. Palmer
Lecture—1 hour. Prerequisite: completion of second year of medical school. Group lecture-discussion will cover major urologic topics, including anatomy, physiology, urinary tract infection, congenital anomalies, urologic cancer, trauma, renal transplantation, methods of diagnosis, and urothrombosis. (SU grading only.)

499. Research (1-12) I, II, III, IV. Palmer
Prerequisite: medical students with consent of instructor. (SU grading only.)

Courses in Medicine

Upper Division Courses

196. Special Study for Advanced Undergraduates (1-3) I, II, III, The Staff (Fowler in charge) (MPH grading only.)

Graduate Courses

*200. Seminar in Veterinary Medicine (3) I, II, III, The Staff (Fowler in charge)
Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (SU grading only.)

201. Research (1-12) I, II, III, The Staff (Fowler in charge) (SU grading only.)

Professional Courses

401. Small Animal Clinics (1/2 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for diagnosis, medical and surgical treatment, monitoring of the wards and outpatient clinic, including history taking, physical examination, laboratory tests, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (SU grading only.)

402. Large Animal Medicine (1/2 per week) I, II, III. The Staff (Clarin in charge)
Laboratory—50 hours total. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, consent of instructor. Interns and residents responsible for the medical care of patients in the VMTH and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (SU grading only.)

403. Small Animal Medicine (1/4 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for the medical care of animals in the wards and outpatient clinic, including physical examinations, history-taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (SU grading only.)

404. Field Health Management (1/2 per week) I, II, III. Hupp and McGown in charge
Laboratory—50 hours total. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the field staff. (SU grading only.)

413. Pulmonary Diseases (1/4 per week) I, II, III. Gillespie Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the field staff. (SU grading only.)

422. Veterinary Dermatology (1 per week) I, II, III. Stannard Laboratory—20 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the field staff. (SU grading only.)

423. Musculoskeletal Medicine (1/2 per week) I, II, III. Gillespie Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the field staff. (SU grading only.)

424. Zoo and Wildlife Medicine (1/4 per week) I, II, III. Fowler Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the field staff. (SU grading only.)

481. Small Animal Grand Rounds (3) I, II, III. The Staff (Ling in charge) Discussion—1 hour. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (SU grading only.)

482. Large Animal Grand Rounds (5) I, II, III. The Staff Discussion—1 hour. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. May be repeated for credit. (SU grading only.)

483. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Ling in charge) Seminar—2 hours. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Interns and residents will assist in the presentation of seminar material. May be repeated for credit. (SU grading only.)
Medieval Studies

(College of Letters and Science)

Winder McConnell, Ph.D., Program Director
Program Office, 912 Sproul Hall (752-1219)

Committee in Charge
Robert J. Grigg, Ph.D. (Art History)
Winder McConnell, Ph.D. (German), Chairperson
James J. Murphy, Ph.D. (Rhetoric)
Marjorie Osborn, Ph.D. (English)
Alan A. Stanislawski, Ph.D. (Dramatic Art)
Valerie A. Tumins, Ph.D. (Russian)

The Major Program

The major in Medieval Studies is designed to introduce you to the main features of European civilization during the period from the fall of Rome to the beginnings of the Renaissance. Medieval studies are inherently interdisciplinary. The program involves studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

Medieval Studies

A.B. Major Requirements:

Preparatory Subject Matter


Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval field.

Depth Subject Matter

52

Literature: at least 16 units, including two courses from each of the following 16

(a) English 111, 112, 113, 110A, 166, 189, 189.
(b) French 115A, 115B
(c) German 120, 121A, 121C
(d) Italian 133A, 133B, 151A, 151B, 159A, 159B,
159C, 159D

Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 193
Religious Studies 102, 110

Arts and languages, at least 8 units from Art 176A, 178A, 178B, 178C, 178D, 179B;

Dramatic Art 157, German 106, Music 114 (not prerequisite), 199; Rhetoric 110, 111.

Political thought, at least one course from Political Science 115, 116, 118A

Senior thesis, Medieval Studies 190

Total Units for the Major: 52

Major Advisers. W. M. Bowles (History), D. J. Dutschke (Italian), J. J. Murphy (Rhetoric), M. Osborn (English), D. A. Trail (Classical).

Courses in Medieval Studies

Lower Division Courses

20A. Early Medieval Culture (4). The Staff
Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the episodes of Justine, the Confessions of Saint Augustine, The Compilation of Philosophy of Beowulf, Beowulf, The Nibelunglied, and The Song of Roland.

20B. The Culture of the High Middle Ages (4). II. The Staff
Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, the Canterbury Tales of Chaucer, and The Divine Comedy of Dante.

20C. Medieval Transformations (4). III. The Staff
Lecture—2 hours; discussion—1 hour, paper or formal presentation. Course deals with the great medieval transformations that took place before the Renaissance. Subjects will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields.

96. Directed Group Study (1-5). II, III. The Staff (Chairperson in charge)
(PRP grading only.)

99. Special Study for Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge)
(PRP grading only.)

Upper Division Courses

120A. The Medieval World (4). II, III. The Staff (Chairperson in charge)
Lecture—2 hours; discussion—1 hour; term paper. Course deals with the selected themes from the Middle Ages, the Fall of Rome to the beginning of the Renaissance. Subjects will vary from year to year and cover such topics as the Monastic Orders, the Universities, the Seven Liberal Arts, and Their Significance in the Middle Ages, the Family and Society, and (3) Church and State.

190. Senior Thesis (I, II, III). The Staff
Seminars—4 hours. Prerequisites: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of two members of the Committee in Charge.

Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairperson of committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (PRP grading only.)

198. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge)
(PRP grading only.)

199. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge)
(PRP grading only.)

The Major Program

The interdepartmental major now allows for two emphases, one in humanities and the other in sociolgy. The humanities track introduces the student to the Spanish language, linguistics, Mexican and Mexican-American history, culture and literature, and social sciences. This curriculum allows for flexibility to accommodate primary interests in bilingual education, community or social service, or advanced professional preparation. The sociology track combines traditional courses in sociology with substantive area courses that deal intensively with the Mexican-American experience. The sociology emphasis promotes a greater understanding of the social, political, and cultural life of Mexican-American people, and it provides a solid basis of knowledge for those who wish to work in a bi-cultural setting. It is designed for students interested in public service careers such as law school, graduate school, public administration, or community groups.

Students who have demonstrated language fluency in Spanish through the placement examination can accelerate their program considerably; thus the language placement examination is strongly recommended to all students entering the program.

Mexican-American (Chicano) Studies

(About of Letters and Science)

Adalazla Sosa-Rieddel, Ph.D., Program Director
Program Office, 211 North Hall (752-2428)

Committee in Charge

Luis L. Arroyo, Ph.D. (History)
Richard A. Figueira, Ph.D. (Education)
Jack D. Forbes, Ph.D. (Anthropology, Applied Behavioral Sciences)
Barbara J. Merino, Ph.D. (Education)
Daniel M. Ramirez, Ph.D. (Sociology)
Reugio I. Rochin, Ph.D. (Agricultural Economics)
Guillermo Rojas, Ph.D. (Spanish)
Adalazla Sosa-Rieddel, Ph.D. (Chicano Studies)

Chairperson

Lenora A. Timm, Ph.D. (Linguistics)

Faculty

Adalazla Sosa-Rieddel, Ph.D., Lecturer

The Major Program

Humanities Emphasis

Preparatory Subject Matter

Spanish 1 or 1AT, 2 or 2AT, 3, or the equivalent
Spanish 4 or 7A, 5 or 7B, 26 or 7C
Linguistics 1

Chicago Studies 10

Depth Subject Matter

Sociology 110

Spanish 125, 129, 130

Education 151

History 169A, 169B, 169C, 169D

Politics 168

Total Units for the Major

48-70

Recommended

Linguistics 115 and 150 (above), American Studies 49, two courses from Spanish 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H, 6I, 6J (for non-native speakers of Spanish), English 2 (for native speakers of Spanish), two courses from Sociology 124, 130, Anthropology 104, 105A, 139B, Spanish 108B, 132 and 133 (above), 300.

Sociology Emphasis

Preparatory Subject Matter

Chicago Studies 10

4

Spanish 4 or 7A, 5 or 7B, 26 or 7C

10-13

Sociology 1, 46A, 46B

13

Linguistics 1

4

Depth Subject Matter

Sociology 110, 140, 169A, 169B

Agricultural Economics 150

History 168B

Linguistics 115

Political Science 168

Electives, a maximum of 12 units chosen from any of the following courses, no more than 2 courses from any one group

Group 1: History 169A, 169B, or 169C

Group 2: Education 116, Linguistics 150, Spanish 128

Group 3: Anthropology 163, Chicano Studies 162, Sociology 118

Group 4: Applied Behavioral Sciences 172, 176, Political Science 176

Total Units for the Major

83-76

NOTE. For key to footnote symbols, see page 124.
Further Study. If you are contemplating studies in a graduate or professional school you can, with the aid of an advisor, build a program around the discipline of your choice, i.e., Spanish or Spanish-American, literature, history, or political science. If you are contemplating a career in bilingual education you should consult the Department of Education for information about the Teacher Credential Program (see also page 99).

Major Advisers. L. L. Arroyo (History), D. M. Ramirez (Sociology), G. Rojas (Spanish), A. Sosaridell (Chicano Studies).

Minor Program Requirements:
This interdepartmental minor provides the student with the general view of the Chicano in terms of the history, culture, political involvement and role in the society of the Southwestern United States.

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-24</td>
<td>Chicano Studies 1</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>History 169A or 1698</td>
<td>3</td>
</tr>
<tr>
<td>110</td>
<td>Sociology 110</td>
<td>4</td>
</tr>
<tr>
<td>168</td>
<td>Political Science 168</td>
<td>4</td>
</tr>
</tbody>
</table>

Two elective courses to be selected from:

- Education 116, 151; History 169A or 1698 (not to duplicate one of the above).
- Linguistics 115; Sociology 169, Spanish 120.

Courses in Microbiology

**Graduate Courses**

- **280C. Advanced Research Conference (1.5)** I, II, III. The Staff (Professor in charge) (P/NP grading only.)
- **299. Research (1-12)** I, II, III. The Staff, Laboratory variable (P/NP grading only.)

Military Science

(College of Letters and Science)

John F. Keith, Lieutenant Colonel, Chairperson of the Department

Department Office, 125 Hickey Gymnasium (752-0541)

**Faculty**

Mike T. Eastman, Captain, Assistant Professor
John F. Keith, Lieutenant Colonel, Professor
Randall L. Peters, Captain, Professor
William N. Ritch, Major, Assistant Professor
Ronald J. Surface, Major, Assistant Professor
David R. Tonnemilk, Major, Assistant Professor

Program of Study

The Military Science Department extends the educational opportunities and provides extracurricular activities which qualify a student for a commission in the United States Army Reserve or Regular Army. The program assists qualified students in all academic fields to prepare for careers in military or civilian careers. A continuing effort is made to assign graduates to military career fields aligned with their major field of study. Individual capabilities and preferences. Active duty obligation for ROTC graduates will not exceed three years for those who choose Active Duty or six months for those who choose Reserve Component Duty. A liberal scholarship program is available. The Army offers four-, three-, and two-year scholarships. The four-year is awarded to high school seniors who will be fresh-

Air Force ROTC

Air Force ROTC is accessible to UC Davis students through a program offered at California State University, Sacramento (CSUS). Their Department of Aerospace Studies (AFROT) offers a two- or four-year program leading to a commission in the United States Air Force. All course work (12 or 16 semester units) is completed on a full-time basis with the exception of Field Training conducted during the senior year at the active Air Force base. The Flying Instruction Program which operates from a local civilian flying school. Upon completion of the Program (integrated with UCS's quarter system) and all requirements for the Bachelor's de-
gree, cadets are commissioned second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and selected may enter pilot or navigator training immediately upon graduation, or serve in a specialty consistent with their academic major, individual goals, and Air Force needs. Graduates may request a delay of entry on active duty to continue their education or may apply for Air Force sponsored graduate study to begin immediately upon entry on active duty.

Application to the AFFOTC Program must be no later than the middle of a student's sophomore year. Contact representatives in the Aerospace Studies Department at CSUS, telephone (916) 454-7315, for information on the program or processing of entry. (An AFFOTC Program is also available within the UC system at Berkeley campus, Department of Aerospace Studies, (916) 642-3572.) AFFOTC offers 3½-, 3-, 2½-, and 2-year scholarships to 200-qualified students. Applications are accepted in a variety of academic disciplines, however, particular emphasis will be given to applicants in the fields of engineering and navigation.

Academic Credit

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowable for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unrestricted elective units available in the curriculum being followed.

School of Veterinary Medicine. The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

Courses in Military Science

Lower Division Courses

11. Introduction to Military Science I (1.1) I The Staff Lecture—1 hour. A discussion of the military as an element of national security and international diplomacy. Course surveys the United States defense structure to include military treaties and organizations.

13. Introduction to Military Science II (1.2) I The Staff Lecture—1 hour. A discussion of the military’s role in American society. Course focuses on various social attitudes within the military and discusses technological developments of modern military forces.

12. Military History I (1.2) I The Staff Lecture—2 hours. An analysis of selected historical military campaigns and battles. Emphasis is on continuity of principles of warfare throughout the ages. Course covers period from Greco-Persian Wars to Age of Louis XIV.

12. Military History II (2.2) I The Staff Lecture—2 hours. Survey of selected campaigns and battles from American Revolution era to end of nineteenth century. Emphasis is on the foundation and development of modern American and European military organizations.

23. Military History III (3.3) I The Staff Lecture—2 hours. An analysis of modern military conflict from World War II to present. Emphasis is on development of mechanized warfare and its impact on current world-wide military doctrine.

NOTE: For key to footnote symbols, see page 124.

Upper Division Courses

131. Principles of Military Instruction (2) I The Staff Lecture—2 hours. Principles and practice in fundamentals applicable to military instruction to include planning, presentation and evaluation. Student presentations exemplary lecture material.

132. Theory of Leadership (2) II The Staff Lecture—2 hours. Principles and theory of leadership, individual and group solution of leadership problems common to small groups.

133. Advanced Military Operations (2) II The Staff Lecture—2 hours. Prerequisite: 132I or consent of instructor. Advanced study of military operations, to include analysis of the functions of primary and supporting branches and commands.

141. Principles of Military Administration (2) II The Staff Lecture—2 hours. Discussion of the functions of military staff organizations to include military briefings, correspondence, procedures, and the system of military administration.

142. Managerial Principles and Theories (2) II The Staff Lecture—2 hours. Military administrative principles and personnel management theories, including the military occupational structure, and the administration of military justice.

143. Revolutionary Conflict (2) II The Staff Lecture—2 hours. Analysis of revolutionary conflict to include an examination of insurgency and counterinsurgency movements in the world arena.

Music

(College of Letters and Science)

*D. Kern Holoman, Ph.D., Chairperson of the Department
Office, 112 Music Building (752-0666)

Faculty

Lawrence E. Anderson, Ph.D., Adjunct Lecturer
Robert S. Bloch, M.A., Professor
Sydney R. Charles, Ph.D., Professor
Andrew D. Frank, M.A., Associate Professor
D. Kern Holoman, Ph.D., Professor
Peter D. Lopez, Ph.D., Visiting Lecturer
Albert J. McNell, M.S., Professor
David A. Nutter, Ph.D., Assistant Professor
Jerome W. Rosen, M.A., Professor
Gérard Souzay, Visiting Professor; (Artist in Residence)
Richard G. Swift, M.A., Professor
William E. Valente, M.A., Professor

Faculty Affiliates in Applied Music

Donna Lee Branden, M.S.M., Adjunct Lecturer (organ)
Lois Brandtwynne, M.A., Visiting Lecturer (piano)
Tony Clements, Visiting Lecturer (tuba)
James Crenshaw, Visiting Lecturer (French horn)
Carrie Crompton, M.S., Visiting Lecturer (Viola da Gamba)
Thomas Derthick, B.M., Visiting Lecturer (string bass)
Susan E. Erickson, Ph.D., Visiting Lecturer (harpichord)
Stephanie Friedman, M.A., Visiting Lecturer (voice)

David Granger, M.A., Visiting Lecturer (bassoon)
Stanley Lunetta, M.A., Visiting Lecturer (percussion)
Robin Richman, B.M., Visiting Lecturer (flute)
Thomas Stauffer, M.A., Visiting Lecturer (cello)

The Robert Bloch String Quartet of UC Davis

Robert S. Bloch, M.A., violin
Elizabeth Gibson, M.M., violin
Duncan Johnstone, viola
Thomas Stauffer, M.A., cello

The Major Program

The Department of Music offers a unique program of study for a career in music as part of a broadly-based liberal arts education leading to the Bachelors of Arts degree.

The student engages in the study and performance of music of all styles and periods. Options are provided for those students with special interests in composition, history, teaching and performance, and for those who plan to continue in graduate work in music. The Department of Music offers a Master of Arts degree with emphasis on composition or music history, and a Master of Arts in Teaching degree with emphasis on the teaching of music.

A.B. Major Requirements:

Music

Preparatory Subject Matter

Music 4A, 4B, 4C, 5A, 5B, 5C, 21A, 21B, 21C...

Music 30, 31 (or the equivalent as determined in consultation with major adviser), one year...

Depth Subject Matter

Music 104A, 104B, 104C...

Music 130, 131 (or the equivalent as determined in consultation with major adviser), one year...

At least 20 units selected from Music 107A, 107B, 107C, 108A, 108B, 111, 112, 113A, 113B, 114, 115, 116, 117, 118, 119, 188 or 199. Of these 20 units a minimum of 14 units must be from courses numbered 113A-119...

At least 1 additional upper division unit in Music to achieve a total of 36 upper division units (may include upper division performance course)...

Performance

At least 14 units from Music 41, 42, 43, 44, 45, 46, 141, 142, 143, 144, 145, 146...

Plano Skills

Music P (required of students with a deficiency in piano playing)...

Total Units for the Major

92

Beginning and transfer students must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with The Little Preludes of Bach is prerequisite to upper division courses in the major. Students with deficiencies will be required to pass Music P. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisers before enrolling in any music course.

Foreign Language Requirement. Attention is called to the requirements in foreign languages for higher degrees in music: 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.

Major Advisers

A. D. Frank, W. E. Valente.
Music

Minor Program Requirements:

Music 18
A minimum of eighteen units of upper division Music courses, 18
Must include a maximum of six units of performance courses (130, 141, 142, 143, 144, 145, 146).

Teaching Credential Subject Representative. A. J. McNeil. See page 99 for the Teacher Education Program.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. and M.A.T. degrees. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. R. S. Bloch.

Courses in Music

Lower Division Courses

PA-PP-PC. Rudimentary Piano (no credit) I, II, III. The Staff (Holoman in charge)
Laboratory—2 hours. Prerequisite: students with a major or minor in Music.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. and M.A.T. degrees. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. R. S. Bloch.

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Graduate Adviser. R. S. Bloch.

Courses in Music

Lower Division Courses

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Laboratory—2 hours. Prerequisite: students with a major or minor in Music.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. and M.A.T. degrees. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. R. S. Bloch.
Native American Studies

(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

The Major Program
Native American studies is an introduction to the world of Native people. It is an interdisciplinary approach to area studies, with a focus on North America.

The major in Native American Studies is designed to fulfill two broad purposes. The first is to provide culture-specific training for students likely to work with persons of American Indian background or with Indian communities, or who wish to go on to advanced study in a related field. The second is to provide an introduction to the politics, philosophy, and culture of tribally-organized peoples and small nationalities for those who plan to work overseas or to pursue advanced study involving similar organized populations.

Native American Studies

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Minimum Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>41-42</td>
</tr>
<tr>
<td>Native American Studies</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology 2</td>
<td>4</td>
</tr>
<tr>
<td>Native American Studies 33</td>
<td>4</td>
</tr>
<tr>
<td>Sociology 1</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>4</td>
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<tr>
<td>Economics 1A or Agricultural Economics 1B</td>
<td>4-5</td>
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<tr>
<td>Environmental Science 10 or Geography 4</td>
<td>4</td>
</tr>
<tr>
<td>History 17A-17B</td>
<td>8</td>
</tr>
<tr>
<td>Native American Studies 70</td>
<td>4</td>
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<td>Breadth Subject Matter</td>
<td>44</td>
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<tr>
<td>Written and oral expression (see college requirement)</td>
<td>8</td>
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<tr>
<td>Humanities (any courses in humanities)</td>
<td>12</td>
</tr>
<tr>
<td>Social science (any courses offered in a social science department or ethnic studies program)</td>
<td>12</td>
</tr>
<tr>
<td>Natural science</td>
<td>12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>32</td>
</tr>
<tr>
<td>Native American Studies 130A, 130B</td>
<td>8</td>
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<tr>
<td>Native American Studies 157</td>
<td>4</td>
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<tr>
<td>Environmental Science 10 or Geography 4</td>
<td>4</td>
</tr>
<tr>
<td>History 162, 166A, 166B, 169A, 169B</td>
<td>4</td>
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<td>Areas of Specialization</td>
<td>20</td>
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<tr>
<td>(A) Arts area: Native American Studies 101, Art 151, 152A, 255A</td>
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<tr>
<td>(B) Education area: Native American Studies 171, Applied Behavioral Sciences 157, 175, Education 100, 110, 163</td>
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<tr>
<td>(C) Community development area: Applied Behavioral Sciences 151, 152, Anthropology 122, 126, Political Science 178 or Applied Behavioral Sciences 154</td>
<td></td>
</tr>
<tr>
<td>(D) Ethnic area: Applied Behavioral Sciences 172, 175, Anthropology 104, Political Science 126, Sociology 130</td>
<td></td>
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<tr>
<td>(Other areas may be developed by the student in consultation with the major adviser)</td>
<td></td>
</tr>
</tbody>
</table>

1Students may substitute other Native American Studies courses with the approval of the Native American Studies Major Review Committee.

Courses in Native American Studies

Lower Division Courses

1. Introduction to Native American Studies (4) I, II, III. Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal-reservation culture; relationships of Native American Studies to other academic disciplines.

2. Native American Experience (4) III. Adams. Lecture—4 hours. Introduction to American-Indian historical and socio-cultural development with emphasis upon the U.S. area and upon those processes such as the growth of the nation which have contributed to the current condition of Indian people.

3. Native American Music and Dance (4) II, II. Lecture—3 hours; discussion—1 hour. Introduction to the music and dance of the native peoples of the U.S. Students will study secular native music and dance from a cross-section of Indian tribes. Offered in even-numbered years.

4. Native American Art in the U.S. (4) I, II. Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon design, media, and function. Intent is to familiarize the student with a wide range of styles and techniques of Indian art in the United States.

5. Native American Art Workshop (4) I, II, III. Lecture—1 hour; laboratory—6 hours; to be arranged—3 hours. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native American art, design, and craft. (P/NP grading only.)

55. Americanizations: Native-American Contributions to World Civilization (4) II. Hutchison. Lecture—4 hours. Prerequisite: course 1. Analysis and study of Americanizations: arts, inventions, and developments originated in the Americas by native peoples and adopted by other peoples. Offered in odd-numbered years.

70. Native American Perception (4) I, II. Lecture—4 hours. Prerequisite: course 1. Study of the culturally determined attitudes, visions, values, and relationships of American-Indian people and the differences in perception between Native Americans and the dominant society.

98. Special Study for Undergraduates (1-3) I, II, III. The Staff (Rising in charge). Prerequisite: consent of instructor. (P/NP grading only.)
Nematology

Upper Division Courses

101. Contemporary Indian Art (4) II. Langfisch
Lecture—4 hours. Prerequisite: course 23. Historical overview of contemporary Indian art from 1900 to the present, looking at the two art centers of Oklahoma and San Antionio. Critical pressures that have influenced the imagery that exists today will be examined. Offered in odd-numbered years.

110. Introduction to Nematology (2) II. Maggini
Lecture—4 hours. Prerequisite: Biology 2 or the equivalent or consent of instructor. The relationship of nematodes to man’s environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.

130. Nematode Behavior (2) III. Vigliorcho
Lecture—2 hours. Prerequisite: course 100 or 110. Behavior mechanisms of nematodes promoting their impact upon plants, animals and micro-organisms including responses to natural and artificial changes in environment. Offered in even-numbered years.

121. Nematode Biology (2) II. Vigliorcho
Lecture—2 hours. Prerequisite: course 100 or 110. Life processes in nematodes describing functions, mechanisms and processes for coping with environment for survival and sustaining nematode apathy. Offered in odd-numbered years.

130. Principles of Nematode Control (4) III. Lear (Plant Pathology)
Lecture—2 hours, laboratory—6 hours. Prerequisite: course 100; Chemistry 68 and Statistics 13 recommended. 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.

Graduate Courses

232. Principles and Techniques of Nematode Taxonomy and Morphology (4) III. Raskel
Lecture—2 hours, laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material. Offered in odd-numbered years.

235. Nematode Taxonomy and Comparative Morphology (5) II. Maggini
Lecture—2 hours, laboratory—6 hours; 3 hours of laboratory to be announced. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes as well as select plant and animal parasites. Offered in even-numbered years.

240. Nematodes of invertebrates (2) I. Kaya
Lecture—1 hour, discussion—1 hour. Prerequisite: Entomology 100 and course 110, undergraduate and graduate student standing. Study the relationships between nematodes and invertebrates with emphasis on insects. Bionomics and biological control potential of nematodes of invertebrates, selected invertebrates as intermediate hosts for nematode parasites of animals, and as phytotoxic hosts for nematode parasites of plants. Offered in even-numbered years.

290. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Selected topics and aspects of general nematology. Topics vary from year to year.

295. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Selected topics in Nematology. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Research. (SU grading only.)

Nematology
(College of Agricultural and Environmental Sciences)

David R. Vigliorcho, Ph.D., Chairperson of the Division
Division Office, 488 Hutchinson Hall (752-1403)

Faculty

Harry K. Kaya, Ph.D., Associate Professor
Benjamin F. Lownesbay, Ph.D., Professor Emeritus
Armand R. Maggini, Ph.D., Lecturer
Dewey J. Raski, Ph.D., Professor
David R. Vigliorcho, Ph.D., Lecturer

Related Major Programs. See the major in Entomology (page 207).

Graduate Study. Graduate degrees specializing in Nematology are offered through the Department of Entomology or the Department of Plant Pathology.

Courses in Nematology

Upper Division Courses

110. General Plant Nematology (4) I. The Staff
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1 or 10; lower division students with consent of instructor only. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

Neurology

See Medicine
Nutrition

See below, and the Graduate Group (page 282); and also Nutrition Science

Minor Program Requirements:
The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

Nutrition (College of Agricultural and Environmental Sciences)
Robert B. Rucker, Ph.D., Chairperson of the Department
Department Office, 129 Eversen Hall (752-6650)

Faculty
Nemat O. Bohani, M.D., Professor (Community Health)
Andrew J. Clifford, Ph.D., Professor
Kathryn G. Dewey, Ph.D., Assistant Professor
Ted K. Ferrell, Ph.D., Assistant Professor
Louis G. Grivetti, Ph.D., Associate Professor (Nutrition, Geography)
Fredric W. Hill, Ph.D., Professor
Lucille S. Hurdle, Ph.D., Professor
Bo L. Lomnerrat, Ph.D., Associate Professor
Jo Ann Proshet, M.S., Visiting Lecturer
Robert B. Rucker, Ph.D., Professor (Nutrition, Biological Chemistry)
Barbara O. Scheneeman, Ph.D., Associate Professor (Nutrition, Food Science and Technology)
Judith S. Stern, Sc.D., Professor
Helene Swenerton, Ph.D., Lecturer
Aloy L. Tappel, Ph.D., Professor (Food Science and Technology)
William C. Wein, Ph.D., Professor
Francis J. Zeman, Ph.D., Professor

Related Major Programs: See the major in Nutrition Science, page 282

Upper Division Courses
101. An Introduction to Nutrition and Metabolism (5.5, Lower-division course to include the required course prerequisites.
Nutrition 101-105, plus 111
Nutrition 111, 114-116
Physiology 110
Physiology 110
Replacement courses (see note above)

Food Service Management (4-23)
Preparation: plan in advance to include the required course prerequisites.
Food Science and Technology 100A-100B, 101A-101B
Food Service Management 120, 120B, 161

Food Service Management 123 or Agricultural Economics 111

Nutrition and Food (1-24)
Preparation: plan in advance to include the required course prerequisites.
Nutrition 101, 111
Nutrition 111
Physiology 110
Physiology 110
Replacement courses (see note above)

Nutrition Science (1-23)
Preparation: plan in advance to include the required course prerequisites.
Biochemistry 101A-101B or Physiological Sciences 101A-101B

Nutrition 111, 114-116B
Nutrition 111, 114-116

Minor Adviser: R. B. Rucker

Graduate Study: Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the graduate adviser.

Courses in Nutrition

Lower Division Courses
10. Discoveries and Concepts in Nutrition (3) II, III, HI
Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutritive values and their role in metabolism of proteins, fats, and carbohydrates; role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 101 or 111.

11. Current Topics in Nutrition (1-3) II, III, HI
Discussion—1 hour, term paper, Prerequisite: course 10 (may be taken concurrently). Assigned readings and discussion of topics of current concern and broad interest in contemporary study. Open to students who have taken an upper division course in nutrition.

12. Food and Cultural Influences in Diet (1-3) II
Lecture—3 hours, discussion—1 hour. Prerequisite: Anthropology 2 or Geology 2; and course 10 recommended. Historical and cultural overview of culture, food habits, and diet; exploration of the major themes in food habit research; micronutrient nutrition; origins and development of dietary practices. (Same course as Food Science and Technology 20.)

13. Public Issues in Nutrition and Food Science (1) I
Lecture—2 hours. Seminar—1 hour. Prerequisite: Anthropology 2 or Geology 2. Discussion of current issues in nutrition and food science which are currently subjects of public debate. Independent study of Nutrition and Food Science for students new to the campus. (P/N grading only.) (Same course as Food Science and Technology 20.)

14. Individual Study for Undergraduates (1-5) II, III, The Staff
Prerequisite: consent of instructor. Opportunity for study under individual projects in library study, laboratory study, field study, and in the analysis of nutrition data. (P/N grading only.)

15. Experimental Nutrition (5) I, II
Lecture—2 hours, four field trips per week. Prerequisite: course 111 or 116 (may be taken concurrently). Consent of instructor. Prerequisite: course 111 or 116. Examination of nutrition problems in applied settings. Application of basic skills to community nutrition programs. Principles and methods of nutrition education. Evaluation of community nutrition programs and resources.

16. Field Work in Community Nutrition (4) II, III, IV
Lecture—2 hours, six field trips per week. Prerequisite: course 111 or 116 (may be taken concurrently) or consent of instructor. Preparation for field work in community nutrition program development and implementation of community nutrition programs.
Nutrition (Graduate Group): Nutrition Science

120. Food Habits and their Nutritional Implications (4) III. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biochemistry 101B; course 20 recommended. Analysis of problems related to food habits and nutrition, physiological implications; pica, toxicants naturally occurring in food; ethnic diet; food systems; dietary codes; overview and case histories.

121. Technical Animal Nutrition (2) II. Heilmann (Animal Science)
Lecture—2 hours. Prerequisite: course 110. The application of principles of nutrition to the feeding of livestock. Evaluation of the nutrient content and feeding value of feedstuffs and formulated rations. Feeding standards and nutrition requirements of domestic species. Nutritional and physiological functions. Ratition formulation; feed cost ratios.

122. Ruminant Nutrition and Digestive Physiology (3) III. Moors (Animal Science)
Lecture—3 hours. Prerequisites: Physiology 110B, Biochemistry 101A-101B or Physiological Sciences 101A-101B; sophomore 2 recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation.

123. Nutrition of Non-Ruminant Animals (3) III. Kratzer (Avian Science)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103 or course 110. Application of nutrition principles to the feed requirements of non-ruminant species, including swine, poultry and laboratory animals.

124. Journalistic Practicum in Nutrition (2) I. Stein, Swernerton
Discussion—2 hours. Prerequisite: course 111; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition. Review of consumer-oriented techniques to interest scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated once for credit. Offered in odd-numbered years.

190. Proseminar in Nutrition (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: senior standing; course 102 or 111. Discussion of current nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated for credit with consent of instructor.

192. Internship (1-12) I, II, III. The Staff
Laboratory—3-36 hours. Prerequisite: upper division course in Nutrition and consent of instructor. Work experience or work in the practical application of nutrition supervised by a faculty member. (P/NP grading only.)

1977. Tutoring in Nutrition (1) (2) I, II, III. The Staff
Discussion—laboratory—3 hours. Prerequisites: Nutrition, Dietetics, Community Health or related major. Completion of course 101 or 110 with B grade or better. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Rucker in charge)
(P/NP grading only.)

Graduate Courses

201. Vitamin Metabolism (2) I. Rucker
Lecture—2 hours. Prerequisite: course 110, Biochemistry 2, Biochemistry 101A-101B or Physiological Sciences 101A-101B, and Physiology 101. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutritional aspects and the metabolism and chemistry of vitamins and vitamin-like compounds emphasized.

202. Advanced Animal Energetics and Energy Metabolism (3) I. The Staff (Baldwin, Animal Science, in charge)
Lecture—4 hours. Prerequisite: course 110, Biochemistry/Physiological Sciences 101A-101B, or Physiology 110. History of nutritional energetics; evaluation of energy transformations associated with food utilization; energy expenditures at cellular, cellular and tissue levels; energy transformations as affected by diet and physiological state; appetite regulation; obesity, lipid transport and metabolism.

203. Advanced Protein and Amino Acid Nutrition (4) III. The Staff (Rogers, Physiological Sciences, in charge)
Lecture—4 hours. Prerequisites: course 110, Biochemistry/Physiological Sciences 101A-101B, and Physiology 110. Nutritional significance of protein and amino acids, including studies of the role of dietary protein in digestion, absorption, metabolism, resistance to disease and food intake. Study of dietary requirements and interactions among amino acids.

212. Design and Evaluation of Nutrition Education Programs (3) I. Lecture—2 hours. Prerequisite: graduate standing in nutrition; credit and instruction in planning and evaluating nutrition programs. Emphasis on nutrition education, curricula, instructional strategies and evaluation methods in formal classrooms and community settings. Intended for students preparing to administer programs or teach in universities or dietetic internships.

216. Advanced Diet Therapy (3) III. Zerman
Lecture—2 hours. Prerequisite: course 116A-116B. Nutrition and disease interrelationships at cellular, tissue and whole body levels with emphasis on human disease. Critical evaluation, methodology in the study of nutrition in disease states.

235. Single Carbon Metabolism in Nutrition (2) I. Zerlin and Vohra (Avian Sciences)
Lecture—2 hours. Prerequisite: course 203. Nutritional and metabolic interrelationships involving the transfer of single carbon units in various animals; the involvement of the metabolic function of biotin, folic acid, vitamin B, pyrophosphates, choline, methionine and other nutrients. Offered in odd-numbered years.

252. Nutrition and Development (3) II. Hurley
Lecture—3 hours. Prerequisites: courses 201, 202, 203. Relationship of nutrition to prenatal and early postnatal development. Offered in even-numbered years.

255. Control of Food Intake (3) III. Rogers (Physiological Sciences, Mendel (Animal Science), Stein
Lecture—2 hours; discussion—1 hour. 2 or 3 laboratory demonstrations per week. Prerequisites: courses 201, 202 or Physiology 2108 or consent of instructor. Comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in even-numbered years.

258. Ruminant Digestion and Metabolism (3) I. Morris and Baldwin (Animal Science)
Lecture—2 hours. Prerequisites: courses 122, 201, 202, 203 recommended. Qualitative and quantitative aspects of ruminant digestive and metabolic processes; nutrient requirements, rumen fermentation, biochemistry and metabolism; digestive physiology; nutrient absorption; patterns and mechanisms of nutrient utilization; regulatory processes. Offered in even-numbered years.

259. Natural Toxins in Foods (2) II, III. Kratzer and Vohra (Avian Sciences)
Lecture—2 hours. Prerequisites: courses 201, 202, 203. Occurrence, mode of action and alleviation of several natural toxins in foods and feeds. Offered in odd-numbered years.

259N. Nutritional and Hormonal Control of Animal Metabolic Function (3) I. Baldwin (Animal Science), Freedland (Physiological Sciences)
Lecture—3 hours. Prerequisites: courses 201, 202, 203. Physiological Sciences 202A, 202B. Significance and interpretation of enzyme, metabolite, in vivo and in vitro isoform tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluating normal metabolism. Diet-hormone interaction and carbohydrate, amino acid and lipid metabolism will be discussed. Offered in odd-numbered years.

259G. Beginning Nutrition Seminar (1) I, II, III. The Staff (Vohra, Avian Science, in charge)
Discussion—1 hour; seminar—1 hour. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition literature review and evaluation as to text. Limited enrollment.

259C. Research Conference (1) I, II, III. The Staff (Rucker in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (SU grading only.)

259A. Advanced Nutrition Seminar (1) I, II, III. Grivetti in charge
Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (SU grading only.)

259H. Supervised Teaching in Nutrition (2) I, II, III. The Staff
Teaching under supervision of members of Nutrition Graduate Group—6 hours. Prerequisite: graduate status in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level, curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (SU grading only, and an evaluation letter to the Graduate Advisor with copy to the student.)

259J. Group Study (1-5) I, II, III. The Staff

259K. Research (1-12) I, II, III. The Staff
(SU grading only)

Professional Course

385. Supervised Teaching in Dietsetics (2-12) I, II, III, extra- semester summer. The Staff
Laboratory—6-36 hours. Prerequisite: graduate standing in M.S. program in Nutrition with emphasis in dietsetics; consent of instructor. Directed teaching in approved dietsetic internship or coordinated program in dietsetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

Nutrition (A Graduate Group)

Louis E. Grivetti, Ph.D., Chairperson of the Group
Group Office, 129 Eversen Hall (752-6850)
Graduate Study. The Graduate Group in Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding these programs, address the chairperson of the group.
Graduate Advisers. Consult the Nutrition Graduate Group Office.

Nutrition Science

(College of Agricultural and Environmental Sciences)

The Major Program

The Nutrition Science major provides organized study in nutrition and relevant biological and physical sciences as preparation for graduate study in nutrition, including the nutrition of species or groups, such as human, domestic animal, avian and wildlife; (2) professional study of medicine, veterinary medicine, public health, dietetics, and other health sciences; (3) technical work in nutrition

To fulfill the academic requirements for an internship in Dietetics, choose the following courses from the categories in which they appear above: English 1, Psychology 1, Sociology or Anthropology 2, Economics 18, Food Science and Technology 100A, 100B, Nutrition 110, 111, 111L, 116A, 116B. The following courses must be added: Agricultural Economics 112, Food Science and Technology 102A, 102B, 125C, 125L, 125N, 125T, 125S, 125, 122, 123. Applied Behavioral Sciences 173 or Education 110. Students intending to apply for admission to a professional internship must contact the Master Adviser in Dietetics no later than the first quarter of the junior year for information on procedures.

282
Courses in Chinese
See Asian American Studies for courses in Can- tonese language.

Lower Division Courses

1-33. Elementary Chinese Modern (E 6-6) I-II-III, Li
  Lecture—3 hours; recitation—3 hours. (Students who have
  successfully completed Chinese 2 or 3 in the 10th or higher
  grade in high school may receive unit credit for this course
  on a P/NP grading basis only. Although a passing grade will
  be charged to the student’s P/NP option, no petition is
  required. All other students will receive a letter grade
  unless a P/NP petition is filed.)

4-5-6. Intermediate Modern Chinese (E 6-6) II-II-III, G. Gibbs
  Lecture—3 hours; recitation—3 hours. Prerequisite: course
  3 or equivalent.

Upper Division Courses

101. Classical Chinese (4) I, II, III, Wallacker
  Lecture—3 hours; term paper. Prerequisite: course 6.
  Readings in selected texts. May be repeated twice for
  credit. To be given if a sufficient number of students
  enroll.

111. Modern Chinese Literature: Reading and Discussion (4)
  I, II, III, G. Gibbs
  Lecture—3 hours; discussion—1 hour. Prerequisite: course
  6 or the equivalent. Short stories, newspaper articles,
  essays. May be repeated twice for credit.

Courses in Japanese

Lower Division Courses

  Lecture—3 hours; recitation—3 hours. (Students who have
  successfully completed Japanese 2 or 3 in the 10th or higher
  grade in high school may receive unit credit for this course
  on a P/NP grading basis only. Although a passing grade will
  be charged to the student’s P/NP option, no petition is
  required. All other students will receive a letter grade
  unless a P/NP petition is filed.)

4-5-6. Intermediate Modern Japanese (4) I
  Lecture—3 hours; recitation—2 hours. Prerequisite: course
  3 or the equivalent. First of three sequential courses in
  intermediate modern Japanese and places equal emphasis
  on reading, speaking, and writing. Approximately 200 new
  kanji will be introduced, in addition to those taught in
  courses 1, 2, and 3.

5. Intermediate Modern Japanese (4) II
  Lecture—3 hours; recitation—2 hours. Prerequisite: course
  4 or the equivalent. Second of three sequential courses in
  intermediate modern Japanese and places equal emphasis
  on reading, speaking, and writing. Approximately 200 new
  kanji will be introduced, in addition to those taught in
  courses 1 through 4.

6. Intermediate Modern Japanese (4) III
  Lecture—3 hours; recitation—2 hours. Prerequisite: course
  5 or the equivalent. Third of three sequential courses in
  intermediate modern Japanese and places equal emphasis
  on reading, speaking, and writing. Approximately 200 new
  kanji will be introduced, in addition to those taught in
  courses 1 through 5.

Upper Division Courses

*101. Literary-Style Japanese (2) I, II, K. Kim
  Lecture—1½ hours; term paper. Prerequisite: course 121.
  Readings from pre-World War II Japanese texts in
  the Bunbun style. May be repeated for credit.

*111. Japanese Composition (2) I, S. Shihaboto
  Lecture—2 hours; term paper. Prerequisite: course 6 or
  consent of instructor. Development of skills in the tech-
  niques of writing Japanese. Practice in short essay
  writing with an Aim toward mastery of the vocabulary and syntax
  of written style Japanese.

121. Modern Japanese: Reading and Discussion (4) I, Shih-
  aboto
  Lecture—3 hours; discussion—1 hour. Prerequisite: course
  6. Readings in modern Japanese short stories, newspaper
  articles, and essays, based on reading skills developed in
  courses 1 through 6. Television programs selected to co-
  ordinate with readings will be used to provide practice
  relating language to social situations.

122. Modern Japanese: Reading and Discussion (4) II, Shih-
  aboto
  Lecture—3 hours; discussion—1 hour. Prerequisite: course
  121. Readings in modern Japanese short stories, newspaper
  articles, and essays, based on reading skills developed in
  courses 1 through 121. Television programs selected to
  coordinate with readings will be used to provide practice
  relating language to social situations.

Oriental Languages and Civilizations
See Class Schedule and Room Directory.

Orthopaedic Surgery
See Medicine
Otorhinolaryngology
See Medicine

Pathology
Veterinary Medicine, this page; Medicine, see page 269.

Pathology (School of Veterinary Medicine)
Donald L. Dungworth, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 1126 Haring Hall (752-1365)

Faculty
Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus
Donald L. Dungworth, B.V.Sc., Ph.D., Professor
Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Assistant Professor
Charles A. Holmberg, D.V.M., Ph.D., Associate Professor
Peter C. Kennedy, D.V.M., Ph.D., Professor
Linda J. Lowenstein, D.V.M., Ph.D., Assistant Professor
Peter F. Moore, B.V.Sc., Ph.D., Assistant Professor
Jack E. Moulton, D.V.M., Ph.D., Professor
Harvey J. Olander, D.V.M., Ph.D., Professor
Bennie I. Osburn, D.V.M., Ph.D., Professor
Roy R. Pool, Jr., D.V.M., Ph.D., Professor
Anthony A. Stannard, D.V.M., Ph.D., Professor (Pathology, Medicine)
Dennis W. Wilson, D.V.M., M.S., Ph.D., Assistant Professor

Courses in Pathology
Upper Division Course
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PHM grading only.)

Graduate Courses
281. Foreign Animal Diseases (2) I, II. Moulton, Howarth Lecture—2 hours. Prerequisite: graduate or veterinary medical students or consent of instructor. Epidemiologic and pathologic processes associated with foreign animal diseases of global importance. Offered in even-numbered years.

282. Tumor Pathology (3) II. Moulton, Dungworth Lecture—3 hours. Prerequisite: graduate standing or final year veterinary medical student and consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in even-numbered years.

Pediatrics
See Medicine

Pharmacology
See Medicine

Pharmacology and Toxicology
Graduate Group (see below), and Veterinary (see page 329)

Pharmacology and Toxicology (A Graduate Group)
Keith F. Kilian, Jr., Ph.D., Chairperson of the Group
Group Office, 4453 Medical Science 1A (Department of Pharmacology), (752-3200)

Faculty
Graduate group faculty members are based in the Departments of Environmental Toxicology, Pharmacology, Veterinary Pharmacology and Toxicology, and other related departments and laboratories in Medicine, Veterinary Medicine and Agricultural and Environmental Sciences.

Graduate Study. The Graduate Group in Pharmacology and Toxicology offers programs of study and research leading to the M.S. and Ph.D. degrees. For information on the program of study, contact the appropriate graduate adviser (below) or the group chairperson. See also page 95.

Graduate Advisers. W. W. Kligore (Environmental Toxicology), R. M. Joy (Veterinary Pharmacology and Toxicology), W. D. Winters (Pharmacology).

Courses in Pharmacology and Toxicology
Graduate Courses
230. Advanced Topics in Pharmacology and Toxicology (1-3) I, II, III. The Staff Lecture-discussion-seminar—1 hour each (course format can vary at option of instructor). Prerequisite: Pharmacology 200A-200B, Environmental Toxicology 200, or consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.

282. Seminar (1) I, II, III. The Staff Prerequisite: consent of instructor. Current topics in pharmacology and toxicology. (PHM grading only.)

Philosophy
(College of Letters and Science)
Joel I. Friedman, Ph.D., Chairperson of the Department
Department Office, 118 Philosophy Building (752-0607)

Faculty
Ronald A. Arbini, Ph.D., Associate Professor
Fred R. Berger, Ph.D., Professor
William H. Bossart, Ph.D., Professor
Joel I. Friedman, Ph.D., Professor

284
Minor Program Requirements:

In consultation with the minor adviser, students may plan a minor in Philosophy. Students may select a broad range of courses, or they may concentrate their work in a special field. Examples of some specialized areas of study include philosophy and the sciences, philosophy and society, history of philosophy, and logic and language.

Minor Program Requirements:

Ordinary, 20 upper division units, chosen in consultation with minor adviser. In some cases, other division units may be substituted for no more than 4 upper division units.


Courses for Non-Majors. The department offers a range of courses for non-majors. Students pursuing careers in agriculture and engineering might find Philosophy 5 and 10A-3 especially useful, since these courses provide practice in concise and logical writing. Science and mathematics students may find these courses useful, as well as Philosophy 12, 107, 108 and 112. Pre-law students and students planning a concentration in the various history sciences may be interested in Philosophy 14 and 114A-114B. The offerings at the upper division level include courses of direct relevance to students in psychology, history, art, sociology, anthropology, and political science.

Department Activities for Undergraduates. The Philosophy Department sponsors a series of well-known philosophers who present papers in their fields of expertise. The department also operates an on-going faculty and graduate student colloquia. Undergraduate students are welcome to attend and join these discussions. Information can be obtained in the department office.

Through a grant from former University President David S. Saxson, the department sponsors an essay contest each year which is open to all undergraduates. The David S. Saxson Prize in Philosophy consists of a monetary award to the student submitting the best essay on the subject set for the year. Information can be obtained in the department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. Graduate students who intend to work only for the M.A. degree are not admitted to the graduate program. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. G. J. Mattly.

Courses in Philosophy

Lower Division Courses

1. Introduction to Philosophy (4) I, II, III. The Staff (Chairperson in charge). Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy.

2. Critical Reasoning (4) III. Berger. Lecture—3 hours; discussion—1 hour. Papers or written reports. Criteria of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity.

3. Themes in Philosophy (4) I, II, III. The Staff. Lecture-discussion—3 hours; papers or written reports. Introduction to study of related problems in an area of philosophical interest. Examples: Knowledge and Existence; (B) Self and Mind; (C) Philosophy and the Arts; (D) Morals and Politics; (E) Philosophy East and West; (F) Philosophy and Science; (G) Religion and Human Nature.

4. Introduction to Logic (4) I, Arbini. Lecture—3 hours; discussion—1 hour. Basic concepts and techniques of deductive logic with emphasis on propositional logic. Development of the logical system for propositional logic. Translation of English into symbolic formulas.

5. Ethical and Social Problems in Contemporary Society (4) III. Gilbert. Lecture—3 hours; discussion—1 hour. Philosophical issues and positions involved in contemporary moral and social problems. Among possible topics are: civil disobedience and revolution, environmental politics, radical feminism, population control, genetic engineering, technology and human values, sexual morality, freedom in society.


Upper Division Courses

901. Founders of Modern Thought (4) I, Gilbert. Lecture-discussion—3 hours; term paper. Prerequisite: not open to philosophy majors or students who have received credit for course 22 or 23. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.

902. Epistemology (4) I, Wecin. Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Theories of being. Subjectivity as reality, subjectivity and objectivity, space, time, causality, becoming, body, experience, persons, freedom and determinism. Views of the nature and method of metaphysics. Anti-metaphysical discriminations.

903. Theory of Knowledge (4) I, Mattly. Lecture-discussion—4 hours. Prerequisite: one course in philosophy recommended. Philosophical problems of experience and theory, knowledge and justification, inference, truth and error, belief and knowledge. Types of epistemology.

904. Philosophy of Mind (4) III, Wecin. Lecture-discussion—3 hours. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, perception, and causation. Offered in odd-numbered years.

905. Philosophy of Religion (4) I, Gilbert. Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological and existential aspects of selected religious concepts and problems.

906. Philosophy of the Physical Sciences (4) I. The Staff. Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or a science background recommended. The nature of factualism and confirmation of scientific hypotheses; the nature of laws, theories, explanations, and models. Problems of causality, determinism, induction, and probability; the structure of scientific research.

907. Philosophy of the Biological Sciences (4) III. Ayala (Genetics) and staff. Lecture-discussion—4 hours. Prerequisite: a background in a biological science or one philosophy course recommended. Scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, and sociobiology. Bio-engineering and environmental ethics. (Same course as Genetics 108 and Environmental Studies 108).

908. Philosophy of the Social Sciences (4) II, Berger. Lecture-discussion—4 hours. Prerequisite: one philosophy course or social science background recommended. Nature of human action and behavior, and of explanation of behavior. Nature of laws and explanation in the social sciences. Problems in the social sciences such as: "interpretive understanding," role of prediction, behaviorism, reductionism, role of value judgments, and social rules.

912. Intermediate Logic (4) II, Mattly. Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or permission of Instructor. Development of the modern logic, with identity and descriptions, decision procedures, advanced translation of English into the formal language; elementary theory of classes and relations, Russell's paradox.

1114. Introduction to Ethics (4) I, Berger. Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. An introduction to major writings of philosophers on central problems of right conduct; principles of obligation, responsibility, justice, the meaning of the basic terms of ethical language. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.
114. Problems of Ethical Theory and Practice (4) II. Berger
Lecture-discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. Discussion of important ethical theories with application to contemporary moral problems. Examples: relativism, utilitarianism, and justice. 301. Sociological Realism, Politics, and Social Science, 3 hours; 3rd year or junior philosophy major. Prerequisite: one course in Philosophy recommended. Examination of the philosophical history of the sociology of law and the role of the sociologist in society. 302. Philosophy of Art (4) II. Stiles
Lecture-discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. The major philosophical systems of art, including Kant, Nietzsche, and Heidegger. 303. Philosophy and the Liberal Arts (4) II. White
Lecture-discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. The philosophy of the liberal arts, including the nature of knowledge, the nature of reality, and the nature of moral action. 304. Existentialism (4) II. Bossart
Lecture-discussion—3 hours; term paper. Prerequisite: one course in Philosophy, course 23 especially recommended. Introduction to the philosophy of existentialism, including the work of Heidegger, Sartre, and Merleau-Ponty. Offered in odd-numbered years. 305. Plato (4) R. Malcom
Lecture-discussion—3 hours. Prerequisite: course 21. Offered in even-numbered years. 306. Aristotelianism (4) II. Malcom
Lecture-discussion—3 hours; term paper. Prerequisite: one course or consent of instructor. Offered in odd-numbered years. 307. Descarte (4) II. Arlin
Lecture-discussion—3 hours; term paper. Prerequisite: course 22. Offered in even-numbered years. 308. Spinitz (4) III. Friedman
Lecture-discussion—4 hours. Prerequisite: course 22. Offered in even-numbered years. 309. Leibniz (4) II. Malcom
Lecture-discussion—3 hours; term paper. Prerequisite: course 22. Offered in odd-numbered years. 310. Hobs (4) II. Gilbert
Lecture-discussion—3 hours; term paper. Prerequisite: one course in Philosophy recommended. Offered in even-numbered years. 311. Locke (4) II. Malcom
Lecture-discussion—3 hours. Offered in even-numbered years. 312. Berkeley (4) III. Mathey
Lecture-discussion—4 hours; term paper. Prerequisite: course 23 recommended. Offered in even-numbered years. 313. Hume (4) III. Arlin
Lecture-discussion—4 hours. Prerequisite: course 23 recommended. Offered in even-numbered years. 314. Kant (4) II. Mathey
Lecture-discussion—4 hours. Prerequisite: course 23. Offered in even-numbered years. 315. Hegel (4) II. Bossart
Lecture-discussion—4 hours. Prerequisite: courses 23 and 175A recommended. Offered in even-numbered years. 316. Special Topics in the History of Philosophy (4) II. Malcom

The Major Program
The major in Physical Education is designed to effect a broad scholarly understanding of human movement. This is achieved primarily by completion of a core of lower division courses in the biological, physical and behavioral sciences, and a required departmental upper division core of courses. The latter are designed to develop a scientific, integrative understanding of man's acute and chronic responses to physical activity under a broad spectrum of developmental and stressor states. The major permits specialization in either the biological or psychological aspects of physical activity. Career options for students completing the major include allied health, exercise and sports sciences, as well as teaching and coaching.

Physical Education
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A</td>
<td>5</td>
</tr>
<tr>
<td>Physical Education 45</td>
<td>3</td>
</tr>
<tr>
<td>Physics 1A</td>
<td>3</td>
</tr>
<tr>
<td>Psychology 1 or 15</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13</td>
<td>4</td>
</tr>
</tbody>
</table>
Fines are imposed for each formal transaction nec-
ecessitated by failure of the student to comply with
the regulations of the department.

Courses in Physical Education

Lower Division Courses

1. Physical Education for Men and Women (12) I, II, III. The Staff (Chairperson in charge)
   Laboratory—2 hours. Prerequisite: Sound in: a) physical skills, skills and strategy; b) physical fitness and personal health; c) recrea-
   tion, d) dance, and e) intercollegiate athletics. May be repeated for a total of 6 units. (P/NP grading only)

2. Principles of Basic Exercise Conditioning (2) I, II, III.
   Lecture—1 hour, laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches to current in
   selected exercise training regimens, e.g., theory of aerobic function and capacity, exercise and diet in weight control, 
   muscular strength development and maintenance, and limitations of environment, age and gender on fitness levels. 
   (P/NP grading only)

5. Foundations of Emergency First Aid Services (2) I, II, III.
   The Staff (Pappas in charge)
   Lecture—1 hour; laboratory—1 hour. An introduction to the
   basic principles and practices that fulfill the prerequisites for
   advanced study in First Aid and Emergency Medical Services.
   Upon successful completion of course the Standard 
   and Red Cross certificates. 
   (P/NP grading only)

7. Professional Physical Education Activities: Men and 
   Women (1) I, II, III. The Staff (Chairperson in charge)
   Lecture—1 hour, laboratory—2 hours. Fundamental skills for
   a) coaching, b) active athletics, c) classroom
   teaching and coaching, and d) classroom teaching and
   officiating. May be repeated for a total of six units.

15. Administration of Intramural Sports (2) II. Collberg
   Lecture—2 hours. Planning, organizing and administering
   intramural sports programs at the high school and college campus.

25. Theory of Lifesaving and Water Safety (2) I, II, III.
   Jahn Lecture—1 hour; laboratory—2 hours. Prerequisite: course
   5. Sound physical condition, no physical handicap that
   would render student unable to perform the required skills
   and ability to pass preliminary swim test. Provides
   the student with the knowledge, organizational
   and skill development necessary to provide for water safety
   and save his own life or the life of another in an aquatic
   emergency. (American Red Cross Advanced Lifesaving Certificate awarded upon successful completion of neces-
   sary requirements.)

27. Training Course for Water Safety Inspectors (2) II.
   Hinsdale
   Lecture—1 hour, laboratory—2 hours. Prerequisite: advanced
   swimming and Senior Life Saving Certificate. Theoretical
   knowledge and practical experience necessary for
   the organization and teaching of swimming and lifesav-
   ing classes. (American Red Cross Water Safety Inspectors Certificate awarded upon successful completion of neces-
   sary requirements.)

28. Basic Scuba (2) I, III, Morris
   Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition and ability to pass preliminary
   swim test. Introduction to basic knowledge required for SCUBA div-
   ing, function and maintenance of equipment, physics
   and physiology of diving, diver first aid and CPR, oceanography
   and marine life, and underwater communication. Pool and
   open water sessions available for certification. (P/NP grading
   only.)

30. Synchronized Swimming Competition (2) I, II.
   Jahn Lecture—1 hour; laboratory—2 hours. Prerequisite: course
   1 (synchronized swimming) or consent of instructor. Princi-
   ples of choreography, tuning, and team compon-
   tions: stage, execution, synchronization. Understanding
   and appreciation of technical principles of water show produc-
   tions: basic tools and equipment, principles of set construc-
   tion, scene painting, costume construction, lighting, and sound
   equipment.

35A. Dance Composition (2) I, II, III, IV.
   Laboratory—6 hours. Prerequisite: course 1 or consent of
   instructor. To learn the elements of dance production as it
   applies to the use of lighting, costume design, selection of
   music, and building of dance structures. (P/NP grading only)

35C. Dance Composition (II, III, IV). Laboratory—6 hours.
   Prerequisite: courses 35A, 35B, or consent of instructor. To encourage the student to create new
   dance forms and prepare them for a 4-7 minute presen-
   tation in a spring concert on stage. Costumes and lighting will be created and correlated for each dance by the
   choreographer.

36A-36B. History of Dance (3-3) I, II.
   Lecture—3 hours. Study of dance as a regulation from 
   the primitive to the Renaissance periods. The development
   of dance as an art form from the Baroque period to the twenti-
   eth century.

44. Principles of Healthful Living (2) I, II, III. Lotter
   Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health prob-
   lems. (P/NP grading only)

44L. Principles of Teaching Healthful Living (I, II, III. Lotter
   Discussion—2 1/2 hour evening sessions. Prerequisite: course
   44 (concurrently). Course will supplement course 44 by 
   specifically dealing with the principles of teaching healthful 
   living, as covered in the lectures and as found in the 
   California Health Education Framework. Required of all 
   teaching credential students. (P/NP grading only)

45. Foundations of Physical Education (3) I, Adams
   Lecture—3 hours. An introduction to historical, biomechani-
   cal, physiological, and sociological foundations of 
   physical education.

92. Physical Education Internship (2-5) I, II, III. The Staff
   (Chairperson in charge)
   Laboratory—6 1/2 hours: written project proposal and evalua-
   tion. Prerequisite: consent of instructor dependent
   on availability of intern positions, with priority given to
   Physical Education majors. Work experience in the application of physical activity programs to teaching,
   counseling, and correctional, clinical or research situations under department faculty supervision. May be repeated for credit once
   but no internships units will be counted toward Physical Education major. (P/NP grading only)

97T. Tutoring in Physical Education (1-9) I, II, III. The Staff
   (Chairperson in charge)
   Tutorial—1-1/2 hours. Prerequisite: lower division standing 
   and consent of Department Chairperson. Tutoring of stu-
   dents in lower division physical activity courses. Weekly 
   meeting with instructor in charge of course. Written re-
   ports on methods and materials required. May be repeated once
   for credit. (P/NP grading only)

98. Directed Group Study (1-5) I, II, III. The Staff (Chair-
   person in charge)
   Prerequisite: consent of instructor and Department Chair-
   person. (P/NP grading only)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
   (Chairperson in charge)
   Prerequisite: consent of instructor. (P/NP grading only)

Upper Division Courses

100. Field Experience in Teaching Physical Education (2) I, II, III. The Staff (Chairperson in charge)
   Discussion—1 hour; field work—4 hours. Prerequisite: upper 
   division standing and approval of 7 or 8 in lower division.
   Consent of instructor. Tutoring or teachers aide in physical education type activities, including athletic coaching, in 
   public schools, under the guidance of a regular physical education teacher supervised by a departmental faculty person. (P/NP grading
   only)

101. Physiological Regulation During Exercise (4) I. Ber-
   nauer, Moss
   Lecture—3 hours; discussion—1 hour alternate weeks with 
   laboratory 3 hours. Prerequisite: Biological Sciences 1; 
   Physiology 110. A study of muscle/neuromuscular, 
   cardiovascular, body fluids, blood, acid base and respiratory 
   metabolic regulations during acute bouts of exercise and 
   work. Focus on physiological and environmental factors 
   limiting capacity and causing fatigue. Role of physical activity
   in maintaining optimal regulatory functions.

105. Physiological Adaptations to Exercise (2) II. Adams, 
   Bracht
   Laboratory—2 hours. Prerequisite: course 101 or consent of 
   instructor. Study of physiological capacities with reference 
   to genotypic and adaptive aspects. Analysis of physiologi-
   cal adaptations to chronic physical activity and selected
   environmental stresses.

106. Analysis of Human Movement (4) II. K. Williams
   Lecture—3 hours; laboratory—3 hours to alternate weekly with
   discussion—1 hour. Prerequisite: Human Anatomy 1 and 
   Physioology 1A; Physics 3A recommended. Kinetic and 
   mechanical fundamentals of human motion. Qualitative 
   and quantitative application of kinesiological principles to a 
   variety of movement situations.

106. Introduction to Motor Control and Skill Acquisition (3) I.
   K. Williams
   Lecture—2 hours; discussion—1 hour alternate weeks with 
   laboratory—2 hours. Prerequisite: course 105, 115.
   Analysis of variables affecting man's ability to produce, 
   learn, and retain movement skills. Basic neuropsychological
Physical Education
and behavioral accounts of motor control processes are examined. Theories of movement retention and motor learning are discussed.

105. Psychosocial Factors in Motor Performance (3) I, III. Ryan
Lecture—3 hours. Prerequisite: Psychology 1, 15, or 18. Survey of theories and experimental findings from social psychology and human motivation and their application to motor performance, including sex differences, success and failure, anxiety, need for affiliation, competition, and aggression.

110. Exercise Metabolism (3) II. Moie
Lecture—2 hours; laboratory—five 4-hour sessions. Prerequisite: course 101, 102, Chemical 1A. Focus on the biochemistry and physiology of metabolic pathways and fuels used during different modes of exercise. Also, exercise-induced adaptations which effect performance and fitness. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise.

111. Environmental Effects on Physical Performance (3) III. Adams, Bernauer
Lecture—2 hours; discussion—1 hour; laboratory—1½ hours. Prerequisite: courses 101 and 102, or consent of instructor. The effects of thermal, biomechanical and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological limitations and adaptations, will be studied.

112. Clinical Exercise Physiology (4) III. Holly
Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined. Normal and diseased populations (cardiac, pulmonary, psychiatric, diabetic). Assessment (graded exercise testing). Exercise prescription and effects of exercise conditioning examined in detail.

113. Growth and Development in Human Performance (3) I. Moie, Adams
Lecture—2 hours. Prerequisite: Biological Sciences 1, Human Anatomy 101, and Physiology 110. Development of human performance potential from conception to old age, including growth and development, athletic participation, and preventive medicine. Alterations in motor skill patterns, morphology and body composition, and physiological capacities are studied.

115. Biomechanical Bases of Movement (3) II. K. Williams
Lecture—2 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: course 103 or consent of instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography, and measurement techniques. Applications to sport, clinical, and work environments, including extensive analysis of locomotion.

120. Sports in American Society (4) III. Gill
Lecture—2 hours; laboratory—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religion, art, sex, and race. Social and economic implications of current trends and problems.

125. Neuromuscular Control of Movement (3) III. K. Williams
Lecture—2 hours; laboratory—2 hours to alternate with discussion—1 hour. Prerequisite: course 104 and Psychology 1, or consent of instructor. Factors which affect control of movement investigated from neuropsychological, physiological, and biomechanical viewpoints. Topics include central versus peripheral control mechanisms, open- and closed-loop systems, background on light and darkness, night vision, research methods, work performance under water, cold-water diving, water-kite diving, introduction to deep diving, and winter sports. Sessions available for certification (contact Department Office for details). (PINF grading only.)

128A. Research Diving: 65 Feet (1) II, Bell
Lecture—1 hour; laboratory—1 hour. Prerequisite: Basic SCUBA Certification from approved agency (course 23 or the equivalent); 10 logged-open-water dives since certification; and consent of instructor. Lectures in diver rescue, survival, navigation, searching and light salvage, night diving, research methods, work performance under water, cold-water diving, water-kite diving, introduction to deep diving, and water skiing. Lab sessions available for certification (contact Department Office for details). (PINF grading only.)

128B. Research Diving: 65 Feet (2) II, III. Morris
Lecture—2 hours; laboratory—2 hours to alternate weekly. Prerequisite: course 128A. Consent of instructor. Lectures in diver rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, coldwater diving, blue-water diving. Introduction to deep diving, and water skiing. Lab sessions available for certification (contact Department Office for details). (PINF grading only.)

129A. Physical Education for the Handicapped (4) II. Voelz
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103 and consent of instructor. The role of exercise, physical rehabilitation, and remediation in the improvement of movement for handicapped individuals.

129B. First Aid Leadership and Accident Management (3) I, II, III. Pappa
Lecture—1 hour; laboratory—2½ hours. Prerequisite: course 5 or the equivalent. Understanding of the use of various types of exercise to prevent accidents; understanding primary areas of participants in all activities and how to handle them.

140. Principles and Theory of Physical Education (4) II. Singleton
Lecture—4 hours. Prerequisite: course 45 or consent of instructor. Critical analysis of the assumptions underlying the physical education program.

142. Physical Education in the Public Schools (3) II. Schmalenberger
Lecture—3 hours. Prerequisite: course 140 and senior standing or consent of instructor. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.

150. Recreation in the Community (3) III. Jahn
Lecture—2 hours; discussion—1 hour; two Saturday field trips—4 hours. Prerequisite: 101; consent of instructor. Exploration of various programs in California emphasizing low income, highly populated areas and poor rural communities.

192. Physical Education Internship (2-12) I, II, III. The Staff
Chairperson in charge)
Laboratory—6-36 hours; written project proposal and evaluation required. Prerequisite: upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physical Education majors. Work-learning experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit for total of 12 units (including course 92), but no internship units will be counted toward Physical Education major. (PINF grading only.)

197T. Tutoring in Physical Education (1-5) I, II, III. The Staff
Chairperson in charge)
Tutorial—1-5 hours. Prerequisite: consent of instructor. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated once for credit. (PINF grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Chairperson in charge)
Prerequisite: consent of Department Chairperson. (PINF grading only.)

Graduate Courses

200A. Introduction to Research: History and Philosophy in Physical Education (2) I, I., Bell, Moie
Discussion—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science and their application to current research in human performance; benchmark studies in the evolution of the field.

200B. Problem Solving and Research Design in Physical Education (2) I, III
Discussion—1 hour; seminar—1 hour. Prerequisite: course 200A. Conventional approaches to problem solving, processes in research design and analysis; written and oral presentation of a thesis proposal.

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. The Staff (Bernauer in charge)
Lecture—2½ hours; laboratory—2 hours. Prerequisite: graduate students with upper division course in systemic physiology or anatomy. Multidisciplinary course introducing the student to pathophysiological processes, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will also be covered. (Same course as Sports Medicine 401A, Physical Medicine and Rehabilitation 201A, 401A.)

220. Research Topics in Biomechanics (3) III. K. Williams
Lecture—2 hours; seminars. Graduate student at instructor standing course; instructor recommended. Survey of current research in biomechanics of human movement, including locomotion, sport biomechanics, electromyography, muscle-skeletal and tissue mechanics, advances in measurement technology, clinical biomechanics.

221. Anthropometric in Physical Activity (3) III. Adams
Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with the five 1-hour discussion sessions. Prerequisite: courses 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, body structural and composition changes accompanying prolonged, systematic physical conditioning, and body composition in old age.

222. Metabolic Functions in Exercise (4) III. Moie
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 102, Physiology 114. Review of the current research of human metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and blood water balance, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

223. Physiological Basis of Physical Fitness (2) II, Bernauer, Semired
Lecture—2 hours. Prerequisite: graduate standing; Review and critical discussion of current research topics concerned with the physiological aspects of physical training and adaptation. Offered in odd-numbered years.

241. Exercise Electrocardiography (2) H. Holly
Lecture—2 hours. Prerequisite: course 112 or consent of instructor; Physiology 112. Physiological implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as is the predictive significance of normal and abnormal ECG.

265. Seminar in Cardiac Rehabilitation (2) II, H. Holly
Seminar—2 hours. Prerequisite: course 112 or graduate standing and consent of instructor. Critical examination of literature dealing with the causes, prevention and treatment of cardiovascular disease with particular emphasis on intervention through cardiac rehabilitation. Both the theoretical bases and practical approaches to cardiac rehabilitation are examined.

266. Measurement of the Biological Aspects of Human Performance (3) III. The Staff (Holly in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor; course 111 or consent of instructor. Examination of primary measurement strategies used to investigate the biological bases of human performance. Emphasis placed on the critical evaluation of these strategies and on obtaining the most accurate and reliable results.

267. Human Performance: Psychological Aspects (3) II. Ryan
Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Critical review of current literature on learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport.

268. Psychological Effects of Physical Activity (3) I, Ryan
Seminar—2 hours. Prerequisite: course 112 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health.

269. Seminar in Physical Education (1, I, II, III. The Staff (Adams in charge)
Seminar—1 hour. Prerequisite: graduate standing; required of all first year students for first two quarters. Presentation and discussion of topics of interest, and the analysis of research in physical education. (SU grading only.)

270. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing; consent of instructor. (SU grading only.)

271. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing; consent of Department Chairperson. (SU grading only.)
Physical Medicine and Rehabilitation

See Medicine, School of

Physics

(College of Letters and Science)

John A. Jungerman, Ph.D., Chairperson of the Department
Wendell H. Potter, Ph.D., Vice Chairperson of the Department

Department Office, 225 Physics-Geology Building (752-1500)

Faculty

Franklin P. Brady, Ph.D., Professor
Thomas A. Caillil, Ph.D., Professor
Albert C. Cheung, Ph.D., Associate Professor
Lawrence B. Coleman, Ph.D., Associate Professor
Linton R. Corrucchini, Ph.D., Associate Professor
James E. Draper, Ph.D., Professor
Glenn W. Erickson, Ph.D., Professor
Ching-Yao Fong, Ph.D., Professor
Milton E. Gardner, Ph.D., Professor Emeritus
Cadee Garrod, Ph.D., Professor
Kenneth R. Greider, Ph.D., Professor
John F. Gunion, Ph.D., Professor
James P. Hurley, Ph.D., Associate Professor
John A. Jungerman, Ph.D., Professor
Joseph E. Kiskis, Ph.D., Associate Professor
William J. Knox, Ph.D., Professor
Winston T. Ko, Ph.D., Professor
Richard L. Laider, Ph.D., Professor
Douglas W. McColm, Ph.D., Associate Professor
Charley G. Patten, Ph.D., Professor Emeritus
Neal Peek, Ph.D., Senior Lecturer
David E. Pellett, Ph.D., Professor
Wendell H. Potter, Ph.D., Associate Professor
Robert P. Reid, Jr., Ph.D., Associate professor
William T. True, Ph.D., Professor

The Program of Study

While many people think of Physics as levers and pulleys or space ships and atomic reactors, there is much more to the realm of physics. From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of Physics is the study of what makes the universe tick. For example the working of the airplane, the paint sprayer, and the pitcher's curve ball are all understood in terms of the same physical laws. Information learned from high-energy particle accelerators and nuclear reactors teaches us not only what holds the nucleii and the atom together but also why stars shine and how radiation therapy fights cancer.

As the world becomes more and more complex, the sciences appear to become more difficult to understand. Yet appearances can be deceiving, and many of the most complex phenomena and devices are easily understood and used by those with a good understanding of the basic principles of physics. A major in Physics or in Applied Physics at UC Davis provides a student with this basic knowledge, plus experience in using that knowledge, to get the most out of today's technical world.

Careers in Physics and Applied Physics. The science of physics involves the observation of natural phenomena and events. From these observations comes the mathematical formulation of general principles which may be tested further or applied to specific problems. Because physics is so basic to other sciences, its study provides a background with broad flexibility for later activities.

Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry.

A major in Physics or in Applied Physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, materials science and energy.

The Major Programs

The Department of Physics offers three degree programs: The Bachelor of Arts in Physics, and the Bachelor of Science in Physics and in Applied Physics. The B.A. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. Either the B.S. degree in Physics or the B.S. degree in Applied Physics should be chosen by the student who plans to enter physics as a profession. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market on completing a B.S. degree, the applied physics orientation would be an asset. Either the B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Both programs are developed in a highly sequential manner, i.e., Physics 8A-8B, 9C-9D and Mathematics 2A-2B, 21A-21C and 22B-22C are required for most upper division courses and must be taken in the freshman and sophomore years. Some prerequisites may be waived with consent of the instructor.

In the freshman year, Astronomy 2 and Physics 7 are recommended for the student who wishes to take some classes in this department prior to enrolling in Physics 8 in the Spring Quarter. These courses are introductory to the department and are not preparatory to Physics 8. Honors mathematics is highly recommended for both the freshman and sophomore years.

Students who have completed a high school course in differential and integral calculus can finish the Physics 8 sequence during the freshman year and begin upper division physics courses in the sophomore year by taking Physics SBA in the first summer session prior to entering the University in the fall. This gives these students extra time in the junior and senior years to be used, for example, to complete a double major, to undertake interdisciplinary studies, to participate in special research, or to take graduate courses in physics.

In the junior year the student normally studies mathematical methods, analytical mechanics, electricity and magnetism, and begins quantum mechanics. In the senior year the study of quantum mechanics is continued and courses in the principal modern fields of physics are selected. Laboratory courses may be taken both years.

Applied Physics

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>56</td>
</tr>
<tr>
<td>Physics 8A, 8B, 8C, 8D (not required of upper division transfer students)</td>
<td>17</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B, 22C</td>
<td>21</td>
</tr>
<tr>
<td>Mathematics 28A or Engineering 5</td>
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<tr>
<td>Chemistry 1A-18-1C or 4A-4S-4C</td>
<td>15</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>50</td>
</tr>
<tr>
<td>At least 15 units from approved courses within one of the following specializations chosen in consultation with a major adviser</td>
<td>18</td>
</tr>
<tr>
<td>Materials science, physical electronics, energy, applied nuclear physics, chemical physics, atmospheric physics, geophysics, physical oceanography, applied mathematical physics. (Lists of approved courses in each specialization with representative programs are available from the Physics Department)</td>
<td>106</td>
</tr>
</tbody>
</table>

Total Units for the Major 106

A.B. Major Requirements:

<table>
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<tr>
<td>Preparatory Subject Matter</td>
<td>37</td>
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<tr>
<td>Physics 8A, 8B, 8C, 8D</td>
<td>5</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B, 22C</td>
<td>21</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>38</td>
</tr>
<tr>
<td>At least 5 additional upper division units in physics or physics. (No more than 4 units in courses numbered 194, 195, 198 and 199 may be applied in satisfaction of this requirement.)</td>
<td>5</td>
</tr>
</tbody>
</table>

Total Units for the Major 75

Recommended: Chemistry 1A-18-1C or 4A-4B-4C. See also recommended elective courses following the B.S. program.

Physics

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>52</td>
</tr>
<tr>
<td>Physics 8A, 8B, 8C, 8D</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C, 22A, 22B, 22C</td>
<td>21</td>
</tr>
<tr>
<td>Chemistry 1A-18-1C or 4A-4B-4C</td>
<td>15</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>54</td>
</tr>
<tr>
<td>At least 10 additional upper division units from physics or astronomy. (No more than 6 units in courses numbered 194, 195, 198, and 199 may be applied in satisfaction of this requirement.)</td>
<td>10</td>
</tr>
</tbody>
</table>

Total Units for the Major 100

NOTE: For key to course symbols, see page 124.
Courses in Astronomy

Lower Division Courses

2. Introduction to Modern Astronomy and Astrophysics (4).

Cheung

Lecture—3 hours; laboratory-discussion—2 hours. Prerequisite: Mathematics 1A, Electrical and magnetism, heat, kinetic theory, and thermodynamics. Experimental work planned to accompany the lectures in course 2C. Recommended for all students who take course 2B.

3. General Physics Laboratory (1) I, II. The Staff Laboratory—2 hours. Prerequisite: course 2A (may be taken concurrently) or equivalent. Mechanics. Experimental work planned to accompany the lectures in course 2A. Recommended for students electing course 2A.

3B. General Physics Laboratory (1) I, II. The Staff Laboratory—2 hours. Prerequisite: course 2A. Wave motion, optics, modern physics. Experimental work planned to accompany the lectures in course 2B. Recommended for all students who take course 2B.

3C. General Physics Laboratory (1) I, III. The Staff Laboratory—2 hours. Prerequisite: course 2A. Wave motion, optics, modern physics. Experimental work planned to accompany the lectures in course 2B. Recommended for all students who take course 2C.

7. Contemporary Directions in Physics (1) I, II. The Staff Lecture—1 hour, computer tutorial, and laboratory. A series of talks by invited speakers describing the various fields now under intensive study: high energy physics, nuclear, atomic and condensed matter physics. Interdisciplinary fields, such as astrophysics, will also be discussed. (P/NP grading only.)

8A. Classical Physics (3) I, II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21B (may be taken concurrently). Mechanics.

8B. Classical Physics (4) I, II. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2A, Mathematics 21C, and 22C (may be taken concurrently). Fluid mechanics; electricity and magnetism, including circuits and Maxwell's equations.

8C. Classical Physics (4) II. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2B, Mathematics 22B (may be taken concurrently). Heat and thermodynamics; gases, including sound and electromagnetic waves; geometric and physical optics.

8D. Modern Physics (4) I, II. The Staff Lecture—4 hours; laboratory—2 hours. Prerequisite: course 2A, Mathematics 21C, and 22B (may be taken concurrently). Quantum mechanics, atomic, molecular, solid state, and nuclear physics.

10. Basic Concepts of Physics (4) I, II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra; students having had any other physics course must have departmental approval prior to enrollment. Survey of basic principles: motion, gravitation, electricity and magnetism, light, relativity, atoms, quanta, nuclear, elementary particles. Includes lecture demonstrations and elementary problem solving. Check with the department of physics for course equivalences (P/NP grading only).

37. Physics of Nuclear Arms Effects and Control (1) II. Jungmann Lecture—discussion—1 hour. Prerequisite: high school physics. Students who have had any other physics course must have departmental approval prior to enrollment. Intended for students in the course 137 (concurrently). Course will emphasize physics concepts of course 137. (Same course as Engineering; Applied Science 37)

39. Introduction to Applied Physics (1) I, II. The Staff Lecture—1 hour. Prerequisite: course 2D (may be taken concurrently). A series of lectures describing current fields of research in applied physics. Topics covered will include materials science, physical electronics, energy, applied nuclear physics, chemical physics, atmospheric physics, physical oceanography, and applied mathematical physics. (P/NP grading only.)

90. Directed Group Study (1-5) I, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

100. Special Study for Undergraduates (1-5) I, II. I, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics (3-3) I-II. Erickson Lecture—3 hours. Prerequisite: course 2B, Mathematics 22C. Elements of vector calculus, linear algebra, matrix methods, boundary value problems, integral transforms with applications to physics.

105A. Analytical Mechanics (3) I. Ko Lecture—3 hours. Prerequisite: course 2A; Mathematics 22A, 22B, 22C. Principles and applications of Newtonian mechanics.
127. Science and Technology of Nuclear Arms Effects and Control (3) II. Jungmann, Craig
Lecture—4 hours. Prequisite: courses 104B, 105A, and 105B.

130. Optics (3) II. Cahill
Lecture—3 hours. Prequisite: course 8 or 2 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of optics, wave treatment of light, with applications to current problems in astrophysics, material science, and atmospheric science. Study of modern optical instrumentation, computer processing, and non-majors.

130L. Optics Laboratory (1) II. Cahill
Lecture—3 hours. Prequisite: current enrollment in 130. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques.

110A-110B-110C Electricity and Magnetism (3-3-3) I-II-III.
Draper
Lecture—3 hours. Prequisite: course 8C; Mathematics 22C. Theory of electrostatics, electromagnetism, Maxwell’s equations, electromagnetic waves.

112A-112B. Thermodynamics and Statistical Physics (5-4)
Lecture—4 hours. Prequisite: course 105A; 106A, 106B. The classical background, basic ideas, and method of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4) II. Potter
Lecture—3 hours; laboratory—3 hours. Prequisite: course 8C; Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) III. Potter
Lecture—3 hours; laboratory—3 hours. Prequisite: course 8D; Mathematics 22C. A study of complex electronic circuits performed in a computer laboratory.

121. Foundations of Atomic and Molecular Physics (4) III.
McCom
Lecture—3 hours; outside work—9 hours. Prequisite: course 8D; Mathematics 21C. The phenomena of atomic physics, introduction to quantum phenomena and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and solid state.

122. Advanced Physics Laboratory (2) I-II. The Staff
Discussion—1 hour; laboratory—3 hours. Prequisite: course 8E. Experimental techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated once for credit.

123. Applications of Nuclear Physics (3) I. Peck
Lecture—2 hours; laboratory—3 hours. Prequisite: consent of instructor. Applications of nuclear physics to environmental, medical, and energy source programs. Course emphasizes but is not limited to experimental programs underway at Crocker Nuclear Laboratory. Student participation in one such experimental program is the required lab work.

127. Introduction to Astrophysics (3) II. Cheung
Lecture—3 hours. Prequisite: course 8B and Mathematics 21C and knowledge of astronomy or consent of instructor. Celestial mechanics, radiation, astrophysical measurements, electromagnetic processes, the sun, binary and variable stars, extrasolar systems, exoplanets, galactic, and cosmology. (Same course as Astronomy 127.)

129A, 129B. Introduction to Nuclear and Particle Physics (4) I, Knoc
Lecture—3 hours; term paper. Prequisite: course 8D; Mathematics 22C. Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.

129B. Nuclear Physics (4) II. Knoc
Lecture—3 hours; outside work—9 hours. Prequisite: courses 115B, 129A. Continuation of course 129A.

130C. Elementary Particle Physics (4) III.
Knoc
Lecture—3 hours; term paper. Prequisite: courses 115A and 129A or consent of instructor. Properties and classification of elementary particles. Strong, electromagnetic, and weak interactions; conservation laws and CPT invariance; Quarks.

NOTE: For key to footnote symbols, see page 124.
Physiological Sciences; Physiology

250. Special Topics in Physics (3) I. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from year to year. May be repeated three times for credit.

251. Special Topics in Applied Physics (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from quarter to quarter. May be repeated three times for credit. Not offered every quarter.

252. Techniques of Experimental Physics (3) III. Potter Lecture—3 hours. Introduction to techniques and methods of designing and carrying out experiments. Problems and examples will be drawn from various fields of current experimental research —low temperature solid state to high energy particle scattering experiments.

260. Seminar (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—1-3 hours. (SU grading only.)

261. Seminar in Nuclear Physics (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

262. Seminar in Theoretical Physics (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

263. Seminar in Solid-State Physics (1-2) I, II, III. Fong, Potter Seminar—1-2 hours. (SU grading only.)

264. Seminar in Applied Physics (1-2) I, II, III. The Staff (Chairperson in charge) Seminar—1-2 hours. Presentation and discussion of current topics in applied physics by visiting lecturers, staff and students. (SU grading only.)

275. Techniques of Teaching Physics (3) I. Greider Prerequisite: consent of instructor and Department Chairperson. Study of devices and methods used to teach physics at the college level. Participation in presenting lectures and demonstrations in undergraduate classes. Preparation of new material for lectures and laboratories. (SU grading only.)

280. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

289. Research (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Courses in Physiological Sciences

Upper Division Courses

101A-101B. Physiological Chemistry (4-3) I, II. Freedland Lecture—4-3 hours. Prerequisite: organic chemistry. Recommended: 101A. Offered: every other year. (S or U grading only.)

180. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (TUPE grading only.)

Graduate Courses

205A. Intermediary Metabolism of Animals (3) I. Freedland Lecture—3 hours. Prerequisites: courses 203A and B. Offered: every other year. (S or U grading only.)

205B. Intermediary Metabolism of Animals (3) II. Rogers Lecture—3 hours. Prerequisites: courses 203A and B. Offered: every other year. (S or U grading only.)

243A-243B. Use of Isotopes as Tracers in Biological Research (2-2) I. Burns Laboratory—6 hours. Lecture—2 hours. Prerequisites: courses 243A and B. Offered: every other year. (S or U grading only.)

260. Comparative Bioenergetics (4) I. Heusner Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 107A, 107B. Fundamentals of the bioenergetics and the application in physiology; entropy, probability, information, and thermodynamic potentials. Theory of biological similarity; dimensional analysis, phenomenology, homeothermy, and biological time. Offered: every other year. (S or U grading only.)

262. Advanced Physiological Psychology (3) III. Boggs Lecture—3 hours. Prerequisites: consent of instructor and Department Chairperson. Study of physiology of mammalian respiration with emphasis on mechanisms of ventilation, distribution and diffusion in blood perfusion. (S or U grading only.)

260. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour.

261. Research (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Physiology

See below, and the Graduate Group (page 294); and also Human Physiology (Medicine), Plant Physiology, and Zoology

Physiology

(College of Agricultural and Environmental Sciences)

Faculty

See under Departments of Animal Physiology, Animal Science, and Avian Sciences.

The Major Program

The Physiology major is designed to provide an understanding of the vital functions of living organisms and includes a systematic study of the functional properties of tissues and organs and comparison of processes among different kinds of animals. It will provide the foundations for a challenging career in physiology and also serve as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in research and advanced teaching may use the program as a preparation for continued study leading to advanced degrees.

Choice of Course. The Bachelor of Science degree is offered in both the College of Agricultural and Environmental Sciences and College of Letters and Science.

Students majoring in Physiology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same subject matter as upper division courses in the subject at UC Davis.

Physiology

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

Preparatory Subject Matter .................................................. 43-47

Chemistry (Chemistry 1A-1B, 1C or 4A-4B-C, 4A-4B or 128A-128B) ........................................ 21-25

Mathematics (Mathematics 16A-16B, 16C, Statistics 112) .................................................. 13

Physics (Physics 2A-2B-2C) ............................................... 9

292
Physiology

Major Adviser: J. M. Horowitz, V. E. Mendel.
Graduate Study. The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information on graduate study can be obtained from the graduate adviser or the Announcement of the Graduate Division.


Courses in Physiology

Lower Division Courses
See Physiology 2, 2L and 10 listed under the Department of Zoology course listing (page 335).

Upper Division Courses
100A. General Physiology (3) I. Horowitz Lecture—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 65. Physics 2B recommended. Examination of the interaction of molecular and intracellular compartments in the functioning of the animal cell. Emphasis is placed on metabolic bases and regulation of cellular function. Cell and tissue structure are discussed in relation to physiological mechanisms.

100B. General Physiology (3) II, III. Horowitz Lecture—2 hours. Prerequisite: course 100A. Continuation of course 100A with particular emphasis on transport phenomena, cell recognition and communication, and properties of excitable cells.

100L. General Physiology Laboratory (2) II, III. Horowitz Discussion—2-hour sessions (alternate weeks); laboratory—5-hour sessions (to alternate with discussion). Prerequisite: courses 100A, 100B (concurrently), Biological Sciences 1; or consent of instructor. Laboratory in the physical and chemical processes of cells and tissues.

102. Physiology of Growth (3) III. Smith Lecture—3 hours. Prerequisite: course 110. The nature of the growth of cells, organs, organisms and populations, and their regulatory processes. Quantitative analysis is placed on the quantitative evaluation of growth.

104A. Experiments in Physiology: Design and Execution (3) II. The Staff (Barkey in charge) Discussion—3 hours; laboratory—7 hours. Prerequisite: course 100A, 100B, 100L, and consent of instructor. Allows students to experimentally examine cardiovascular, respiratory, and endocrine mechanisms. Following group discussions on approaches to designing experiments, groups of 2-3 stu- dents will choose a project and design an experimental protocol that they will then carry out and report upon. (P/N grading only.)

108B. Experiments in Physiology: Design and Execution (3) I. The Staff (Barkey in charge) Discussion—2-hour meetings during quarter, laboratory—4 hours. Prerequisite: course 100A and consent of instructor. Continuation of course 100A. (P/N grading only.)

110. Systemic Physiology (5) II, III. Barkley, Covlin, Goldberg, Silman, Weidner Lecture—5 hours. Prerequisite: Biological Sciences 1. Physiology of organ systems; including concepts of integrative and homeostatic mechanisms.

110L. Systemic Physiology Laboratory (2) I, II. Barkley, Goldberg Discussion—1 hour; laboratory—3 hours. Prerequisite: course 110 prior to taking 110L recommended, but 110 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 110.

111-111B. Advanced Systemic Physiology Laboratory (3-3) II-III. Burger, Carstens Lecture—1-3 hours, five 2-hour laboratory sessions (to alternate with laboratory 1); laboratory—five 6-hour sessions. Prerequisite: course 110, courses 112, 113, 114 recommended. Selected experimental steps in depth on the nervous, cardiovascular, respiratory, renal, and endocrine systems. Emphasis on modern conceptual and methodological approaches using computer techniques in describing the physiology of organ systems.

112. Neural and Endocrine Control Systems (4) I. Horowitz, Barkley Lecture—4 hours. Prerequisite: course 110. The nature, functional significance, and integration of neuronal and endocrine control of physiological processes. Emphasis will be placed on neural, sensory, and motor systems, higher integration and control of metabolic and reproductive status.

113. Cardiovascular, Respiratory, and Renal Physiology (4) II. Goldberg, Weidner Lecture—4 hours. Prerequisite: course 110; Chemistry 65, Physics 2A, 2B, 2C recommended. An intense and advanced presentation of cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiological students, graduate students, and graduate students.

114. Gastrointestinal Physiology (3) II. Mendel Lecture—3 hours; term paper. Prerequisite: course 110; Biochemistry 101B or Physiological Sciences 101B recommended. Advanced gastrointestinal physiology covering absorption, secretion, motility, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the alimentary tract, some pathology and nutritional items will be covered.

117. Avian Physiology (3) III. Burger Lecture—3 hours. Prerequisite: course 110 or Zoology 2. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and the endocrine system.

117L. Avian Physiology Laboratory (2) II. Burger Discussion—five 2-hour laboratory sessions; five 6-hour sessions. Prerequisite: course 117 may be taken concurrently; Laboratory instruction in selected system of the bird.

120A. Comparative Physiology: Neurointegrative Mechanisms (3) I. Woolley Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom; neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.

120B. Comparative Physiology: Circulation (3) I. Goldberg, Rhode Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom; circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates. Offered in odd-numbered years.

120C. Comparative Physiology: Digestion (3) III. Colvin Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom; digestion. Offered in even-numbered years.

120D. Comparative Physiology: Endocrinology (3) II. Lecture— 3-3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: animal hormones and their functions.

120E. Comparative Physiology: Respiratory (3) I. II. Smith, Burger Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: respiratory function in even-numbered years.

121. Physiology of Reproduction (3) I. Anderson Lecture—3 hours. Prerequisite: course 110. Physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.

121L. Physiology of Reproduction Laboratory (1) I. Anderson Lecture—3 hours. Prerequisite: course 121 may be taken concurrently recommended. Experiments on the reproductive systems of domestic animals including males and female gametes. (P/N grading only.)

130. Physiology of the Endocrine Glands (4) I. Adams Lecture—4 hours. Prerequisite: course 110. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease.

147. Avian Physiology (3) II. Smith Lecture—3 hours. Prerequisite: course 110. The nature and physiological consequences of the avian environment (altitude, acceleration, motion, etc.) and of protective devices (oxygen equipment, G-suits, etc.). Field trips will be available (as course 118) to visit operational avian physiology installations. Offered in odd-numbered years.

148. Principles of Environmental Physiology (3) III. Smith, Horowitz, Mendel Lecture—3 hours. Prerequisite: course 110 and 100A or Biochemistry 101B or the equivalent. Physiological aspects of interactions of organisms and environment at cellular, system, and organismal levels. Emphasis on regulatory mechanisms/mechanisms to thermal, pressure and osmotic environmental variables.

149. Environmental Physiology of Domestic Animals (3) III. Smith Lecture—3 hours. Prerequisite: courses 110-110L, or Zoology 2. Influences of environmental factors on physiological processes related to animals including man. The nature of environmental variations which influence physiological responses are given emphasis.

150. Proseminar in Physiology (3) I, III, III. The Staff (Horowitz in charge) Seminar—3 hours. Prerequisite: courses 110 and 100A, one additional upper division course in physiology or a related course in science, and consent of instructor. Student presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited registration.

190C. Introduction to Physiological Research (1) I, II, III. The Staff (Horowitz in charge) Discussion—1 hour. Prerequisite: upper division standing in physiology or related biological science, consent of instructor. Introduction to research findings and methods in physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/N grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Lecture—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience opportunity and on-campus in all subject areas offered in physiology. (P/N grading only.)

196A. Voluntary Control of Physiological Processes (2) I, II, III. Lorenz Seminar—1 hour; laboratory—3 hours. Prerequisite: adequate preparation in physiology, behavioral science, computer science, physics or electrical engineering, consent of instructor. Individual student's control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. (P/N grading only, pending completion of courses 196A-196B.)

196B. Voluntary Control of Physiological Processes (1-4) I, II, III. Lorenz Laboratory—3-12 hours. Prerequisite: course 196A; consent of instructor. Individual student's control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit with a new research project. (P/N grading only, pending completion of courses 196A-196B.)

197. Tutoring in Physiology (2) I, II, III. The Staff (Horowitz in charge) Discussion—1 hour; tutorial—1 hour. Prerequisite: course 110 or 113 (with grade of B or better) and consent of instructor. Extensive review of systemic physiology through
Physiology (Graduate Group): Plant Pathology

leading a weekly tutorial session with a small group of students. Courses vary with background of tutors and instructional needs. (PDP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Horowitz in charge) (PDP grading only.)

199. Special Study for Advanced Undergraduates (1-5), I, II, III. The Staff (Horowitz in charge) (PDP grading only.)

Graduate Courses

202A, 202B. Advanced General Physiology (3) B. I. Silman, Taufik (Biological Chemistry)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determinant of mammalian life and death. Leukemia and other cancers. Stress and interaction of tissues and cells in the process of development in higher multicellular systems. (SU grading only.)

203. Neuroanatomical Physiology of the Nervous System (3) I. Wolsey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Nervous system in terms of nervous system function and its components. (SU grading only.)

204. Neuropharmacology (3) I. Wolsey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Pharmacological methods of drug action. (SU grading only.)

205. Neurophysiology (4) II. Carver
Lecture—4 hours; prerequisites: course 112, 112B; consent of instructor. Electrical activity of neurons and the effects of drugs on neural activity. (SU grading only.)

206. Neuroendocrinology (3) I. Horowitz, S. Sobel
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. Hormonology and neuroendocrinology. Endocrine and paracrine influences on physiological processes. (SU grading only.)

211. Cellular and Molecular Biology (3) B. Wilson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

212. Genetics (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

213. Evolutionary Biology (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

214. Immunology and Microbiology (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

215. Ecological Genetics (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

216. Biochemistry (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

217. Molecular Biology (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

218. Neurochemistry (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

219. Cell Biology (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

220. General and Comparative Physiology of Reproduction (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

221. The Ruminant Stomach (3) I. Milam
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B, 102B, or equivalent. Normal and pathological physiology of the stomach and associated organs. (SU grading only.)

222. Physiology of the Nervous System (3) I. Milam
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101B, 102B, or equivalent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determinant of mammalian life and death. Leukemia and other cancers. Stress and interaction of tissues and cells in the process of development in higher multicellular systems. (SU grading only.)

223. Neuroendocrinology (3) I. Wolsey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determinant of mammalian life and death. Leukemia and other cancers. Stress and interaction of tissues and cells in the process of development in higher multicellular systems. (SU grading only.)

224. Neuropharmacology (3) I. Wolsey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determinant of mammalian life and death. Leukemia and other cancers. Stress and interaction of tissues and cells in the process of development in higher multicellular systems. (SU grading only.)

225. Physiology of the Nervous System (3) I. Wolsey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determinant of mammalian life and death. Leukemia and other cancers. Stress and interaction of tissues and cells in the process of development in higher multicellular systems. (SU grading only.)

226. Neuroendocrinology (3) I. Wolsey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B or equivalent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors determinant of mammalian life and death. Leukemia and other cancers. Stress and interaction of tissues and cells in the process of development in higher multicellular systems. (SU grading only.)

227. Neurophysiology (4) I. Carver
Lecture—4 hours; prerequisites: course 112, 112B; consent of instructor. Electrical activity of neurons and the effects of drugs on neural activity. (SU grading only.)

228. General and Comparative Physiology of Reproduction (3) I. Milam, Anderson
Lecture—3 hours; seminar—1 hour. Prerequisite: course 101B, 102B, or equivalent. Basic concepts of cell biology, genetics, and molecular biology. (SU grading only.)

229. Research (1-12) I, II, III. The Staff (Horowitz in charge) (SU grading only.)

Professional Course

300A-300B. Advanced General Physiology (4) I, II. The Staff (Horowitz in charge)
Lecture, discussion, or laboratory, or combination. Prerequisites meet requirements for teaching assistant in physiolog. Participation as a teaching assistant for one quarter in a designated physiology course. Instruc. in methods of leading discussion groups, leading laboratory sections, writing and giving quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. pro. in Physiology. (SU grading only.)

Physiology (A Graduate Group)

Ray E. Burger, Ph.D., Chairperson of the Group
Group Office, 168 Briggs Hall (752-0203)

Graduate Study. The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding these programs, address the chairperson of the group.

Graduate Advisers. Consult Physiology Graduate Group Office.

Plant Pathology

(College of Agricultural and Environmental Sciences)

James E. DeVay, Ph.D., Chairperson of the Department
Department Office, 354 Hutchison Hall (752-0301)

Faculty

Richard M. Bostock, Ph.D., Assistant Professor
Edward A. Butler, Ph.D., Professor
Robert N. Campbell, Ph.D., Professor
James E. DeVay, Ph.D., Professor
John M. Dunphy, Ph.D., Professor
W. Harley English, Ph.D., Professor Emeritus
David G. Gilchrist, Ph.D., Associate Professor
Austin C. Goheen, Ph.D., Adjunct Lecturer
Raymond G. Grogan, Ph.D., Professor
Dennis H. Hall, Ph.D., Adjunct Lecturer
William B. Hewitt, Ph.D., Professor Emeritus
Clarence I. Kado, Ph.D., Professor
John M. Kildahl, Ph.D., Adjunct Lecturer
Tsunou Kosegawa, Ph.D., Adjunct Lecturer
Lytle D. Leach, Ph.D., Professor Emeritus
Bert Larr, Ph.D., Professor
James D. MacDonald, Ph.D., Associate Professor
Patrick Thistle, Ph.D., Associate Professor
Creccio M. Mircelich, Ph.D., Adjunct Lecturer
George Nylander, Ph.D., Professor
Joseph M. Ogawa, Ph.D., Professor
William C. Schnathorst, Ph.D., Adjunct Lecturer
Robert J. Shepherd, Ph.D., Professor
Robert R. Webster, Ph.D., Professor
Edward W. Wilson, Ph.D., Professor Emeritus

294
Plant Physiology

See Botany for undergraduate majors, and below for graduate study.

201. Physiology and Biochemistry of Host-Pathogen Interaction (4) I, Kougou, DeVay
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130 or the equivalent; Biochemistry-101B. Discussion of the nature of host-pathogen interactions, metabolic alterations in plant disease, biochemistry of disease resistance, toxins in plant disease.

215. Genetics of Plant Pathogens (4) II, Webster
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 120; Genetics 100B; Botany 119. Study of fundamental concepts, research techniques and current information on the genetics of plant pathogenic microorganisms; origin and determination of pathologic specialization, host resistance and virulence in the pathogen as related to the host-parasite interaction. Special emphasis on the fungi. Offered in odd-numbered years.

224. Pathogenic Fungi (3) III, Butler
Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 119. Morphology and taxonomy of plant pathogenic fungi.

225. Plant Virology (5) II, Shepherd
Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses, pathological cytology and anatomy; application of equipment and techniques used in research.

229. Plant Bacteriology (5) I, Kado
Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Botany 2 or the equivalent; Biochemistry 101A, 101B. Study of bacteria which have a saprophytic, symbiotic or parasitic association with higher and lower plants. Chemical and molecular methods for identification and classification of these bacteria.

250. Seminar (1) I, Llear; II, Butler; III, Nyland
Seminar—1 hour. (SU grading only.)

250C. Advanced Research in Plant Pathology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: course 120. (SU grading only.)

251. Seminar in Host-Parasite Physiology (1) I, Bostock; II, Kougou
Seminar—1 hour. Prerequisite: course 120. (SU grading only.)

252. Seminar in Plant Virology (1) III, Shepherd
Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (SU grading only.)

255. Seminar in Mycology (1) I, Butler; III, Wells
Seminar—1 hour. Review and evaluation of current literature and research in mycology. (SU grading only.) (Same course as Botany 295.)

265. Special Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Research—1 hour. (SU grading only.)

NOTE: For key to footnote symbols, see page 124.
Plant Protection and Pest Management (A Graduate Group)

Albert A. Grippin, Jr., Ph.D., Chairperson of the Group
Group Office, 300 Briggs Hall (752-0475)

Graduate Study. The Graduate Group in Plant Protection and Pest Management offers programs of study and research leading to the M.S. degree. Detailed information can be obtained from the Group Chairperson and the Announcement of the Graduate Division.

Graduate Adviser. O. L. Bacon (Entomology).

Courses in Plant Protection and Pest Management

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (3) I. Lecture—3 hours. Prerequisite: Entomology 110 or 112. Plant Pathology 120, Botany 120 (may be taken concurrently), Nematology 100; Botany 117 or Zoology 125 recommended. Ecological perspective of agricultural systems; role of pests in these systems; plant protection and pest management methods as modifiers of the systems and their components.

204A-204B-204C. Diagnosis of Plant Pest Problems and the Control of Casual Agents (3-3-3) I, II, III, Bacon (entomology) Field stations: Entomology 110 or 112, Plant Pathology 120, Botany 120, Nematology 100 (Botany or Entomology may be taken concurrently). Diagnosis of problems and assessment of losses caused by insects, pathogens, weeds, nematodes, and other pests. Methods of determining infestation levels and establishing economic thresholds, and control of these pests with emphasis on integration of available management practices into programs.

205. Seminar (1-2-3) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

230. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) (SU grading only.)

Research (1-2, 1, 2, 3) I, II, III, IV. The Staff (Chairperson in charge) (SU grading only.)

Plant Science

(College of Agricultural and Environmental Sciences)

Faculty

For faculty in departments offering areas of specialization (Depth Subject Matter) in Plant Science, see under Departments of Agronomy and Range Science, Botany; Environmental Horticulture; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology.

The Major Program

The objective of the Plant Science major is to train students in the biological and natural sciences as applicable to the technology required for the production, protection, and maintenance of crop plants, and their quality following harvest.

The Plant Science student may choose to specialize in one of the seven departmentally associated options or may choose general education by selecting the general Plant Science option. The option selected will be identified immediately following the name of the major, Plant Science, on the transcript.

The Master Adviser serves as advisor for all students who opt for the Plant Science major. Following a student's commitment to one option, the student is assigned to an adviser associated with the department offering expertise in that area.

Upon graduation, students may qualify for a career in their area of specialization or for advanced study leading to the M.S. or Ph.D. degrees. Each of the (UCCD) Departments of Agronomy, Plant Pathology, and Vegetable Crops offer an M.S. degree in their respective fields. In addition, the M.S. degree in Horticulture is available through the Departments of Environmental Horticulture, Pomology, and Viticulture and Enology.

Occupational opportunities exist in nursery and greenhouse management, teaching, technical, and sales positions in agricultural business and associated enterprises, such as banking and equipment and supply companies, as well as in private, state and federal service in consulting and research.

Plant Science

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your adviser's approval. Courses shown without parentheses are required.)

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<th>Units</th>
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Additional courses may be included.

296
102. Physiology of Cultivated Plants (4) II. Sachs (Environmental Horticulture), Martin (Pomology)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Plants as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

103. Evolution of Crop Plants (3) I. Jain (Agronomy and Range Science)
Lecture—2 hours; discussion—1 hour (4 sessions will be used for laboratory work on plant materials). Prerequisite: course 10; introductory genetics (e.g., Genetics 100B). Diversity and domestication of economic plants, principles of plant evolution; centers of origin; genetic diversity of germ plasm collections; implications in new agricultural developments.

107L. Plant Cell, Tissue, and Organ Culture (5) II. Kurokawa (Pomology)
Lecture—2 hours and laboratory—4 hours (Intensive 5-day session); seminar—1 hour and research projects. Prerequisite: Botany 111A, 111B (may be taken concurrently); consent of instructor. Basic and applied aspects of plant tissue culture methodology with emphasis on quantification. Intensive 5-week methodology section will be conducted before Spring Quarter, but can extend into the first week of instruction. Application of methodology will extend throughout the quarter with weekly seminars and individual research projects.

108. Plant Propagation (4) II. Kester (Pomology), Sutter (Pomology)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or Botany 2 or consent of instructor. Principles and practices of propagating plants with emphasis on anatomical and physiological relationships.

112. Postharvest Physiology and Handling of Horticultural Commodities (3) III. Kader (Pomology), Reid (Environmental Horticulture), Salvet (Vegetable Crops)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 111B or consent of instructor: course 112 (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 atmosphere storage, etc.

116. Physiological Genetics of Crop Plants (3) II. Jones (Vegetable Crops)
Lecture—3 hours. Prerequisite: Genetics 100A or 120; Botany 111A, 111B (may be taken concurrently). An introduction to the genetic principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels: genetic control, biochemical regulation and the impact of the environment on development of plants.

117. Physiology of Environmental Stresses in Plants (3) II. Luchi (Land, Air and Water Resources)
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 111B (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses.

131. Plant Growth Kinetics (4) III. Sik (Land, Air and Water Resources)
Lecture—2 hours; laboratory—4 hours. Prerequisite: Botany 2, Mathematics 16A, 18B; Botany 105 recommended. Topics include growth curves, developmental indices, growth of the plant axis, leaf expansion, phylotaxis, and growth of the apex. In laboratory, students plant seeds and use methods described in lecture to analyze quantities aspects of plant development.

135. Mineral Nutrition of Plants (3) III. Epstein (Land, Air and Water Resources, Botany)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 111A or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation of mineral metabolism; deficiencies and toxicities; genetic and environmental aspects of plant nutrition. (Same course as Botany 135.)
Political Science

College of Letters and Science

Department Office, 227 Voorhees Hall (752-0066)

Faculty
Lawrence Berman, Ph.D., Associate Professor
Edmond Costantini, Ph.D., Professor
William K. Domke, Ph.D., Assistant Professor
George W. Downe, Jr., Ph.D., Associate Professor
Professor (Political Science, Administration)
Philip L. Dubois, Ph.D., Associate Professor
Richard W. Gabby, Ph.D., Professor
Alexander J. Groth, Ph.D., Professor
Charles M. Hardin, Ph.D., Professor Emeritus
Stuart L. Hill, Ph.D., Assistant Professor
Clyde E. Jacobs, Ph.D., Professor
Bruce Jentleson, Ph.D., Assistant Professor
Joyce K. Kallgren, Ph.D., Professor
Dale Rogers Marshall, Ph.D., Professor
Lloyd D. Musolf, Ph.D., Professor
Donald R. Rothchild, Ph.D., Professor
Larry I. Peterman, Ph.D., Professor
Donald S. Rothchild, Ph.D., Professor
Randal M. Siverson, Ph.D., Professor
Alvin B. Stocklow, Ph.D., Professor
Larry L. Wade, Ph.D., Professor
Geoffrey A. Wandasforde-Smith, Smith, Ph.D., Associate Professor (Political Science, Environmental Studies)
Marvin Zetterbaum, Ph.D., Professor
Paul E. Zinner, Ph.D., Professor

The Major Programs

Political Science is the study of politics and political systems at the subnational, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political values, political influence and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

The Department of Political Science offers two major programs: Political Science and Political Science—Public Service. Both provide students with preparation for professional careers in government, politics, law, and international affairs.

Political Science aims to provide a broad understanding of political concepts and values, political institutions, political behavior and political processes. It offers excellent preparation for careers in government, political science, and related fields with a two-year public affairs internship for which academic credit is granted.

The major combines regular coursework in political science and related fields with two quarters of public affairs internship where academic credit is granted. It differs from the regular Political Science major in having the internship as a requirement and in emphasizing upper division coursework in general areas of American Government. The functional areas are policy formulation, implementation, and evaluation. The substantive policy areas include urban, environmental, or others designed under the guidance of faculty counselors. Courses taken in other departments, for example, Economics, Environmental Studies, Environmental Planning and Management, may also be used to satisfy the major.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>19-20</th>
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<tbody>
<tr>
<td>Three courses from Political Science 1, 2 or 3D, 3 or 3D, 3 or 3D</td>
<td>11-12</td>
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</table>

Select two courses in each of three fields, listed below. The fields must be chosen from at least two groups, A, B, or C, as follows:

- **Group A**
  - (1) Political theory: Political Science 111-119
  - (2) American government: Political Science 100-109, 172-175
  - (3) Parties and political behavior: Political Science 160-171
  - (4) Public law: Political Science 150-159
  - (5) Comparative government: Political Science 126, 140-149

- **Group B**
  - (1) International relations: Political Science 120-139
  - (2) Only 5 units of Political Science 192 (Internship) may be counted towards the 36-unit requirement; and Political Science 192A or 192B may not be counted toward a field requirement.

**Total Units for the Major:** 55-56

Political Science—Public Service

A.B. Major Requirements:

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<th>Preparatory Subject Matter</th>
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<tbody>
<tr>
<td>One course from Political Science 1, 2 or 3D</td>
<td>3-4</td>
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</table>

| Two courses from Political Science 2 or 3D | 3-4 |

**Recommended:** Economics 1A-1B

**Depth Subject Matter**

<table>
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<th>Course program</th>
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<tbody>
<tr>
<td>Two courses from Political Science 100, 104, 105, 106, 113, 180, 181</td>
<td>18, 100, 109, 114</td>
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<tr>
<td>Internship, Political Science 192A, 192B</td>
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<tr>
<td>Research paper, Political Science 193</td>
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<tr>
<td>Fields of concentration</td>
<td>24</td>
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</tbody>
</table>

Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science. (Core Program courses may not be counted toward this requirement.)

**Total Units for the Major:** 59-60

Fields of Concentration

<table>
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<tr>
<td>Political formulation and evaluation: Political Science 156, 180, 181, 182, 183, 184, 185, 186, 188, 189, Economics 131</td>
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<tr>
<td>Policy interpretation—Substance and procedures (public/pre-law): Political Science 151, 152, 153, 156, 157A-157B, 158, 159</td>
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</tbody>
</table>

- **Political Science**
  - 24 UNITS

| Plan I: Upper division units in political science (may include 4 units of lower division coursework) | 24 |

- **Plan II: Upper division units in political science, with the approval of the minor adviser**
  - 24 |

This plan does not require a distribution of courses in any particular group as long as the courses chosen will be those most appropriate to the student's academic major.

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans:

<table>
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<th>Plan I</th>
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<tbody>
<tr>
<td>Plan II</td>
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</table>

**Political Science**

<table>
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<th>Preparatory Subject Matter</th>
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<tr>
<td>One course from Political Science 1, 2 or 3D</td>
<td>3-4</td>
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</tbody>
</table>

| Two courses from Political Science 2 or 3D | 3-4 |

| Recommended: Economics 1A-1B | 6 |

**Depth Subject Matter**

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<tr>
<th>Course program</th>
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<tbody>
<tr>
<td>Two courses from Political Science 100, 104, 105, 106, 113, 180, 181</td>
<td>18, 100, 109, 114</td>
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<tr>
<td>Internship, Political Science 192A, 192B</td>
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<tr>
<td>Research paper, Political Science 193</td>
<td>2</td>
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<tr>
<td>Fields of concentration</td>
<td>24</td>
</tr>
</tbody>
</table>

Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science. (Core Program courses may not be counted toward this requirement.)

**Total Units for the Major:** 59-60

**American History and Institutions.** This University requirement may be met by passing any one of the following Political Science courses: 1, 5, 5D, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163. (See also page 62.)

**Courses in Political Science**

**Lower Division Courses**

1. American National Government (4) I, II. The Staff
   - Lecture—3 hours; discussion—1 hour. Survey of American National Government, including the constitutional system, political culture, parties, elections, the Presidency, Congress, and the courts.

2. Introduction to Comparative Politics (4) I, II, III. The Staff
   - Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 2. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other influences on dimensions of politics as well as to more formal political and governmental structures.

*20 Seminar in Comparative Politics (4) I. The Staff
   - Seminar—2 hours; seminar section or student/faculty conferences—2 hours. Prerequisite: open only to upper division students with consent of instructor. Not open to students having credit for course 2. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Individual or team research projects will be required and constitute a major part of the course.

3. International Relations (4) I. The Staff
   - Lecture—3 hours; discussion—1 hour. Prerequisite: Not open to students having credit for course 3. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

Teacher Credential Subject Representative: Consult Departmental Office. See page 99 for the Teacher Education Program.

Graduate Study. The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.

Graduate Adviser: Consult Departmental Office.

Teacher and Institutions. This University requirement may be met by passing any one of the following Political Science courses: 1, 5, 5D, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163. (See also page 62.)
192. Internship in Public Affairs (5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: enrollment dependent on availability of intern position with highest priority assigned to students with Political Science/Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.)

241. Communist Political Systems (4) II. Zinner Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic analysis of selected topics dealing with the political process of Communist political systems.

242. Seminar in Comparative Politics (4) II. Groth Seminar—4 hours. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

244. Latin American Politics (4) II, III. Seminar—3 hours. Prerequisite: consent of instructor. Intensive study of topics chosen by instructor each year. Normally students will focus on a specific country, although other possible foci include land reform and politics, the U.S. in Latin America, etc. Students conduct research projects related to their areas.

246. Policy-Making in Third World Societies (4) III. Rothstein Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policy-making process in Third-World countries are such topics as political resources, institutional resources, decision-making, resource allocation, planning, and budgeting, implementation, and distribution of world resources. Offered in odd-numbered years.

248. Politics of East Asia (4) III. Kalgren Seminar—3 hours. Selected contemporary problems of government and international relations in East Asia.

258. Political Parties (4) III. Owens Seminar—3 hours. Survey of selected topics in American and comparative parties.

259. Political Behavior (4) III. Owens Seminar—3 hours. Survey of selected topics in political behavior and public opinion.

262. Concepts and Problems in Public Administration (4) II, III. Gable Seminar—4 hours. Nature of administrative processes in modern society; analysis of common origins; contemporary management practices and processes; and means of controlling bureaucracy. Offered in even-numbered years.

268. Organizational Behavior (4) II, Downs Seminar—4 hours. Organizational behavior as it relates to public sector decision-making.

269. Administrative Values (4) III. Musolf Seminar—2 hours. Examination of American administrative values. Offered in odd-numbered years.


270B. Research in Political Theory (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

270C. Research in International Relations (4) II, III, IV. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

270D. Research in Public Law (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of public law.

270E. Research in Political Parties, Politics and Political Behavior (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics and political behavior.

270F. Research in Comparative Government and Policy (4) II, III, IV. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

270G. Research in Public Administration (4) II, III, IV. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

270H. Internals in Political Science (2) I, II, III. The Staff Seminar—2 hours. Prerequisite: enrollment limited to internships or other positions in governmental agencies, political parties, etc., including participants in the State and Local Government Internship Program. Focus the evaluation of the practical experience gained in the program and the training of political scientists in the conduct and analysis of political research.
Pomology: Forestry: Preventive Veterinary Medicine

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

300. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

301. The Teaching of Political Science (1) I, II, III. The Staff (Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (SU grading only.)

Pomology
(College of Agricultural and Environmental Sciences)

Don J. Durzan, Ph.D., Chairperson of the Department
Department Office, 1045 Wickers Hall (752-0122)

Faculty
James A. Bleutele, M.S., Adjunct Lecturer
Muriel V. Bradley, Ph.D., Lecturer Emeritus
Royce S. Bringhurst, Ph.D., Professor
Dixon S. Brown, Ph.D., Professor Emeritus
Robert M. Carlson, Ph.D., Lecturer
Peter B. Cattin, Ph.D., Lecturer
Lawrence L. Ciaypoo, Ph.D., Professor Emeritus
Julian C. Crane, Ph.D., Professor
Theodora M. DeJong, Ph.D., Lecturer
Don J. Durzan, Ph.D., Professor
William H. Griggs, Ph.D., Professor Emeritus
Paul E. Hanches, Ph.D., (Professor (Pomology; Genetics)
Hudson T. Hartmann, Ph.D., Professor Emeritus
Claron O. Hesse, Ph.D., Professor Emeritus
Scott Johnson, Ph.D., Adjunct Lecturer
Adel A. Kader, Ph.D., Professor
Dale E. Kester, Ph.D., Professor
Andrew H. Kuniyuki, Ph.D., Assistant Professor
John M. Labavitch, Ph.D., Associate Professor
Ormund Lilleland, Ph.D., Professor Emeritus
George C. Marin, Ph.D., Lecturer
Gale McGrawthorn, Ph.D., Adjunct Lecturer
Warren C. Mickie, M.S., Assistant Professor
E. Louis Proebsting, Ph.D., Professor Emeritus
David E. Ramos, Ph.D., Adjunct Lecturer
Roger J. Rivard, Ph.D., Professor
Kay Ryugo, Ph.D., Professor
Noel H. Sommer, Ph.D., Lecturer
Elian G. Sutter, Ph.D., Assistant Professor
Kiyoto Uji, Ph.D., Professor
Steven A. Weinbaum, Ph.D., Lecturer

Related Major Program. See the major in Plant Science, page 299.

Related Courses. See Plant Science 109, 112, 112L.

Courses in Pomology

Lower Division Courses

3. Citrus and other Subtropical Fruits (3) II. Bringhurst
Lecture—3 hours (including one 3-hour field trip to be arranged). 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. One 3-hour field trip as applied to these fruits.

10. Fruit and Nut Crop Production and Utilization (3) I, Martin, Sommer
Lecture—2 hours; discussion—1 hour; one all day Saturday field trip in lieu of discussion last 3 weeks of quarter. Introduction to pomology including climatic adaptation of deciduous fruits; orchard planning and management; tree nutrition and physiology; fruit development, maturation and harvesting; presence of pests, soil, climate and water relations, mineral nutrition, and postharvest handling and marketing.

92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3 to 4 hours. Prerequisite: consent of instructor. Work-learning experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (PMP grading only.)

Upper Division Courses

101. Tree Growth and Development (4) II. Uru
Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or Plant Science 102 or consent of instructor. Physiology of plant growth and development; species adaptation; responses to environment and cultural modification (pruning, soil and water management, etc.)

102. Principles of Fruit Production (4) III. Ryugo
Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or Plant Science 102. The course covers principles of cultural practices associated with fruit and nut production, including morphology and physiology of the developing buds, flowers and fruits. The course emphasis is on commercially important temperate zone species.

107. Small Fruit Production (2) II. Bringhurst
Lecture—2 hours; field trips arranged at mutual convenience. Prerequisite: Botany 2 or the equivalent. Strawberries (Fragaria), blackberries-rasberries (Rubus), blueberries-cranberries (Vaccinium), and currants-gooseberries (Ribes) as important nutritional resources; their origin, production and utilization with emphasis on recent advances in integrated management. Offered in even-numbered years.

170A-170B-170C. Applied Pomology (2-2-2) III-III. Kester, Mickie, Ramnos, and Uru in charge
Lecture—seven 2-hour discussion and two full-day field trips. Prerequisite: introductory course in pomology or consent of instructor. Overview of production and handling of major pomological crops including a clinical study of important cultural and harvesting activities and problems associated with commercial fruit growing.

192. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3 to 4 hours. Prerequisite: consent of instructor. Work-learning experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (PMP grading only.)

196. Directed Group Study (1-5) III, III. The Staff (Durzan in charge) Prerequisite: consent of instructor (PMP grading only.)

198. Special Study for Undergraduates (1-5) III, III. The Staff (Durzan in charge) (PMP grading only.)

Graduate Courses

201. Biochemistry of Maturation and Senescence (4) II. Romano

203. Physiology of Fruit Plants (3) I, Weinbaum
Lecture—2 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B; Botany 111A-111B or Plant Science 102. Physiology of plants as it relates to fruit physiology and postharvest handling. Consideration of the physiological bases of development and senescence of certain fruits. Classroom discussions will include interpretation of current research as well as future research approaches. Offered in odd-numbered years.

204. Water and Nutritional Requirements of Deciduous Fruit Crops (3) II. Carlson, Uru
Lecture—3 hours; laboratory—1 hour. Prerequisite: Soil Science 103. Botany 111A-111B or Plant Science 102. The requirements of deciduous fruit crops with emphasis on uptake, transport, and partitioning of water and nutrients. Offered in odd-numbered years.

210. Fruit Morphology (4) III. Polito
Lecture—2 hours; laboratory—4 hours. Prerequisite: Botany 2. The development of flower, fruit, and seed structures of representative fruit types. Offered in even-numbered years.

212. Postharvest Biology and Biotechnology of Fruits and Nuts (3) III. Mitchell
Lecture—3 hours. Prerequisite: Plant Science 112 or the equivalent. Review of post-harvest biology of fruits and nuts and relation to biotechnological processes used in handling, emphasizing research needs. Offered in odd-numbered years.

280. Seminar (1) I, III. The Staff (Catlin in charge)
Seminar—1 hour.

286. Group Study (1-5) II, III. The Staff (Durzan in charge)

299. Research (1-12) I, II, III, Summer. The Staff (Durzan in charge) (SU grading only.)

Portuguese

See Spanish

Pre forestry

(College of Agricultural and Environmental Sciences)

Pre forestry students who intend to major in either General Forestry/Wood Science and Technology may be admitted to the School of Forestry and Conservation located on the Berkeley campus, following completion of the sophomore year. The programs offered at Davis provide full preparation for admission to the School. To qualify for such admission, at least 84 quarter units of credit must be completed with a grade-point average of C or higher. In addition, the prescribed preparatory subject matter requirements for the majors must be satisfied. For full details on the majors in General Forestry, Wood Science and Technology, and in the Conservation of Natural Resources please consult the Announcement of the School of Forestry and Conservation, which may be obtained from the School of Forestry and Conservation, 145 Mulfad Hall, Berkeley 94720. (See also: page 102.)

Pre forestry Adviser. C. C. Delwiche (Land, Air and Water Resources), Fall Quarter, J. V. Renkig (Land, Air and Water Resources), Winter and Spring Quarters.

Preventive Veterinary Medicine

(A Graduate Group)

Margaret E. Meyer, Ph.D., Director of the Group
Group Office, 112 Surge-IV (752-2375/11-6)

Graduate Study. The School of Veterinary Medicine offers a program of study and research leading to the Master's degree in Preventive Veterinary Medicine (M.P.V.M.). Detailed information on this program may be obtained by writing the Program Director in the Department of Epidemiology and Preventive Veterinary Medicine.

Graduate Adviser. M. E. Meyer (Epidemiology and Preventive Medicine).
Psychiatry

See Medicine

Psychology

(College of Letters and Science)

Albert A. Harrison, Ph.D., Chairperson of the Department

Department Office, 149 Young Hall (752-1880)

Faculty

Linda P. Accredido, Ph.D., Associate Professor
Jarvis R. Bastian, Ph.D., Associate Professor
Leo M. Chalupa, Ph.D., Professor
Richard G. Coss, Ph.D., Associate Professor
William F. Dukas, Ph.D., Professor Emeritus
Alan C. Elms, Ph.D., Professor
Albert A. Harrison, Ph.D., Professor
Kenneth R. Henry, Ph.D., Professor
Joel T. Johnson, Ph.D., Assistant Professor
Neal E.A. Kroll, Ph.D., Professor
Joseph Lyons, Ph.D., Professor
William A. Mason, Ph.D., Professor
G. Mitchell, Ph.D., Professor
Robert M. Murphy, Ph.D., Professor
Thomas Natsoulas, Ph.D., Professor
Donald H. Owings, Ph.D., Professor
Karen E. Paige, Ph.D., Professor
Theodore E. Parks, Ph.D., Associate Professor
Robert B. Post, Ph.D., Assistant Professor
Staphanie A. Shields, Ph.D., Assistant Professor
Deen K. Simonton, Ph.D., Associate Professor
Robert Sommer, Ph.D., Professor
Charles T. Tart, Ph.D., Professor

The Major Programs

Psychology is both a science and a form of humanistic inquiry. It provides knowledge about human and animal behavior and constitutes a background for examining your own behavior and that of other people. The UCD Psychology program has several objectives: it provides an introduction to the study of individual and group behavior; it provides a liberal arts major for students looking for employment in business, government, personnel work, or other fields directly or indirectly related to their bachelor's degree; and it prepares students for graduate study in various areas of psychology, to teaching, research, and applied work. (Counseling and other careers in psychology require graduate-level training.)

The Psychology program at UC Davis is extremely broad and represents a wide variety of interests. The courses are organized around three focal points: Personality/Social emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. Psychobiology emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. Cognitive Psychology emphasizes how information from the physical world is sensed, perceived, and used, and stresses the roles of consciousness, language, and learning in making us what we are.

The Department offers both the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program geared for students with a keen interest in either biology or mathematics. Each program involves an introduction to each of the three areas of psychology. In addition to completing the required core courses, majors may also take specialty courses on topics such as sex differences, aging and maturity, environmental awareness, altered states of consciousness, and primate behavior.

Psychology

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Mathematics Emphasis</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>4-64</td>
</tr>
<tr>
<td>Psychology 1</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 21A, 21B, 21C</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics 29A or the equivalent</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 10</td>
<td>4</td>
</tr>
<tr>
<td>Physics 10</td>
<td>4</td>
</tr>
<tr>
<td>Biological Sciences 1, or a combination of Biological Sciences 10 and one course from Anthropology 1, Physiology 10, Genetics 10</td>
<td>5-8</td>
</tr>
<tr>
<td>One course in sociocultural anthropology (may be lower or upper division), minimum of 4 units</td>
<td>4-5</td>
</tr>
<tr>
<td>Recommended: Psychology 41.</td>
<td></td>
</tr>
</tbody>
</table>

Depth Subject Matter | 46-49 |

Five Psychology courses, distributed as specified:

Group A: two courses from 130, 131, 132, 135, 136 | 15-20 |
Group B: two courses from 108, 129, 134, 150 | 10 |
Group C: one course from 112, 145, 147 | 4 |
Group D: one course from Psychology 106, 206, 207 | 4 |
Group E: one additional course to total a total of 40 upper division units in psychology | 8-9 |

Total Units for the Major | 57-61 |

Psychology

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Mathematics Emphasis</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>47-50</td>
</tr>
<tr>
<td>Psychology 1</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
<td>6-8</td>
</tr>
<tr>
<td>Physics 10</td>
<td>4</td>
</tr>
<tr>
<td>Biological Sciences 1, Physiology 2, Zoology 2, 2L</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>One course in sociocultural anthropology (may be lower or upper division), minimum of 4 units</td>
<td>4-5</td>
</tr>
</tbody>
</table>

Depth Subject Matter | 47-50 |

Seven Psychology courses distributed as specified:

Group A: two courses from 130, 131, 132, 135, 136 | 8-9 |
Group B: three courses from 108, 129, 134, 150 | 15 |
Group C: two courses from 112, 145, 147, 168 | 8 |
Additional units to achieve a total of 40 upper division units in psychology | 8-9 |
Genetics 10A-10B or 112A-112B | 4-6 |
Zoology 125 or 148 | 3-4 |

Total Units for the Major (Biological Emphasis) | 94-100 |

Recommended:

Psychology 41, 154, 180B, and 189 (or a psychological topic), Zoology 105, 106, Anthropology 154, Environmental Studies 110.

NOTE: For key to footnote symbols, see page 124.

303
Psychology

Courses in Psychology

Lower Division Courses

1. General Psychology (4 I, II, III. The Staff)
   Lecture—4 hours. A general introduction emphasizing empirical approaches with particular attention to the areas of perception and cognition, personality and social psychology, and biological aspects of behavior. Not a prerequisite for psychology 101 or 16.

15. Introductory Psychobiology (4 I, II, III. The Staff)
   Lecture—4 hours. A survey of genetic, evolutionary and physiological factors affecting behavior. Using the comparative approach, where appropriate, the behavioral, biological and biochemical mechanisms to an understanding of people and their interaction with their environment will be emphasized.

16. Psychology and Modern Life (3 I, II, III. The Staff)
   Lecture—3 hours. Personality development, interpersonal relationships, and the relevance of psychology to social processes.


98. Directed Group Study (1-5 I, II, III. The Staff (Chairperson in charge))
   By prior arrangement with individual instructor. Primarily for lower division students. (P/N grading only.)

99. Special Study for Lower Division Students (1-5 I, II, III. The Staff)
   By prior arrangement with individual instructor. (P/N grading only.)

Upper Division Courses

103. Advanced Quantitative Description of Behavior (5 I, Kroll, Kronish)
   Lecture—4 hours. Prerequisite: Statistics 13 or 102 or consent of instructor. Summary, inference, and prediction from psychological data, with emphasis on the theoretical aspects.

105. Statistical Inference from Psychological Experiments (4 II. Kroll)
   Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Probability theory, sampling distributions, hypothesis testing, statistical inference, and nonparametric statistics.

108. Psychological Psychology (5 I, II, III. Chatupa, Henry)
   Lecture—4 hours. Laboratory—2 hours. Prerequisite: course 1; at least one zoology or physiology course recommended. Structure, function and growth of the human organism, emotion, motivation, perception, states of consciousness, language, learning, and memory in humans and other animals. Introduction to the method of psychological psychology.

   Lecture—4 hours. Prerequisite: course 1. An anthropological view of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

115. Maturity and Aging (4 I. Lyons)
   Lecture—4 hours. Prerequisite: course 112. Biological, cognitive, personalological, and social aspects of the human life span between early maturity and death, in its theoretical, methodological, and empirical aspects.

120. History of Psychology (4 I, Bliss, Murphrey)
   Lecture—3 hours. term paper. Prerequisite: course 1; upper division standing or consent of instructor. Development of psychological thought and research in context of history of psychology.

129. Sensory Processes (5 I, II. Henry)
   Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: course 1 or Zoology 2-2L, or consent of instructor. Psychobiology of sensory systems in man and other animals. Relation of behavior to physiology, structure and function of the senses.

130. Human Learning and Memory (4 I, II, III. Kroll, Parks)
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Statistics 13 and 102, or course 41, or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.

131. Personality (4 I, II. Natsoulas, Bastian, Parks, Post)
   Lecture—3 hours, independent library work. Prerequisite: course 1. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

132. Language and Cognition (5) II. Bastian
   Lecture—5 hours. Prerequisite: course 1, and 6 units of upper division psychology. A cross-cultural and individual perspectives of linguistic actions; their production, perception, cognitive significance, and their role in human conduct, enunciation, and cognitive development.

134. Animal Learning and Motivation (5) I, Coess
   Lecture—5 hours. Prerequisite: course 1 or consent of instructor. General ideas of phylogenetic schemes in animal learning and motivation drawing upon data from laboratory and field observations. Innate physiological mechanisms, developmental and methodological changes and other constraints on these processes are examined.

135. Psychology of Consciousness (4) I, II. Natsoulas
   Lecture—4 hours. Prerequisite: course 1. Consideration of major theories and critical examination of relevant experimental, clinical, and field data.

136. Cognitive Psychology (4) II. The Staff
   Lecture—3 hours; term paper. Prerequisite: course 1. Introduction to human information processing, mental representation and transformation, imagery, attention, concept formation, problem solving, and computer simulation.

137. Altered States of Consciousness (4) II. Tart
   Lecture—4 hours. Prerequisite: course 1. Characteristics, uses, and abuses of altered states of consciousness from experiential, behavioral, physiological, and methodological perspectives. Values and ethics of altered states of consciousness, dreams, meditation, hypnosis, autohypnosis, marijuana intoxication, psychedelic drugs and mystical experiences.

143. Human Emotion and Feeling (4) I, II, III. Natsoulas, Shields
   Lecture—4 hours. Prerequisite: introductory psychology course. An analysis of the evolution and emotional and bodily feelings with special reference to self-knowledge.

146. Environmental Awareness (4) I, II, III. Sommer, Cossa
   Lecture—4 hours. Prerequisite: course 1. Examination of basic psychological processes in solving various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, III. Elms, Paige
   Lecture—4 hours. Prerequisite: course 1. The theories of Freud, Erikson, and other major twentieth-century approaches to personality.

148. Interpersonal Relations (4) II.
   Lecture—4 hours. Prerequisite: 16 hours of social science or the equivalent and consent of instructor. Study of interpersonal relationships from the theoretical and experiential points of view. Social psychological theory, case studies and a small group laboratory within the class provide the basis for class discussion. Limited enrollment.

149. Psychology of Differences (4) I, II, Paige, Mitchell
   Lecture—4 hours. Prerequisite: upper division standing and enrollment in one of the following: course 106, 145 or 147. Examination of the origin of sex differences in human behavior. The role of physiology, child socialization, and cultural institutions in determining sex differences in personality, cognitive abilities, motivations, and social status.

150. Comparative Psychology (5) II, III. Mason, Owings, Mitchell
   Lecture—4 hours; discussion or project—1 hour. Prerequisite: courses 1 or 15 or consent of instructor. Perspectives in animal behavior; psychological, ethological, and social systems, with an emphasis on cross-species variations in communication, in community, and in institutional settings. Credit not available toward 40 units of upper division Psychology required of majors. May be repeated once for credit. Limited enrollment. (P/N grading only.)

153. Primate Psychology (4) I, Mitchell
   Lecture—4 hours. Prerequisite: course 15 or 150 or an equivalent course of consent of instructor. Comparative survey of primate psychology based primarily on laboratory experimentation in learning, communication, cognition, sensation, memory, behavior, perception, and affects of early experience in many species of primates.

157. Personality Assessment (4) II.
   Lecture—4 hours. Prerequisite: course 41 or Statistics 13. An exploration of methods in psychological assessment of personality, attitude, and ability, including objective, questionnaire, and projective tests.

159. Social Psychology of Black Americans (5) II.
   Lecture—4 hours. Discussion—1 hour. Prerequisite: course 145 and Sociology 130, or consent of instructor. Interaction between the black community and between the black community and national institutions from the perspectives of black nationalism, black culture, and national institutional structure.

165. Introduction to Clinical Psychology (4) II. Lyons
   Lecture—4 hours. Prerequisite: courses 1, 168, and either 112 or 153, or consent of instructor. A survey of the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. Survey based on current readings, films, and clinical psychology do, including methods of appraisal, professional roles, and approaches to treatment.

168. Abnormal Psychology (4) I, II. Murphy, Sommer
   Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Descriptive and functional account of behavioral disorders, with primary consideration given to neuropsych and psychopath behavior.

171. Humanistic and Transpersonal Psychology (4) I, II. The Staff
   Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Survey and demonstrations of humanistic, and transpersonal movements in contemporary psychology. Theory, data, and techniques in the work of Maslow and others who emphasize creativity, self-actualization, and realization of human potential.

177. Psychobiology and Life History (4) III. Elms
   Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Research as a non-quantitative approach to studying behavior. Historical interpretation of life histories of outstanding individuals in the arts, politics, science and other areas.

180A. Research in General Experimental Psychology (4) III.
   Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division Psychology courses and consent of instructor. Research in selected topics in general experimental psychology (general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

180C. Research in Personality and Social Psychology (4) III.
   Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division Psychology courses and consent of instructor. Research in selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

183. Organizational Psychology (4) II. Harrison
   Lecture—4 hours. Prerequisite: introductory psychology course. Survey of the techniques of psychological processes, interpersonal dynamics, and organizational forms. Topics include motivation, communication, decision making, leadership, personnel selection and training, stress and conflict, career development, organizational development, and organization-community relations.

189. Seminar in Psychology (4) III.
   The Staff
   Seminar—4 hours. Prerequisite: junior or senior standing; major in psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject areas.

192. Field Work in Psychology (1-8) I, II, III. Harrison
   Field work—3-18 hours; term paper. Prerequisite: upper division standing in psychology and consent of instructor. Supervising internship, off-campus, in community, and institutional settings. Credit not available toward 40 units of upper division Psychology required of majors. May be repeated once for credit. Limited enrollment. (P/N grading only.)

197. Tutoring in Psychology (1-3) I, II, III. The Staff
   Prerequisite: upper division standing and consent of instructor. Tutoring in Psychology Department courses. This course is intended for advanced undergraduate and graduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. No more than 6 units may count toward the Psychology major requirement. (P/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. Directed small group study on psychological topics of special interest and relevance to instructor and students. (P/N grading only.)
Radiological Sciences

Courses in Radiological Sciences

Upper Division Courses

115. Biomedical Consequences of Nuclear Technology (3)  
Goldman  
Lecture—2 hours; discussion—1 hour; field trip to Nuclear Power Station. Prerequisite: Physics 2A and Biological Science 1A or equivalent; consent of instructor. Discussion of biophysical implications of radionuclide and thermal effluents generated by nuclear technology. Hazards evaluation based on the predictions of the response of the most sensitive physiological systems will be emphasized. (Same course as Environmental Studies 115.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III  
Lecture by Staff  
(PNP grading only)

Graduate Courses

263A-263B-263C. Topics in Cognitive Psychology (4) I, II, III  
Bastian, Kroll, Parks  
Seminar—4 hours. Elective topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes.

254. Psycholinguistics (4) I, II  
Bastian  
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Topics in current research in the psychology of language.

272. Experimental Study of Personality (4) I  
Seminar—4 hours.

273. Environment and Behavior (4) II  
Seminar—4 hours. The social psychology of the environment. Research into the use of space and its design implications.

275. Attitude Formation and Change (4) II  
Ems  
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Development of attitudes: theories of attitude change; relationships between attitudes and behavior.

300. Seminar (4) I, II, III  
The Staff  
Seminar—4 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topics selected for a quarter will vary depending on interest of instructors and students.

298. Group Study (1-5) I, II, III  
The Staff  
(SU grading only)

299. Research (1-12) I, II, III  
The Staff  
(SU grading only)

Professional Courses

406. Special Procedure Rounds (2) I, II, III  
The Staff  
Discussion—6 hours. Prerequisite: a DVM degree and consent of instructor. Review of selected radiology cases from previous day. Specific radiographic changes and differential diagnosis are discussed, with participants leading the discussions. Special procedures such as angiography; nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (SU grading only.)

409. Known Cases Conference (1.5) I, II, III  
The Staff  
Discussion—demonstration—1.5 hours. Prerequisite: a DVM degree and consent of instructor. Film review of current VM Teaching Hospital proved cases. Intended for Radiology residents and others with background in diagnostic radiology. May be repeated for credit. (SU grading only)

410. Radiology of the Skeletal System: Large Animals (3) I  
O'Brien and Staff  
Lecture—3 hours. Prerequisite: a DVM degree and consent of instructor. Presentation of information on radiographic diagnosis of pathologic conditions of the skeleton. These conditions include fractures, skeletal disorders of the foal, bone and joint disease, osteomyelitis, responses, respiratory problems, and spinal disorders. Offered every three years (next offering, Fall 1964).

411. Radiology of the Appendicular Skeleton (3) II  
Morgan and Staff  
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: a DVM degree and consent of instructor. Presentation of information on radiographic diagnosis of pathologic conditions of the bones and joints in appendicular skeleton. Congenital, developmental, traumatic, inflammatory, neoplastic, and degenerative lesions. Offered every three years (next offering, Winter 1965).

412. Urogenital Radiology (3) III  
Nyland and Staff  
Lecture—3 hours. Prerequisite: a DVM degree and consent of instructor. Radiographic diagnosis of urogenital tract disorders. Included are diseases of the kidneys, ureters, bladder, urethra, uterus, and prostate. Theory and interpretation of contrast, untrasound, and nuclear medicine procedures. New procedures and current research topics. Offered every three years (next offering, Spring 1985).

413. Gastrointestinal Radiology (3) I  
O'Brien and Staff  
Lecture—3 hours. Prerequisite: a DVM degree and consent of instructor. Presentation of information on radiographic diagnosis of gastrointestinal disorders. Included are diseases of the liver, stomach, and intestines. Theory and interpretation of upper and lower GI procedures, cholecystography and other special procedures. Offered every three years (next offering, Fall 1985).

Radiological Sciences

(School of Veterinary Medicine)

Timothy R. O'Brien, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1114 Medical Science I (752-0184)

Faculty

Steven Bock, Ph.D., Lecturer (Laboratory for Energy-Related Health Research)
Marvin Goldman, Ph.D., Professor (Laboratory for Energy-Related Health Research)
Juan A. Gomez, D.V.M., Acting Associate Professor
William J. Horwitz, D.V.M., Assistant Professor
Joe E. Morgan, D.V.M., Vet. med. dr., Professor
Thomas G. Nyland, D.V.M., Assistant Professor
Timothy R. O'Brien, D.V.M., Ph.D., Professor
Otto G. Raabe, Ph.D., Adjunct Professor (Laboratory for Energy-Related Health Research)
Jane Turel, D.V.M., Assistant Professor

Part-Time Clinical Faculty

Sam Silverman, D.V.M., Associate Clinical Professor

NOTE: For key to footnote symbols, see page 124.
Range and Wildlands Science; Range Science

414. Pulmonary Radiography (3) III. Gomez and staff. Lecture—3 hours. Prerequisite: A DVM degree and consent of instructor. Radiographic diagnosis of thoracic diseases of the dog and cat, excluding cardiac diseases. Techniques, indications, complications, and value of special radiographic procedures and topics of special interest will be discussed. New diagnostic modalities will be reviewed together with current research, literature and new procedures. Offered every three years (next offering, Winter 1988).

415. Nuclear Medicine (2) II. Homof and staff. Lecture—2 hours. Prerequisite: A DVM degree, Radiology Nuclear Medicine 400A, and consent of instructor. Application of nuclear medicine techniques including computer usage to the diagnosis of various disease states in animals. Radiologic diagnosis of various disease states in animals as well as the methodology for performing special procedures in animals will be covered. Offered every three years (next offering, Spring 1998).

416. Principles of Radiotherapy (2) II. Turre and staff. Lecture—2 hours. Prerequisite: A DVM degree and consent of instructor. Introduction to principles of radiotherapy, physics of equipment, and dosimetry. Emphasis will be placed on radiation safety regulations and monitoring devices. Applications of radiotherapy and patient selection. Techniques of teletherapy and brachytherapy. Offered every three years (next offering, Winter 1984).

417. Cardiovascular Radiography (3) III. Gomez and staff. Lecture—3 hours. Prerequisite: A DVM degree and consent of instructor. Radiographic diagnosis of cardiovascular disorders of the dog and cat. Emphasis will be placed on knowledge and application of angiography and angiography of the head, abdomen, and extremities. Newer diagnostic techniques including nuclear medicine, ultrasound and CT scanning will be reviewed and current research and literature. Offered every three years (next offering, Spring 1984).

418. Radiology of the Axial Skeleton (3) III. Morgan and staff. Lecture—1.5 hours, discussion—1.5 hours. Prerequisite: A DVM degree and consent of instructor. Radiographic diagnosis of pathologic conditions of the axial skeleton including congenital, developmental, traumatic, infectious, and neoplastic diseases. Theory and interpretation of myelography. Radiography of the skull and mandible. Offered every three years (next offering, Fall 1983).

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Radiology

See Medicine

Range and Wildlands Science

See below, and the Graduate Group (this page); and also Range Science

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Range and Wildlands Science

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology (Biological Sciences 1)</td>
<td>5</td>
</tr>
<tr>
<td>Botany (Botany 2)</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry (Chemistry 1A, 1B, 8A, 8B)</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics (Mathematics 15-16)</td>
<td>5-10</td>
</tr>
<tr>
<td>Computer science (Mathematics 19, or Engineering 5)</td>
<td>3</td>
</tr>
<tr>
<td>Economics (Economics 1A, or 1B)</td>
<td>4-5</td>
</tr>
<tr>
<td>Geology (Geology 1-11, Geology 2)</td>
<td>3-4</td>
</tr>
<tr>
<td>Soil science (Soil Science 100)</td>
<td>4</td>
</tr>
<tr>
<td>Animal science (Animal Science 117)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant physiology (Botany 111A-111B)</td>
<td>6</td>
</tr>
<tr>
<td>Plant ecology (Plant Science 101 or Botany 117)</td>
<td>4</td>
</tr>
<tr>
<td>Meteorology (Geography 3, Atmospheric Science 20, or 105)</td>
<td>3</td>
</tr>
<tr>
<td>Soil science, two upper division courses</td>
<td>6-8</td>
</tr>
<tr>
<td>Watershed management (Water Science 141)</td>
<td>3</td>
</tr>
<tr>
<td>Animal nutrition (Nutrition 103)</td>
<td>4</td>
</tr>
<tr>
<td>Wildlife ecology or management, one upper division course in wildlife and fisheries biology, or zoology</td>
<td>3-4</td>
</tr>
<tr>
<td>Forage crops (Agronomy 112)</td>
<td>3-4</td>
</tr>
<tr>
<td>Range science (Range Science 1, 92, 100, 105, 133, 134, 135, 142, 145, 150, 160, 164, 170, 192, 198, 199)</td>
<td>18-27</td>
</tr>
</tbody>
</table>

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Range and Wildlands Science

(The College of Agricultural and Environmental Sciences)

The Major Program

Range and Wildlands Science is the study of the biological and physical components of land resources which are used mostly for grazing domestic livestock, but which also provide wildlife habitats, watersheds, recreation, and open space.

The major provides background in the biological, physical, and social sciences. Comprehensive study in the plant, animal, soil, and resource sciences supplements the core of range management courses. Integration of the knowledge of a variety of specialized fields is learned as a basis for land management oriented toward the multiple use concept and the maintenance of environmental quality.

The field is broad and diverse. Graduates, especially those with some experience, may be employed as consultants, range managers, or ranchers. They may also qualify for the position of Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and others. If career work with such an agency is desired, it is recommended that training in a second degree or relevant area be considered in the major program. In addition, the training provided by this major should give an excellent background for natural resource management positions.

Job experience, in-service training, and formal education beyond the bachelor's degree may lead to advanced professional positions in research, education, or management.

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Range and Wildlands Science

(A Graduate Group)

R. Merton Love, Ph.D., Chairperson of the Group

Graduate Study. The Graduate Group in Range and Wildlands Science offers a program of study and research leading to the M.S. degree. For detailed information regarding the program, address the graduate adviser for the group.

Graduate Adviser. W. A. Williams (Agronomy and Range Science).

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Range Science

(For College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Agronomy and Range Science.

Major Program. See the major, Range and Wildlands Science, above.

Graduate Study. A program of study is offered leading to the M.S. degree in Range Management. Detailed information can be obtained from the graduate adviser and the Announcement of the Graduate Division.

Graduate Adviser. W. A. Williams (Agronomy and Range Science).

Related Courses. See Agronomy 112, 112L, Nutrition 103, Resource Sciences 100, Soil Science 105, 120, 121, Wildlife and Fisheries Biology 151.
Courses in Range Science

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 258 Hunt Hall.

Lower Division Courses

1. Principles of Range Management (4) J. Phillips
   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.

92. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)
   Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-experience offered on or off campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

106. Range Plants (4) J. Crampton
   Lecture—2 hours; laboratory—6 hours. Two Saturday field trips. Prerequisite: Botany 2. Systematic relationships and identification of range grasses, legumes, forbs, and shrubs; their distribution, environmental requirements, and use.

110. Field Course (2) III. Merke, Crampton
   Lecture—10 hours total; laboratory—30 hours total. Prerequisite: consent of instructors. Field studies of range conditions and methods of the various parts of the range. To be given between winter and spring quarters. Considered a spring course for preenrollment.

133. Grassland Systems (4) J. Rague
   Lecture—3 hours; one Saturday field trip. Prerequisite: course in plant ecology or consent of instructor. Structure, function, and economic use of grasslands, with emphasis on the California annual type. Concepts and problems in measuring primary and secondary productivity. Principles of grassland and management including vegetation improvement, utilization by animals, and recreation and aesthetic values. Offered in even-numbered years.

134. Comparative Ecology of Major Rangeland Systems (4) II. Merke
   Lecture—3 hours; one weekend field trip to Nevada; term paper. Prerequisite: course 100 or the equivalent, or consent of instructor. Study of vegetation structure, composition, and succession in representative North American rangeland plant communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of management strategies used in these systems today. Offered in odd-numbered years.

135. Ecology and Community Structure of Grassland and Savanna Herbivores (3) III. Demment
   Lecture—3 hours. Prerequisite: Biological Sciences 1 or Botany 2 or Zoology 2 or the equivalent; general ecology course recommended. Feeding ecology of grassland herbivores and the interaction of herbivores in communitie states and social systems. Optimal foraging, interspecific interactions, and primary productivity is considered as factors structuring natural and managed grassland and savanna systems.

142. Rangeland Improvements (3) II. Jones, George
   Lecture—3 hours. Prerequisite: courses 100 and 100. Implementation and development practices and their environmental impacts on rangeland communities, including vegetation-type conversion, range animal and grazing management, fertilization, revegetation, water development and management, control of undesirable plants, and chemical, herbicidal and biological methods, and pest predator control.

145. Revegetation of Disturbed Lands (2) II. Kay
   Lecture—2 hours. Prerequisite: Botany 2 and Soil Science 100. Principles of vegetation and specific applications. Topics include characteristics of disturbed sites, especially soil-related problems; techniques for mechanical stabilization, mulching, and grassing; and the use of various species. Offered in odd-numbered years.

150. Principles of Rangeland Vegetation Measurement, Inventory and Ecology (4) III. Merke
   Lecture—2 hours; laboratory—3 hours; one weekend field trip. Prerequisite: course 100. Agricultural Science and Management, 301, and 3 credit courses in range management and graduate study. Principles and techniques of sampling grassland and shrubland vegetation cover, frequency, density, and weight. Methods for inventorying range vegetation data analysis and evaluation.

Faculty

R. David Freedman, Ph.D., Associate Professor
Lincoln D. Hurst, Ph.D., Assistant Professor
Whalen W. Lai, Ph.D., Associate Professor
Jonathan L. Siedlik, M.A., Visiting Lecturer

The Major Program

Majoring in Religious Studies provides an opportunity to explore and analyze the written and oral traditions of the world's great religions: Eastern (Hinduism, Buddhism, Taoism, Confucianism), Western (Judaism, Christianity, and Islam), ancient (Egyptian, Mesopotamian), and modern (contemporary American religions). The program takes a rigorously academic approach to the study of these religions.

In addition to studying the abstract aspects of religious thought, students in the major also study the practical questions of how religion has shaped human behavior within cultures in matters such as family life, ideas of right and wrong, sexual roles and relations, relations between individuals and society, relations between one society and another, and artistic expression. The student majoring in Religious Studies is offered a broad choice of courses in departments in the College of Letters and Science including Anthropology, Art, Comparative literature, English, German, History, Music, Philosophy, Russian, and Sociology.

The program provides training in reading critically and analytically, and encourages speculative thought, and on such primary questions as the purpose and meaning of human existence. Courses offered by the Religious Studies faculty emphasize close analysis of texts and therefore train minds rather than test memories. By focusing on the interactions between different traditions, the courses explore the foundations of each tradition and seek an understanding of the complexities, uniqueness, and similarities of the various religions.

Religious Studies

A.B. Major Requirements:

Preparatory Subject Matter

- History 2, 4A, and 4B or 98
- Philosophy 21 or Religious Studies 75
- One course from Art 18, 20, Comparative Literature 1, 15, 53A, 53B
- Religious Studies 4A, 4B
- Depth Subject Matter
- Religious Studies 193
- Additional upper division units of religious studies courses

Religious Studies

Religious Studies (College of Letters and Science)

Paul A. Castelfranco, Ph.D., Program Director
Program Office, 912 Sproull Hall (752-1219)

Committee in Charge

Paul A. Castelfranco, Ph.D. (Botany)
Chairperson
Richard T. Curley, Ph.D. (Anthropology)
R. David Freedman, Ph.D. (Religious Studies)
Neil W. Gilbert, Ph.D. (Art History)
Seymour Howard, Ph.D. (Art History)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Whalen W. Lai, Ph.D. (Religious Studies)

NOTE: For key to footnote symbols, see page 124.
Religious Studies

Course Equivalents
The majors advisors have a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended
Anthropology 2, Classics 10, 41; Philosophy 1. A reading knowledge of a second language is highly recommended. Consult major advisor for a complete list of recommended upper division courses.


Minor Program Requirements:
The following four minor program options and others responsive to students' needs are subject to approval by the major advisor or the Curriculum Committee.

Religious Studies

Religious Studies 102, 110, 122, 124, 140, 168, 172
50

Oriental Religions

Religious Studies 70, 168, 172; 200
20

Judaism

Religious Studies 23, 122, 124
12

Two additional courses from Religious Studies

Religious Studies 110, History 191A, 194A; 130C, 131B
8

Preministerial Training

Seminaries and professional theological schools, as a rule, do not prescribe any specific major program and give equal consideration to all qualified applicants completing a course of study that gives them a broad cultural background. A program combining the Preparatory Subject Matter for the B.A. degree in Religious Studies, with one of the B.A. degree curricula in the humanities and social sciences is an excellent preparation for most seminaries and professional theological schools. A reading knowledge of a foreign language is highly recommended.

Students interested in applying for admission to a theological school should consult the Religious Studies office and make an appointment with the preministerial advisor.

Preministerial Advisor. L. D. Hurst.

Courses in Hebrew

Lower Division Courses

1. Elementary Modern Hebrew (5) I. The Staff (Chairperson in charge)
   Lecture—4 hours; laboratory—2 hours. Introduction to modern written and spoken Hebrew. (Students who have successfully completed Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's option, no petition is required. All other students will receive a letter grade unless a PINP petition is filed.)
   1A7. Individualized Elementary Hebrew (5) I, II, III. The Staff (Chairperson in charge)
   Lecture—1 hour; laboratory—4 hours. Introduction to modern written and spoken Hebrew. Parallel material of course 1. Individualized instruction by videotape. Students who have successfully completed Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's option, no petition is required. All other students will receive a letter grade unless a PINP petition is filed.)

2. Elementary Modern Hebrew (5) II. The Staff (Chairperson in charge)
   Lecture—4 hours; laboratory—2 hours. Prerequisite: course 1 or 1A7. Introduction to modern written and spoken Hebrew. Continuation of course 1.

   2A7. Individualized Elementary Hebrew (5) I, II, III. The Staff (Chairperson in charge)
   Lecture—1 hour; laboratory—8 hours. Prerequisite: course 1 or 1A7 or consent of Instructor. Introduction to modern written and spoken Hebrew. Parallel material of course 2. Individualized instruction by videotape.

3. Elementary Modern Hebrew (5) III. The Staff (Chairperson in charge)
   Lecture—4 hours; laboratory—2 hours. Prerequisite: course 2 or 2A7. Introduction to modern written and spoken Hebrew. Continuation of course 2.

4. Intermediate Modern Hebrew (4) I. Freedman
   Lecture—1 hour; discussion—3 hours. Prerequisite: course 3 or the equivalent. Review of grammatical principles by means of discussion of written exercises; readings of modern texts.

5. Intermediate Modern Hebrew (4) II. Freedman
   Lecture—1 hour; discussion—3 hours. Prerequisite: course 4. Review of grammatical principles by means of discussion of written exercises; readings of modern texts. Readings will reflect Hebrew literature from the Enlightenment to the present. Authors represented include Hasidic, Tsedekhivetski, Aharon Hai and Agnon.

5A-5B. Introduction to Biblical Hebrew (4-4) II. The Staff (Chairperson in charge)
   Lecture—2 hours; discussion—2 hours. The grammar and syntax of Biblical Hebrew with the goal of reading Biblical prose.

Courses in Religious Studies

Lower Division Courses

1. Survey of Religion (3) II. Hurst
   Lecture—3 hours. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.). Readings from the Bible, Bhagavad Gita, Koran, and selections from Plato and early Buddhist writings.

   4A. World Religions (4) I. Lai
   Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism and Taoism from their origins to the present.

   4B. World Religions (4) II. Seidell
   Lecture—3 hours; discussion—1 hour. Western religions including ancient Near-Eastern and Mediterranean religions. Judaism, Christianity, and selected aspects of contemporary Western religious life.

10. Introduction to Religious Studies (2) I, II, III. The Staff (Chairperson in charge)
   Lecture—2 hours. Topic of importance in more than one religious tradition as an illustration of the problems and methods of religious studies. May be repeated for credit in different subject area.

21. Religion of the Hebrew Bible (4) I. Hurst
   Lecture—discussion—4 hours. Religion of Israel from Abraham to the rebuilding of the Temple in post-exilic time. Emphasis will be on themes; covenant, law, prophecy and wisdom.

23. Basic Judaism (4) II. Seidell
   Lecture-discussion—4 hours. General overview of the traditional laws and customs of Judaism, with an introduction to the history, ethics, and underlying beliefs of Judaism. Course requires no prior knowledge of Judaism.

40. Testament (3) I. Hurst
   Lecture—3 hours; discussion—1 hour. New Testament literature from critical, historical and theological perspectives.

40A. Introduction to Islam (4) I. The Staff
   Lecture—4 hours (3 hours lecture, 1 hour discussion). Basic literature and institutions of Islam. Topics include: Muhammad and the Qur'an; Islamic law, theology, and mysticism; relationship to Judaism and Christianity; Islamic sects, position of women; Islam and politics. Offered in even-numbered years.

40B. Introduction to Judaism (4) I. Lai
   Lecture—3 hours; term paper (30 hours minimum preparation). Lectures, readings, and discussions on the development of Judaism in India, China, Japan, Islam; influence on various Far Eastern art forms.

75. Chinese Philosophy: An Introduction (3) II. Lai
   Lecture—2 hours; discussion—2 hours. Introduction to Chinese philosophy from classical to Modern times: emphasizes on basic metaphysics and its change over time, including Confucius. Emphasis on the Han syntheses of Tao, Yin-yang and Five Elements; its impact on Buddhism, Sung new syntheses and conflict with the West. Offered in odd-numbered years.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor; primarily for lower division students. (PINP grade only.)

99. Special Study for Lower-Division Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. (PINP grade only.)

Upper Division Courses

100. Study of Religion: Issues and Methods (4) II. The Staff (Chairperson in charge)
   Lecture-discussion—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields.

102. Christian Origins (4) I.
   Lecture-discussion—3 hours; term paper. Prerequisite: course 40; course 23 recommended. Beginning of the Christian faith seen in relation to milieu in which it originated. Offered in odd-numbered years.

113. Religious Biographies (4) III. Hurst
   Lecture-discussion—4 hours; term paper. Lives of selected religious leaders necessary for understanding of different religious terminologies and traditions.

115. Mysticism (4) III. The Staff (Chairperson in charge)
   Lecture-discussion—4 hours. Prerequisite: one lower division Religious Studies course (20-4). Course intended primarily for Religious Studies majors, with others admitted. Historical and descriptive analysis of selected mystical traditions, and a few key figures; readings of representative mystical authors. Offered every 3 or 4 years.

122. Studies in Biblical Texts (4) III. Freedman
   Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, religion, or literature. May be repeated once for credit in different subject area.

124. Topics in Judaism (4) III. Seidell
   Lecture—3 hours; term paper. Prerequisite: course 23. Study of a book from the Prophets or Writings from critical, historical and religious perspectives. May be repeated once for credit in different subject area.

125A-125B-125C. Talmud: Zeraim (2-2-2) I-II-III. Freedman
   Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Zeraim (from Biblical to Mishnaic) from critical, historical, and religious perspectives. (PINP grade only.)

126A-126B-126C. Talmud: Moed (2-2-2) I-II-III. Freedman
   Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Moed (from Biblical to historical and religious perspectives. (PINP grade only.)

127A-127B-127C. Talmud: Nashim (2-2-2) I-II-III. Freedman
   Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Nashim (women) from critical, historical, and religious perspectives. (PINP grade only.)

128A-128B-128C. Talmud: Nezikin (2-2-2) I-II-III. Freedman
   Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Nezikin (forty) from critical, historical, and religious perspectives. (PINP grade only.)

129A-129B-129C. Talmud: Goshen (2-2-2) I-II-III. Freedman
   Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Goshen (sacrifices) from critical, historical, and religious perspectives. (PINP grade only.)

130A-130B-130C. Talmud: Tosefta (2-2-2) I-II-III. Freedman
   Seminar—2 hours. Prerequisite: course 23; reading knowledge of Hebrew helpful. Examination of texts from the Talmudic order Tosefta (purity) from critical, historical, and religious perspectives. (PINP grade only.)

140. Christian Theology (4) I. Hurst
   Lecture—3 hours; term paper. Prerequisite: course 40; course 102 recommended. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy.

308
Reproduction
(School of Veterinary Medicine)
John P. Hughes, D.V.M., Chairperson of the Department
Department Office, 1126 Medical Science I
(752-1358)

Faculty
Donald L. Bath, Ph.D., Adjunct Lecturer
Domenico Bernoco, D.V.M., Libera Docenza, Associate Professor
Robert H. BonDurant, D.V.M., Associate Professor
Ann Tropmehowen Bowling, Ph.D., Associate Adjunct Professor
Edward C. Feldman, D.V.M., Associate Professor
John F. Hughes, D.V.M., Professor
Irwin K. M. Lii, D.V.M., Ph.D., Associate Professor
Robert L. Pashen, B.V.Sc., Ph.D., Assistant Professor
George H. Stabenfelst, D.V.M., Ph.D., Professor
Clyde J. Stornom, Ph.D., Professor Emeritus

Part-Time Clinical Faculty
Robert E. Dickerson, D.V.M., Associate Clinical Professor
Robert J. Harris, D.V.M., Associate Clinical Professor
James R. Howard, D.V.M., Ph.D., Associate Clinical Professor
Gregory A. Lederberg, D.V.M., M.P.V.M., Assistant Clinical Professor
Gerald R. Mitchell, D.V.M., Associate Clinical Professor
Frank A. Mongini, D.V.M., Associate Clinical Professor
Jack W. Morse, D.V.M., Associate Clinical Professor
Frank N. Walton, D.V.M., Associate Clinical Professor
John E. Zimmerman, D.V.M., Associate Clinical Professor

Courses in Reproduction
Upper Division Courses
111. Immunogenetic and Electrophoretic Techniques (2) I, II
Bernoco Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 100A-100B or the equivalent, or consent of instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins and enzymes of domestic animals.
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Hughes in charge)
(PIN grading only.)

Graduate Courses
231. Pathophysiology of Mammalian Reproductive Processes (3) III. Stabenfelst
Lecture—3 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior. Offered in odd-numbered years.
234. Applied Dairy Cattle Nutrition (2) III. Bath Lecture—2 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of basic nutritional principles to practical dairy cattle feeding and use of computers to formulate rations based on optimum nutritional and economic value. Lectures supplemented with visits to dairy farms to evaluate feeding programs.

Seminar (1) I, II, III. The Staff (Hughes in charge)
Rhetoric

Preparatory Subject Matter ............................................. 73
English or English and rhetoric (see college requirements, page 71) ........ 8
Chemistry (Chemistry 1A, 1B) ......................................... 10
Physics (Physics 2A, 2B, 3A, 3B) ...................................... 8
Mathematics and statistics (Mathematics 16A, Statistics 13, and computer science) ........................................ 10
Biology (Biological Sciences) .......................................... 5
Animal and plant sciences ............................................. 6
Soil and water science .................................................. 6
Atmospheric science ..................................................... 3
Geology or physical geography ....................................... 3
Additional courses in biological/physical sciences and mathematics, to be selected with advisor’s approval (e.g., Botany 2, Zoology 1A, Chemistry 2B) ........................................... 7
Mathematics 16B, Physics 2C) ......................................... 14

Depth Subject Matter .................................................... 47-49
Resource Sciences 100 ................................................... 4
Agricultural and biological sciences 147, 148 ....................... 7
Resource-oriented courses selected with advisor’s approval ...... 24
Supervisory courses ..................................................... 3
Written expression (in addition to College requirement) ..... 3
Quantitative skills (e.g., Agricultural Science and Management 150, Environmental Studies 123, Statistics 106) .......... 4
Social-political awareness in resource sciences (e.g., Environmental Studies 160, 161; Environmental Toxicology 138, Geography 161, Geology 134, Water Science 150, Wildlife and Fisheries Biology 151) ........ 3
Plant and animal ecology (e.g., Botany 117, Entomology 104, Environmental Studies 100, Plant Sciences 101, Zoology 129) .......... 3
Special study or internship (Resource Sciences 190, 192, 198, 199) ......................................................... 3

Resource Sciences 100 ................................................... 4
Agricultural and biological sciences 147, 148 ....................... 7
Resource-oriented courses selected with advisor’s approval ...... 24
Supervisory courses ..................................................... 3
Written expression (in addition to College requirement) ..... 3
Quantitative skills (e.g., Agricultural Science and Management 150, Environmental Studies 123, Statistics 106) .......... 4
Social-political awareness in resource sciences (e.g., Environmental Studies 160, 161; Environmental Toxicology 138, Geography 161, Geology 134, Water Science 150, Wildlife and Fisheries Biology 151) ........ 3
Plant and animal ecology (e.g., Botany 117, Entomology 104, Environmental Studies 100, Plant Sciences 101, Zoology 129) .......... 3
Special study or internship (Resource Sciences 190, 192, 198, 199) ......................................................... 3

Broad Subject Matter .................................................... 8
Social science electives ............................................... 12
At least one upper division course from three of the following areas: 9
- Agricultural economics or economics, agronomy, animal science, atmospheric sciences, botany, civil or agricultural engineering, environmental horticulture, environmental planning and management, environmental studies, environmental toxicology, geography, geology, plant sciences, range management, resource sciences, soil science, water science, wildlife and fisheries biology, zoology, or others presented in the catalog as approved ........................................ 37-39

Total Units for the Major ............................................. 180

Related Courses. For courses that are related to this area see course listings for Agricultural Economics, Agricultural Science and Management, Animal Science, Botany, Entomology, Environmental Planning and Management, Environmental Studies, Environmental Toxicology, Geography, Geology, Range Management, Wildlife and Fisheries Biology, and Zoology.

Major Adviser: R.G. Bura (Land, Air and Water Resources, 175 Hoagland Hall)

Advising Center for the major is located in 122 Hoagland Hall (752-1669).

Courses in Resource Sciences

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (752-1669).

Lower Division Courses

2. Concepts in Forestry (2) II. Delwiche.
Lecture—2 hours. An introduction to the concepts of forestry as illustrated by current issues in the western United States. (P/NP grading only) ........................................ 3

10. Natural Resources of California (2) III. Walker
Lecture—2 hours. Study of the natural resources of California; topographical influences on climate and resource characteristics; resource interrelationships; the social and economic implications of resource utilization for agriculture, recreation, and urban development. (P/NP grading only) .......................... 12

12. Aerial Study of Natural Resources of California (2) III. Walker
Discussion—2 hours; one Saturday flight. Prerequisite: course 10 may be taken concurrently or consent of instructor. Group study of natural resources of California with emphasis directed by the resource character and utilization in potential. Mid-quarter study of topics via a "flying classroom" enhances a unique learning experience. (P/NP grading only) .............................. (N60) Limited enrolment. .......................... 14

22. Resource Sciences Internship (1-12) II, III. The Staff (Chairperson in charge)
Laboratory—3 to 6 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only) ........................................ 26

96. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only) .......................... 31

98. Special Study for Undergraduates (1-5) II, III. The Staff (Chairperson in charge)
(P/NP grading only) ........................................ 31

Upper Division Courses

100. Concepts in Renewable Natural Resources (4) II. Snyder, Walker
Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. A survey of renewable natural resources, including relationships among soil, water, air, energy, and the role of man in resource management, preservation and improvement for provision of food, fiber, environmental enhancement and recreation. ........................................ 14

101. Agriculture and Wildlife (3) III. Crampton
Lecture—3 hours; two Saturday field trips. Prerequisite: upper division standing or consent of instructor. Study of the Central California Valley and the Delta region as an example of utilization for production, agriculture, and outdoor recreation—the conflicts and harmonies; lectures by distinguished biologist of the University, and the State Department of Fish and Game. ........................................ 14

103. Solar Energy Applications (3) III. Fiochini
Lecture—3 hours. Prerequisite: Mathematics 16B and Atmospheric Science 20. Characteristics of solar energy, energy balance of structures; analysis of systems for heating and air conditioning; electricity from the sun; biomass conversion; wind power. ........................................ 14

110. Wildflowers of the Central Valley of California (3) III, Crampton
Lecture—3 hours. Prerequisite: Botany 2. Study of the resident plants in and about the Central Valley of California; growth forms, plant communities; identification and systematic relationships, field collecting; land use and overall influence on wildflower habitats. ........................................ 14

131. Air as a Resource (3) III. Fiochini
Lecture—3 hours. Prerequisite: Mathematics 16A, 16B, and Chemistry 1A. Properties and applications of the atmosphere; air pollution; principles and control. (P/NP grading only) ........................................ 14

198. Seminar in Sustainable Agriculture (2) II. The Staff (Chairperson in charge)
Seminar—2 hours. Seminar on alternative points of view regarding agronomic, economic and public policy aspects of current and future agricultural systems. (P/NP grading only) ........................................ 14

198. Resource Sciences Internship (1-12) II, III. The Staff (Chairperson in charge)
Laboratory—3 to 6 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only) ........................................ 14

198. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only) ........................................ 14

198. Special Studies for Advanced Undergraduates (1-5) II, III. The Staff (Chairperson in charge)
(P/NP grading only) ........................................ 14

Graduate Courses

203. Solar Energy Conversion Processes (3) II. Fiochini
Lecture—4 hours; laboratory 103. Mathematics 16C. Forms of solar energy; solar energy climatology; heat transfer; analysis of systems for space heating and cooling. (P/NP grading only) ........................................ 14

Rhetoric

(A College of Letters and Science)

James J. Murphy, Ph.D., Chairperson of the Department
Department Office, 224 Academic Office Building IV (752-1221)

Faculty

Don Abbott, Ph.D., Assistant Professor
Mary Kahn, M.A., Visiting Lecturer
Martin J. Medhurst, Ph.D., Assistant Professor
Rena P. Mohrman, Ph.D., Professor
Michael T. Motley, Ph.D., Associate Professor
James J. Murphy, Ph.D., Professor
Ralph S. Pomeroy, Ph.D., Associate Professor
Susan B. Shimabuku, Ph.D., Assistant Professor
Michael J. Sunnafra, Ph.D., Assistant Professor
John L. Yohn, M.A., Senior Lecturer

The Major Program

The major in Rhetoric centers on human beings as communicators, on the ways in which messages and their uses influence our lives. Course offerings allow the student to explore all facets of the communication process, from interpersonal communication through the rhetoric of film, and from major theories through the close analysis of particular messages. The centrality of communication in our lives is the basis for the program, and although specific courses may have quite varied emphases, all are designed to focus attention on communication. The sequence of required courses is designed to establish a coherent and systematic foundation from which the student can proceed in ways suited to individual interests. Whatever those interests, the major program can become an organizing principle, and in reporting research, students are asked to use the study of communication as a perspective for understanding themselves and their cultural inheritance.

Because of the general orientation and because communication is so basic to education, rhetoric courses can be profitable to any student in any major, and the profit can extend far beyond the immediate scope of a university education. Students who have majored in rhetoric have found that the program has opened a broad vista of career opportunities. Some have entered the job market directly and are pursuing careers in journalism, broadcasting, public relations, advertising, personnel, and sales. Some have gone on to graduate work in the field, others in studies ranging from business administration to law and even to medicine. It is impossible to exhaust the possibilities for, in both public and private sectors, opportunities continue to develop for those who have a sound liberal education and who have prepared themselves with special attention to the uses of communication.

Rhetoric

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Units</th>
<th>Preparatory Subject Matter</th>
<th>Rhetoric 1, 3</th>
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<tbody>
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<td>8</td>
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Depth Subject Matter ............................................. 44
Rhetoric 100, 110, 114, 120, 153 ......................... 20
One course from each of the following five groups ........... 20
(a) Rhetoric 103, 105, 107
(b) Rhetoric 111, 112, 113
(c) Rhetoric 121, 122, 123
(d) Rhetoric 130, 134, 136, 152
(e) Rhetoric 140, 141, 143

One additional upper division course in Rhetoric .......................... 4

Total Units for the Major ........................................ 52
Minor Program Requirements:
There are four study emphases offered through the minor program in Rhetoric.

1. Upper Division Courses

100. Rhetorical Research (4) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours. Examination in various organizational situations. Focuses on the use of effective communication strategies for achieving organizational and individual goals. Emphasis is placed on identifying and amending ineffective communication within organizations.

140. Mass Communication and the Public (4) I, Medhurst
Lecture—4 hours. Current issues in mass communications policy, with emphasis on the broad impact of mass communication. Involves study of the economic and legal influences on media performance, the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites.

141. Mass Communication Theory and Research (4) I, II. Pre-requisite: course 153, or the equivalent course in Social Science research methods. Recent developments in the study of mass communications content and effects, with emphasis on the broadcast media. Special attention to the function of television for selected audiences; children, minorities, the aged.

142A. News Policies and Practices in Television (2) III. The Staff (Chairperson in charge)
Lecture—2 hours. Course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the broadcast media, as examined by a practicing professional.

142B. News Policies and Practices in the Press (2) III. The Staff (Chairperson in charge)
Lecture—2 hours. Course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the print media, as examined by a practicing professional.

143. Media Criticism: Broadcast (4) III. Medhurst
Lecture—1 hour. Discussion of one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including gene studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture. Course requirements include one or two major writing assignments.

151. Methods of Advocacy (4) I. Pomeroy
Lecture—4 hours. Pre-requisite: course 51 or consent of instructor. Study and practice of methods involved in the effective advocacy of public policies, current controversial issues. Relation of inquiry and explanation to advocacy. Consideration of logical and non-logical means of persuasion.

152. Persuasion (4) III. Sunnafrank
Lecture—4 hours. Pre-requisite: course 114 or 153 recommended. Theory and research on the effectiveness of various communicative techniques used to influence the perceptions and behaviors of others. Focuses on scientific research into the processes of persuasion and resistance to persuasion in various contexts.

153. Empirical Studies in Rhetoric (4) II. Motley
Lecture—4 hours. Pre-requisite: consent of instructor. Consideration of empirical contributions to the study of rhetoric and psychometric approaches to analysis of rhetorical processes.

180. Current Topics in Rhetoric (4) II. Abbott
Seminar—4 hours. Pre-requisite: upper division standing with a major in Rhetoric or consent of instructor. Group work or special topic in Rhetoric. May be repeated once for credit. Enrollment limited.

197. Internship in Rhetoric (1-12) I, II, III. The Staff
Laboratory—36 hours. Pre-requisite: 12 upper division units in rhetoric and consent of instructor. Work-related projects at off-campus sites under departmental supervision. (P/NP grading only.)

404H. Senior Honors Thesis (4) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour; individual tutoring on research project—3 hours. Pre-requisite: senior standing and approval by Honors Committee. Honors thesis; oral defense and discussion. (P/NP grading only.)

407. Tutoring in Rhetoric (2-4) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours; laboratory—1-2 hours. Pre-requisite: upper division standing with a major in rhetoric and consent of Department Chairperson. Tutoring in undergraduate rhetoric courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units. (P/NP grading only.)

498. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Pre-requisite: consent of instructor. (P/NP grading only.)

499. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)
Russian

Graduate Courses
Seniors may take graduate courses with consent of instructor.

209. Current Scholarship (3) I. Murphy
Lecture: 1 hour. Examination and evaluation of research issues and practices in the study of human communication.

210. Theories of Rhetorical Criticism (3) I. Medhurst
Lecture: 1 hour. Discussion: 2 hours. Exploration of various approaches to the art of critique, including dramatism, fantasy theme analysis, phenomenology, generic studies, and sociolinguistic criticism. Philosophical assumptions, limitations, and potential of each approach is assessed.

212. Advocacy in Communication Theory (3) I. Summack
Lecture: 3 hours. Introduction to current theories in the field of communication. Various theoretical approaches including covering law, rules, axiom, causal, and systems will be covered. Several current theories which exemplify existing approaches will be examined.

220. Empirical Methods in Communication (4) II. Motley
Lecture: 4 hours. Prequisite: course 153 or consent of instructor. Introduction to the use of experimental and descriptive research methods in communication research. Topics include survey research, interviewing, experimental and quasiexperimental design, and statistics.

222. Practice in Rhetorical Criticism (3) I. Mohrmann
Seminar: 1 hour. Individual conferences: 2 hours. Prequisite: course 120 or the equivalent. Intensive analysis of selected persuasive messages. Particular attention to the rhetorical situation and to elements in the rhetorical process.

234. Advancement in Contemporary Society (3) I. Pomony
Seminar: 3 hours. Rhetorical and communication theories of participation and persuasion. These theoretical perspectives are employed to analyze the persuasive impact of communication occurring in current public controversies.

240. Discourse Analysis (3) III. Shimeroff
Seminar: 3 hours. Prequisite: course 107 or consent of the instructor. Deferred grading only. Students enrolled in planned and unplanned messages with particular emphasis on oral discourse. Analyses may include insights of stylistic variations, speech acts, syntactical patterns, topic management, argumentative structures, and communication rules.

244. Communication Processes and Problems in Organizations (3) I. Volsky
Seminar: 3 hours. Prequisite: course 130, or the equivalent with consent of instructor. Advanced study of theory and research on communication processes in organizations.

249. Oral and Written Modes of Communication (3) I. Murphy
Lecture: 2 hours. Discussion: 1 hour. Study of elements common to both speaking and writing, and of features specific to each. History of Western attitudes toward writing and speaking. Analytical and interpretative views including those of linguistics, rhetorical and literary critics, and social scientists.

260. Rhetoric of Film (4) III. Medhurst
Seminar: 3 hours. Laboratory: 2 hours. Prequisite: a course in criticism. Explores the relationship between cinematic forms and the perception and interpretation of those forms by viewers. Films are treated as texts intentionally designed to elicit responses from an audience.

260. Special Topics (3) III. Abbott
Seminar: 3 hours. Selected topics in rhetoric and communication. May be repeated once for credit.

262. Communication Applications (3) I, II, III. The Staff (Chairperson in charge)
Lecture: 1 hour. Laboratory: 2 hours; field work under faculty supervision. Field work in communication. May be repeated once for credit. (SU grading only.)

269. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture: 3 hours.

270. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Russian

(College of Letters and Science)
James Gallant, Ph.D., Vice-Chairperson of the Department

Department Office (German and Russian), 416 Sproul Hall (752-2114)

Faculty

Virginia H. Bennett, Ph.D., Assistant Professor
James Gallant, Ph.D., Associate Professor
Lawrence J. Grant, M.A., Lecturer
Daniel Rancour-Laférrière, Ph.D., Associate Professor
Valerie A. Tumin, Ph.D., Professor

The Major Program

The Department offers a major in which students may elect to complete one or two emphases, depending upon anticipated career interests. The common basis for both programs is extensive training in the Russian language. The traditional major, the Russian Literature emphasis, concentrates on the evaluation of the literary movements and cultural trends that have expressed and shaped the Russian national consciousness. This program prepares students for graduate study in literature and a career in teaching. The second area of study, the Russian Language emphasis, focuses on linguistics and practical language skills. This program prepares students for graduate work and, in conjunction with a secondary field of study, such as social or natural science, can lead to a career in government or business.

Russian

A.B. Major Requirements:

Preparatory Subject Matter

- Russian 1 through 6 (or the equivalent)...
- Recommended, Linguistics 1...

Depth Subject Matter

- Russian Literature emphasis...
- Russian 101A, 101B, 101C...
- Russian 102 or 103 or 105...
- Russian 121, 128...
- Russian 127 or 128...
- Additional upper division units chosen in consultation with advisor...

- Russian Language emphasis...
- Russian 101A, 101B, 101C...
- Russian 102 or 105...
- Russian 103 or 104...
- Russian 180...
- Additional upper division units chosen in consultation with advisor...

Total Units for the Major...

44-74

Major Advisor...

L. J. Grant

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also page 93.

Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The Literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate advisor.

Courses in Russian

Lower Division Courses

Course Placement. Students with two years of Russian in high school normally continue in Russian 2; those with three years, Russian 3; those with four years, Russian 4.

1. Elementary Russian (6) I, II. Grant and staff
- Recitation—5 hours; language laboratory—1 hour. Elementary Russian grammar and conversation. (Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Intermediate Russian (6) I, II. Grant and staff
- Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 1. Elementary grammar, reading, and conversation.

3. Elementary Russian (6) I, II. Grant and staff
- Recitation—5 hours; language laboratory—1 hour. Prerequisite: course 2. Elementary grammar, reading, conversation, and composition.

4. Intermediate Russian (4) I, II. Grant and staff
- Discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.

5. Intermediate Russian (4) I, II. Grant and staff
- Discussion—4 hours; laboratory—1 hour. Prerequisite: course 4. Grammar review. Introduction to literature. Conversational practice.

6. Intermediate Russian (4) I, II. Grant and staff
- Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature.
10. Elementary Conversation (2) I, III. The Staff Discussion—2 hours. Prerequisite: course 1; course 2 or 3 (comprehensive). Conversational practice to improve pronunciation and master spoken idioms. May be repeated for credit up to a maximum of 6 units.

36. Great Russian Writers (In English) (4) III. Grant Lecture—2 hours. Thirteen famous Russian proverbs and their antecedences in Russian literature and society. Offered in even-numbered years.

41. Survey of Nineteenth-Century Russian Literature (In English) (4) I. Bennett, Rancour-Laferté Lecture—3 hours. Thirteen major works of nineteenth-century Russian literature. Offered every other year.

42. Survey of Twentieth-Century Russian Literature (In English) (4) II. Rancour-Laferté, Bennet Lecture—3 hours. Three major works of twentieth-century Russian literature. Offered in odd-numbered years.

96. Special Study for Undergraduates (1-5) I, II, III. The Staff (Tumins in charge) (P/NP grading only.)

Upper Division Courses

101A. Advanced Russian (4) I. The Staff Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 6. Topics in Russian grammar and literature such as the relationship of literature and art, and the relationship of contemporary literature and art. Offered in odd-numbered years.

101B. Advanced Russian (4) I. The Staff Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101A. Topics in Russian literature and history. Offered in even-numbered years.

101C. Advanced Russian (4) III. The Staff Lecture—2 hours; discussion—1 hour; oral reports. Continuation of course 101B. Topics in Russian literature and art. Offered in odd-numbered years.

102. Literary Translation (4) I. Rancour-Laferté and staff Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into or from English. Offered in odd-numbered years.

104. Scientific Translation (4) I. Gallant and staff Discussion—3 hours; individual translation projects. Prerequisite: course 101A. Techniques of translating Russian scientific and technical material. Offered in even-numbered years.

123. Twentieth-Century Russian Prose (In English) (4) I. Rancour-Laferté, Bennett Lecture—3 hours; term paper. Examination of various trends and techniques in Russian literature. Offered in even-numbered years.

125. The Russian Theater (In English) (4) III. Bennett, Rancour-Laferté Lecture—3 hours; discussion—1 hour. The major trends in Russian drama. Offered in even-numbered years.

127. Nineteenth Century Russian Poetry I (4) I. Bennett, Rancour-Laferté Discussion—3 hours; term paper. Examination of various trends and techniques in Russian literature. Offered in odd-numbered years.

128. Twentieth Century Russian Poetry I (4) I. Bennett, Rancour-Laferté Discussion—3 hours; term paper. Examination of various trends and techniques in Russian literature. Offered in odd-numbered years.

140. Dostoevsky (In English) (4) I. Tumins Lecture—3 hours. Reading and analysis of Dostoevsky's principal works. Prerequisites: course 101B, Dostoevsky's works, Rancour-Laferté's works, and/or Russian literature. Offered in even-numbered years.

141. Tolstoy (In English) (4) I. Tumins Lecture—3 hours. Study of Leo Tolstoy's literary evolution and art. Offered in odd-numbered years.

150. Russian Culture (4) III. Tumins Discussion—3 hours; term paper. Knowledge of Russian not required. SKS: introduction to the culture and society of Russia. Offered in odd-numbered years.

155. Russian Folklore (4) III. Bennett Lecture—3 hours; term paper. Knowledge of Russian not required. SKS: introduction to the culture and society of Russia. Offered in odd-numbered years.

194. Special Study for Honors Students (5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. Old Church Slavic (4) I. Gallant Lecture—3 hours; term paper. Introduction to the liturgical and synodal literature of Old Church Slavic. Offered in even-numbered years.


204. Descriptive Russian Grammar (4) II. Gallant Lecture—3 hours; term paper. Introduction to the language of Old Church Slavic. Offered in even-numbered years.

NOTE: For key to footnote symbols, see page 124.
Scandinavian

(Sociology)

Faculty

Fritz Sammen-Frankenberg, Ph.D., Associate Professor (Swedish; German)

Course in Scandinavian

Upper Division Course

110. Masterworks of Scandinavian Literature in Translation

4a. Sammen-Frankenberg

Lecture—3 hours; written reports. Readings in English translation from Icelandic Saga to the present, treating such major authors as Ludvig Holberg, Soren Kierkegaard, Henrik Ibsen, Sigrid Undset, August Strindberg, Selma Lagerlief, Pär Lagerkvist. Content varies from year to year. May be repeated twice for credit.

Courses in Swedish

Lower Division Courses

1. Elementary Swedish (6) I. Sammen-Frankenberg

Discussion—5 hours; language laboratory—two 1-hour sessions. (Students who have successfully completed C or higher in Swedish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a PNP grading basis only. Although a passing grade will be charged to the student's PNP option, no petition is required. All other students will receive a letter grade unless a PNP petition is filed.)

2. Elementary Swedish (8) II. Sammen-Frankenberg

Discussion—5 hours; language laboratory—two 1-hour sessions. Prerequisite: course 1.

3. Intermediate Swedish (6) III. Sammen-Frankenberg

Discussion—5 hours; laboratory—two 1-hour sessions. Prerequisite: course 2.

4. Intermediate Swedish (4) I. Sammen-Frankenberg

Discussion—3 hours; weekly reports. Prerequisite: course 3. Review of grammatical principles by means of written exercises leading to discussion of modern Swedish literary and nonliterary texts.

68. Spoken Swedish (2) I. Sammen-Frankenberg

Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. May be taken concurrently with course 3. (PNP grading only.)

98. Directed Group Study (1-3) I, II, III. Sammen-Frankenberg

Prerequisite: consent of instructor. (PNP grading only.)

99. Special Study for Undergraduates (1-3) I, II, III. Sammen-Frankenberg

Prerequisite: consent of instructor. (PNP grading only.)

Sociology

(Options: Law and Society; Social Welfare)

Edwin M. Lemert, Ph.D., Professor Emeritus
John Loiland, Ph.D., Professor
Lyn Loiland, Ph.D., Associate Professor
Leon H. Mayhew, Ph.D., Professor
Daniel M. Ramirez, Ph.D., Assistant Professor
Julius Roth, Ph.D., Professor
John F. Scott, Ph.D., Professor
Judith Stacey, Ph.D., Assistant Professor
John T. Walton, Ph.D., Professor

The Major Program

Sociology focuses on the structure of human interaction and the processes or institutions that both control and emerge from it. The special features of families, tribes, communities, formal organizations, and nation-states, as well as the processes of courtship, conflict and domination, delinquency, religious conversion, and artistic creation are among the major subjects of study. Graduate courses in the field have traditionally led into teaching careers; increasingly, however, career possibilities include the application of sociological knowledge to the areas of policy and correction, education, industrial management, regional and community planning, and the administration of hospitals and health care systems.

A student may elect to complete requirements for the general major or, if desiring to specialize, complete the Law and Society or Social Welfare option.

Sociology

A.B. Degree Requirements:

UNITS

Preparatory Subject Matter (General Major) 21

Sociology 1, 46A, 46B (or the equivalent) 13

Select 12 units from Anthropology 1, 2,

Economics A, B, History 3, 4, 4C,

17A, 17B, Philosophy 1, 12, 21, 22, 23,

Political Science 1, 2, 3, 4, Psychology 1, 2.

Depth Subject Matter 6

Sociology 165A, 165B

Select 8 units from Sociology 126, 140, 160

Sociology 120 20

Total Units for the Major 61

Recommended

Anthropology 1, 118, 119, 124, 128; History 101, 102;

Political Science 1, 2, 10, 21, 22, 23, 105, 151, 156; Political Science 150, 161; Psychology 145; Statistics 106, 108.

Sociology

A.B. Degree Requirements:

(Options: Law and Society; Social Welfare)

UNITS

Preparatory Subject Matter (for either option) 25-27

Sociology 1, 13, 46A, 46B 17

Two courses from Anthropology 1, 2,

Economics A, B, History 3, 4, 4C,

17A, 17B, Philosophy 1, 12, 21, 22, 23,

Political Science 1, 4, Psychology 1, 2 8-10

Depth Subject Matter 40

Law and Society option:

Sociology 152, 155 4

Sociology 120 or 150 4

At least 4 units in one of the following courses:

Sociology 123, 130, 140, 143, 156, 165B, 180, 185 12

At least 12 additional units in upper division sociology courses to achieve a minimum of 40 units 12

Social Welfare option:

Sociology 131, 140, 185 12

At least 4 but not more than 8 units of

Sociology 109A, 109B, 109C 4

At least one course from Afro-American Studies 120, 124, 156, 170, 171, American Studies 110, 111, Native American Studies 124, 156, 170, 171, Spanish 124, Sociology 128 4

At least three courses from Sociology 127, 132, 133, 152, 154, 156, 165B, 180 12

At least 8 additional units in upper division sociology courses to achieve a minimum of 40 units 8

Total Units for the Major 85-87

Major Advisers. Consult the Department Office.

Minor Program Requirements:

The Department of Sociology has established the following minor program of study which are open to Letters and Science students.

Sociology

20

Select 8 units from Sociology 126, 140, 160,

165B, 180

8

Additional upper division units in Sociology 12

Sociology—Social Welfare

20

Sociology 185, plus 4 units selected from

Sociology 109A, 131, 140

4

Four units from Sociology 143, 154, 156,

165B, or 180

4

Additional upper division units selected from

Sociology 120, 123, 127, 130, 132, 152

8

Sociology—Law and Society

20

Sociology 152, plus 4 units selected from

Sociology 109A, 131, 156

4

Four units from Sociology 140, 143, 165B, 180

4

Additional upper division units selected from

Sociology 123, 130, 155, 156, 185

8

Minor Advisers. Consult the Department Office.

Teaching Credential Subject Representative, J. Roth. See page 99 for the Teacher Education Program.

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information and applications regarding graduate study may be obtained at the department office.

Graduate Advisers. See Class Schedule and Room Directory.

Courses in Sociology

Lower Division Courses

1. Introduction to Sociology (5) I. Hackett, III. Mayhew

Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality.

2. Self and Society (4) II. Loiland

Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociological psychology. Includes the study of: the character of the self, identity, roles, socialization, identity change, emotion and social interaction.

3. Social Problems (4) II. Loiland; III. Cramer

Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

* Seminar in Sociological Analysis (4) A, B, C. The Staff Seminar—3 hours; to be arranged—1 hour. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.

314
108. Sociological Analysis (4) III. J. Lofland Lecture—4 hours. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. Course must be completed within one academic year. May be repeated for credit with consent of instructor. Limited enrollment.

109. Sociology of Popular Culture (4) III. Ramirez Lecture—4 hours. The historical emergence of popular culture. "High" culture, "folk" culture and "mass" culture; the development of the "mass" culture; the organization of popular tastes, characteristic art forms of popular culture: literature, music, the graphic arts. The social structure of audience.

40. Computers and Social Research (2) I. Wicow Lecture—2 hours; exercises. Elementary introduction to the use of computers in the social sciences. Topics include use of canned programs such as SPSS and MINITAB, data preparation and elementary analysis, and simulations and games. No prior knowledge of FORTRAN or statistics necessary. Prerequisites: Engineering 5 or Mathematics 19 or 28 can receive only one unit of credit for Sociology 40. (P/NP grading only.)

46A. Introduction to Social Research (4) I. L. Lofland Lecture—4 hours. Introduction to social research—1 hour or term paper or project (instructor's option). Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, sampling.

46B. Introduction to Social Research (4) II. Dixon Lecture—4 hours. Prerequisite: course 46A. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

98. Directed Group Study (1-5) I, II, III. The Staff (Walfon in charge) Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Walfon in charge) Prerequisite consent of instructor. (P/NP grading only.)

Upper Division Courses

102. Sociology of the Environment (4) I. Cramer Lecture—4 hours. Prerequisite: course 3; upper division standing or consent of instructor; course 140 or 156 recommended. Sociological analysis of environmental problems in America: demographic trends of population growth; pollution; leisure and recreation; urbanization; industrialization; suburbanization. Primer of Sociology Eco- systems.

103. Evaluation Research Methods (5) II. Roth Lecture—4 hours; discussion—1 hour; field research. Prerequisites: course 46B or equivalent. Study of the application of research methods to the evaluation of social programs, primarily emphasizing methodological issues, e.g., research design and data collection; uses of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project.

104A-105B. Laboratory in Survey Research (5-5) I-II. The Staff Lecture—4 hours; laboratory—3 hours. Study design, data collection, and analysis of the data collected. Provides an introduction to survey methods, nonexperimental research, and data collection and analysis in a computerized grading only, pending completion of sequence.)

106. Intermediate Social Statistics (4) I. Dixon Lecture—4 hours. Prerequisite: course 46B. An intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures and mathematical models especially relevant to sociological data.

107. Seminar in Sociological Analysis (4) I. Hackett Seminar—3 hours, to be arranged—1 hour. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.

NOTE: For key to footnote symbols, see page 124.
Sociology

147. Sociological Perspectives on East Asia (4) III. Hamilton Lecture—4 hours. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification and economy in China and Japan, with historical and contemporary similarities and differences.

148. Crowd and Mass Behavior (4) II. J. Lofland Lecture—3 hours; discussion—1 hour or term paper or problem set may be assigned. Emphasis on sociological analysis of collective behavior. Topics may include: mass meetings, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions.

150. Criminology (4) III. Lecture—4 hours. Sociological analysis of criminal behavior in relation to social structure and the criminalization process.

152. Juvenile Delinquency (4) III. Lecture—4 hours. Studies of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processes of the delinquent boy.

154. Sociology of Health Care (4) II. Roth Lecture—4 hours. An overview of sociological research in medicine and health care, with emphasis on the organizational, institutional and social psychological aspects.

155. Sociology of Law (4) II. Lemer Lecture—4 hours. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform.

156. Social Movements (4) III. J. Lofland Lecture—3 hours; discussion—1 hour or term paper or problem set may be assigned. Emphasis on social movements; small group theories of mass behavior; mass communication linking the two. Research methods: observational, surveys, and experiments.

157. Social Conflict (4) II. J. Lofland Lecture—3 hours; discussion—1 hour or term paper or problem set may be assigned. Emphasis on the structural and cultural aspects of conflict.

158. Consumer-Vendor Relationships (4) III. Roth Lecture—3 hours; discussion—1 hour. Emphasis on the relationship between the consumer and the vendor of goods and services using case material, student projects, and relevant literature in sociology and related fields.

159. Sociology of Occupations (4) III. Biggar Lecture—4 hours. The nature of occupations; the individual's position in the occupational structure, role relationships, occupational social controls, career lines, and occupational-related self-definition; occupational politics.


160B. Sociological Theory (4) II. Ramirez Lecture—4 hours. Historical introduction to sociological theory with special reference to the history of American sociology and the emergence of contemporary schools of thought in the United States. Schools discussed will include functionalism, symbolic interactionism, exchange theory, and ecology.

189. Research in the Chicano Community (4) II. Ramirez Lecture—3 hours; research project. Emphasis on sociological research with special reference to the Chicano community. Topics may include: social and economic conditions, political and cultural life, problems of adjustment, and the role of the Chicano in the larger society.

199. Sociology Through Literature (4) II. Walton Lecture—4 hours. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Draper, Schulberg, Orwell, etc.


221A. Behavioral Political Sociology (4-4) III. Lemer Seminar—3 hours. Development of the historical and contemporary relationship of politics and government and the political process. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

222. Deviance, Law, and Social Control (4) II. Lemer Seminar—3 hours; paper. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

224. Sociology of Education (4) II. Scott Seminar—3 hours; discussion—1 hour or term paper (to be assigned). Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

228. Sociological Social Psychology (4) I. L. Lofland Seminar—3 hours; seminar—1 hour. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

230. Ethnic (Race) Relations (4) III. Jorgensen Lecture—3 hours; paper. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

234. Gender, Family and Society (4) I. Stacey Seminar—3 hours; seminar—1 hour. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

236A-236B. Comparative Methods in Historical Sociology (4, 4) III-IV. Hawley, Stacey Seminar—3 hours; term paper. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.


245. Developing Societies (4) II. Lemer Seminar—3 hours; term paper or project. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

249. Collectivist Behavior and Social Movements (4) II. J. Lofland Seminar—3 hours; seminar—1 hour. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

252. Sociological Issues in Health Care (4) II. Roth Seminar—3 hours; seminar—1 hour. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.

259. Prosmenir in Sociology (4) II. Jorgensen Seminar—3 hours; paper. Emphasis on the role of government, political life, and economic factors in the development and behavior of societies.
Soil and Water Science
(From Agricultural and Environmental Sciences)

The Major Program

Soil and Water Science is concerned with the use and protection of our land and water resources. The major is designed to provide preparation for a career involving these resources as well as for a more general interest in resource use and protection. Programs are designed to include land use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, general soil science, and general water science. (For example, the emphasis on water quality would include more than the minimum number of units of physical and biological sciences, while an emphasis in resource allocation and land use planning would include more courses in the social, political, and economic areas.) The flexibility of this major makes possible a wide variety of career opportunities which include managerial and technical positions with agri-businesses such as equipment and supply companies, farm management, and positions involving advising, planning, land appraisal, research, and teaching with private, district, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

Soil and Water Science

B.S. Major Requirements:

(For convenience in program planning the usual course taken to satisfy the req. are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>Biology (Biological Sciences 1)</td>
<td>6-8</td>
</tr>
<tr>
<td>Botany (Botany 2)</td>
<td>5</td>
</tr>
<tr>
<td>Mathematics, including calculus, statistics, and computer programming</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry, including Chemistry 1A-1B or 4A-4B and a more advanced course</td>
<td>13</td>
</tr>
<tr>
<td>Physics (Physics 2A-2B or 8A-8C)</td>
<td>9-12</td>
</tr>
<tr>
<td>Geology (Geology 2)</td>
<td>3</td>
</tr>
<tr>
<td>Economics or agricultural economics</td>
<td>3</td>
</tr>
<tr>
<td>Written expression (see College requirement)</td>
<td>7</td>
</tr>
<tr>
<td>Oral expression (see College requirement)</td>
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Depth Subject Matter

<table>
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<th>Name</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Physical sciences, biological sciences and mathemtics with approval of adviser</td>
<td>18</td>
</tr>
<tr>
<td>Soil Science 100</td>
<td>4</td>
</tr>
<tr>
<td>Water Science 100</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units in soil science and water science</td>
<td>22</td>
</tr>
<tr>
<td>Special study or experience (199 or Soil Science 192 in the major area)</td>
<td>3</td>
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Breadth Subject Matter

<table>
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<tr>
<td>Social sciences and humanities</td>
<td>13</td>
</tr>
<tr>
<td>At least one upper division course from each of the following areas, with approval of adviser: (1) resource management, (2) environmental law, (3) environmental economics and decision making</td>
<td>9</td>
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Restricted Electives

<table>
<thead>
<tr>
<th>Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>To supplement or expand areas of student interest selected with approval of adviser</td>
<td>21</td>
</tr>
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</table>

Unrestricted electives

<table>
<thead>
<tr>
<th>Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Units for the Major</td>
<td>180</td>
</tr>
</tbody>
</table>

Specific Courses of Instruction

For specific courses of instruction in this major, see course listings under: Atmospheric Science, Plant Science, Resource Science, Soil Science, and Water Science.

Major Adviser: M.J. Singer (Laboratory in charge)

Advising Center: for the major is located in 122 Hoagland Hall (752-1669).

Graduate Study: Graduate programs are available in Soil Science as well as Water Science. Detailed information can be obtained from the Graduate Adviser and the Announcement of the Graduate Division. See also page 95.

Related Courses: See courses in Agricultural Economics, Agricultural Science and Management, Agronomy, Botany, Chemistry, Geology, Agricultural Engineering, Civil, Environmental Studies, Environmental Toxicology, Geology, Interaction, Land Development, Range Science, and Vegetable Crops.

Soil Science

See below and the Graduate Group (page 318); and also Soil and Water Science

Summarized in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

NOTE: For key to footnote symbols, see page 124.
groups of microorganisms in the geosphere and their responses to environmental variables. Activities of microorganisms related to environmental problems, soil waste disposal, pesticide degradation, and soil fertility.

118. Soils in Land Use and the Environment (4) II. Singer Lecture—3 hours; discussion—1 hour; two 1-day field trips. Prerequisites: WS 100 or consent of instructor. Joins soils considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, and capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation.

120. Soil Genesis and Morphology (2) II. Begg Lecture—2 hours. Prerequisite: course 100; Geology 1 or 2. Soil forming factors are discussed. These factors affect soil properties and soil morphological characteristics. Soil forming processes as they influence the genesis and features of the soil profile. Soil-landform relationships.

120L. Soil Genesis and Morphology Laboratory (1) II. Begg Laboratory—3 hours (including 4 Saturday field trips). Prerequisites: course 120 (may be taken concurrently). Identification and description of soil morphological characteristics. Use of thin sections and the petrographic microscope to identify micromorphological features. Field trips to study soil parent materials, soil climate, soil vegetation, and soil-landform relationships.

121. Soil Classification and Mapping (3) III. Huntington Lecture—2 hours; laboratory—3 hours (seven of the ten sessions are in the field). Prerequisite: course 120; 120L; course 118 recommended. Course introduces systems of soil classification to develop a broader understanding of soils on the landscape and as a basis for soil resource inventory; procedures used in soil survey introduced. Laboratory-field studies provide practice in morphological soil description and soil mapping.

122. Salt-Affected Soils (3) II. The Staff Lecture—3 hours. Prerequisite: consent of instructor; a course in soil chemistry and either plant physiology or plant nutrition. Soil problems in salt-affected soils and the management of soils affected by salt. Aims: to develop practical knowledge about the behavior of salt in soil and the effects of salt on plant growth.

123. Soil Taxonomy (3) III. Huntington Lecture—1½ hours, discussion—1½ hours. Prerequisites: courses 120, 120L and 121, or consent of instructor. An intermediate course in soil classification. Study and analysis of the current system of classification used by the National Cooperative Soil Surveys of the United States. Practice in classifying soil individuals with emphasis on evaluating their placement in the system. Offered in even-numbered years.

150. Soil and Plant Tissue Testing (3) III. Rendig, Reisenauer, Current (Forestry) Lecture—3 hours. Prerequisite: course 109, an upper division course in plant nutrition, and consent of instructor. Preparation of plant tissue samples for analysis, including procedures for soil and plant analysis and interpretation of results. The laboratory is open to students who have completed course 109 or 110.

182. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off-campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

189. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Directed group study in soil science for advanced undergraduates. (P/NP grading only.)

190. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

207. Soil Physics (3) II. Rollston Lecture—3 hours. Prerequisite: Mathematics 228B or consent of instructor; course 107 recommended. Physical properties of soils, processes of water and heat flow, diffusion of gases and solutes, the movement of soluble materials during teaching and irrigation, mechanics, and application of chemical and mathematical tools to soil systems. Offered in even-numbered years.

208. Soil-Plant Interrelationships (3) II. Rendig Lecture—3 hours. Prerequisite: course 100; Botany 110B. Soil-plant relationships in the acquisition of nutrients by plants from soils, the root-soil interface, physiological reactions involved in the assimilation of nutrients, soil factors, and crop quality.

211. Soil Microbiology (2) II. Broadbent Lecture—2 hours. Prerequisite: Chemistry 68B, course 102, or consent of instructor. Activities of selected microorganisms in soil including organic substances; influence of microbial activities on soil properties, microbial activities in soil relation to some environmental problems.

214. Soil Mineralogy (3) III. Whittig Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: a course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of mineral analysis methods, including X-ray, thermal and chemical for characterizing soil and mineral systems, and the study of properties of soils and weathering of minerals. Offered in odd-numbered years.

215. Physical Chemistry of Soils (3) III. Bureau Lecture—3 hours. Prerequisite: Chemistry 107B or 110B, or consent of instructor. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

216. Soil Erosion and Conservation (3) II. Singer Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in even-numbered years.

260. Special Topics in Soil Science (1) I, II, III. Singier, Whittig Seminar—1 hour. Prerequisite: graduate standing. Oral presentation and discussion of scientific material and procedures for review and critique of publications. (S/U grading only.)

291. Current Literature in Plant Nutrition (1) I, II, III. Reisenauer Seminar—1 hour. Prerequisite: graduate standing in Soil Science, Plant Physiology, Ecology, or related subject, and consent of instructor. Current literature in plant nutrition and soil-plant relationships will be reviewed and discussed. Each participant will prepare and present reports to the seminar. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

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Soil Science (A Graduate Group)

Debby W. Henderson, Ph.D., Chairperson of the Group

Group Office, 122 Hoagland Hall (752-0868/1669)

Graduate Study. The Graduate Group in Soil Science offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advisers. Consult the Group Office.

Spanish

College of Letters and Science

Robert M. Scari, Ph.D., Chairperson of the Department

Department Office (Spanish and Classics), 616 Sprout Hall (752-0835)

Faculty

Marta E. Atliken, Ph.D., Visiting Assistant Professor

Samuel G. Armstead, Ph.D., Professor

Donald G. Castanien, Ph.D., Professor Emeritus

Devin L. Carpenter, Ph.D., Visiting Assistant Professor

Mariano González, Ph.D., Lecturer

Richard Gullón, Ph.D., Visiting Professor

Didier T. Jans, Ph.D., Professor

David S. Keller, Ph.D., Associate Professor

Emilio Rojas, Ph.D., Lecturer

Lynn E. Roller, Ph.D., Assistant Professor

Fabián A. Samaniego, M.A., Lecturer

Antonia Sánchez-Ramos, Ph.D., Professor

Robert M. Scari, Ph.D., Professor

Maximiro Torreblanca, Ph.D., Professor

Hugo J. Verani, Ph.D., Professor

Faculty

José da Cruz, Licenciato, Visiting Lecturer (Portuguese)

The Major Program

The major in Spanish is designed to develop competence in the spoken and written language and to provide the possibility of emphasis either on language or on literature, depending upon each student's professional goal. The program, alone or in combination with other major programs, may lead to advanced study of the language or literatures of Spain and Spanish America, and to careers not only in teaching but also in other professional fields such as library science, law, medicine, and in government, social service, or business. Spanish majors are strongly encouraged to complement their work in the department through studies in related areas such as Latin-American studies, international relations, linguistics, comparative literature, art, history, and philosophy.

Spanish

A.B. Major Requirements:

Preparatory Subject Matter: 0-33

Spanish 1 or 2AT, 2 or 2AT, 3 or 2AT, 4 or

7A, 5 or 8 or 7B, 2B or 7C (or the equivalent) 0-33

Depth Subject Matter: 39

Spanish 100 3

Spanish 103A/103B 8

Spanish 110A or 110B 4

Spanish 131 4

Spanish 134, 135, or 136 4

Additional upper division units 16

To be selected in consultation with a major adviser. These units may be concentrated in a single area such as Spanish language, Spanish literature, or Spanish-American literature, or selected from two or more areas. See recommendations below.

Total Units for the Major 39-72

Recommended

The following recommendations should be taken into account. Majors who are interested in a concentration in:

(a) language are advised to take Linguistics 1 (not counted toward major). This course is prerequisite to Linguistics 115 (Chicago sociolinguistics) and 150 (contrastive analysis of Spanish) which may be counted toward the 16 additional upper division units.

(b) a teaching career are advised to take Spanish 300 (the teaching of Spanish).

(c) graduate work in Spanish are advised to take Latin 10 or the equivalent.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Spanish</th>
</tr>
</thead>
<tbody>
<tr>
<td>22-24</td>
<td>One course in Spanish literature (any course)</td>
</tr>
<tr>
<td>4</td>
<td>One course in Spanish from Spanish 194, 135</td>
</tr>
<tr>
<td>4</td>
<td>One course in advanced composition from Spanish 110B, 110C, 120A, 120B, 130A, 130B</td>
</tr>
<tr>
<td>1</td>
<td>Two elective courses acceptable for the Spanish major</td>
</tr>
</tbody>
</table>

Teaching Credential Subject Representative, D. K. Keller. See page 86 for the Teacher Education Program.

The Master of Arts Degree. The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree requirements or 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 Chairperson of the Spanish Department.

Graduate Adviser, D.T. Jaid (M.A. degrees); A. Sánchez-Romero (Ph.D. degrees).

Courses In Portuguese

Lower Division Courses

1. Elementary Portuguese (5) I. The Staff
   Discussion—1 hour; laboratory—1 hour, recitation—3 hours. Portuguese grammar, conversation, and reading. (Students who have successfully completed, with a C- or better, Portuguese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although the passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)
   1A1/1ATB-1ATC. Individualized Instruction in Elementary Spanish (2-2-2) (1 hour, laboratory—1 hour, recitation—3 hours. Grammar, conversation, and reading. This three segments of course 1AT correspond to course 1. Student-instructor contacts consisting of individual tutoring conversation practice and testing period. Students may start at any point and complete one or more two-unit segments in a given quarter. Students who have successfully completed, with a C- or better, Spanish 2 or 3 in the 10th grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Spanish (6) II, III. The Staff (Samariniego in charge)
   Laboratory—two 1-hour sessions; recitation—6 hours. Pre-requisite: course 1. Continuation of course 1.

2A/2ATB-2ATC. Individualized Instruction in Elementary Spanish (2-2-2) II, III. (Samariniego in charge)
   Pre-requisite: course 1 or 1A1/1ATB-1ATC. The three segments of course 2AT correspond to course 2. Student-instructor contacts consisting of individual tutoring, conversation practice, and testing period. Students may start at any point and complete one or more two-unit segments in a given quarter.
   1. Intermediate Spanish (6) I, II, III. The Staff (Samariniego in charge)
      Laboratory—1 hour; recitation—5 hours. Pre-requisite: course 2 or 2AT or 2AT-2ATB-2ATC. Conversational practice based on everyday vocabulary of written Spanish. Review of grammatical principles and expansion of vocabulary through readings of modern texts.
      2. Intermediate Spanish (5) II, III, III. The Staff (Gonzalez in charge)
         Discussion—1 hour; recitation—4 hours. Pre-requisite: course 3. Grammar review through oral and written exercises, and expansion of vocabulary through reading of modern texts.

3. Intermediate Spanish (5) II, III, III. The Staff (da Cruz in charge)
   Discussion—1 hour; laboratory—1 hour, recitation—3 hours. Pre-requisite: course 2 or consent of instructor. Continuation of course 2.

Upper Division Courses

104. Survey of Brazilian Literature: Prose Fiction (4) I.
   Lecture—3 hours. Individual and group conferences. Pre-requisite: course 3.

105. Survey of Brazilian Literature: Poetry (4) II.
   Lecture—3 hours. Individual and group conferences. Pre-requisite: course 3.

106. Survey of Brazilian Literature: Drama and Essay (4) II.
   Lecture—3 hours. Individual and group conferences. Pre-requisite: course 3.

Courses In Spanish

Lower Division Courses

1. Elementary Spanish (6) I, II, III. The Staff (Samariniego in charge)
   Laboratory—two 1-hour sessions; recitation—5 hours. An introduction to the fundamentals of Spanish grammar. Listening and speaking emphasized. (Students who have successfully completed, with a C- or better, Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

Spanish

34. Mexico In Its Literature (3) II. Rojas
   Lecture—3 hours. Introduction to significant literary trends in Mexican literature. Lectures and discussions in English, readings in either Spanish or Spanish of representative works by major contemporary authors. May not be counted as part of the major or minor in Spanish.

35. Survey of Mexican Culture (3) III. Rojas
   Lecture—3 hours. Indian cultural patterns before the discovery of Mexico; development of Mexican civilization during the Spanish conquest; the national period; and the Revolution of 1910. Conducted in English. May not be counted as part of the major or minor in Spanish.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor and Department Chairperson. Primarily for lower-division students. (P/NP grading only.)

Upper Division Courses

Course 100 is prerequisite to all upper division literature courses.

101. Introduction to Principle of Criticism (3) I, II, III. Varani in charge
   Lecture—3 hours. Pre-requisite: course 28 or 7C. Designed to provide students with the skills to recognize the basic principles involved in literary criticism and a useful terminology.

102A-102B. Hispanic Literature I: Medieval and Golden Age (4-4) I, II, III. The Staff (Chairperson in charge)
   Lecture—4-5 hours; written reports. Pre-requisite: course 28 or 7C. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spanish America. Review of Spanish- and Spanish-American grammatical principles and expansion of vocabulary through readings of modern texts.

103A-103B. Hispanic Literature II: Modern Panineral I (4) II. The Staff (Chairperson in charge)
   Lecture—4 hours; written reports. Pre-requisite: course 28 or 7C. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1700 to the present. Offered once every 4 quarters (next, Winter 1984).

104. Hispanic Literature II: Modern Panineral II (4) III. The Staff (Chairperson in charge)
   Lecture—3 hours; written reports. Pre-requisite: course 28 or 7C. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1700 to the present. Continuation of course 104A. Offered once every 4 quarters (next, Spring 1984).

105. Hispanic Literature III: Modern Spanish American (4) I.
   The Staff
   Lecture—3 hours; written reports. Pre-requisite: course 28 or 7C. Introduction to the study of the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries. Offered once every 4 quarters (next, Fall 1983).

106. Hispanic Literature III: Modern Spanish American (4) II.
   The Staff
   Lecture—3 hours; written reports. Pre-requisite: course 28 or 7C. Continuation of the study of the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries. Continuation of course 105A. Offered once every 4 quarters (next, Winter 1984).

106A. Spanish-American Prose of the Twentieth Century (4)

Spanish literature. Offered in odd-numbered years.

106B. Spanish-American Prose of the Twentieth Century (4) III.
   Lecture—3 hours; conferences and reports. Pre-requisite: course 28 or 7C. Emphasis on the development of the novel. Offered in even-numbered years.

109. Spanish Drams of the Golden Age (4) III. Sanchez-Perera in charge
   Lecture—3 hours; conferences and reports. Pre-requisite: course 28 or 7C. Offered in even-numbered years.

110A. Advanced Spanish Composition (4) I.
   The Staff
   Lecture—3 hours; written reports. Pre-requisite: course 28 or 7C. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

110B. Advanced Spanish Composition (4) II.
   The Staff
   Lecture—3 hours; written reports. Pre-requisite: course 28 or 7C. Practice in expository writing, with an aim toward refinement and appreciation of written expression and expansion of vocabulary.

111. Don Quixote (4) II.
   Lecture—3 hours. Pre-requisite: course 28 or 7C.
112. Medieval Masterworks (4) I. Armistead Lecture—3 hours; term paper. Prerequisite: course 100 and 28 or 29. Study of major works of Medieval Spanish literature from the ninth to the fifteenth century. Offered in odd-numbered years.

114. Spanish Romantic Literature (4) I, Scari Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 27 C, or consent of instructor. Study of the Spanish novel, the short story, and poetry in the last half of the nineteenth century. Offered in even-numbered years.

116. Lyric Poetry of the Golden Age (4) III. Sánchez-Romero Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

118. Spanish Novel of the Nineteenth Century (4) III. Scari Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

120A. Twentieth-Century Spanish Prose (4) I. Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

120C. Twentieth-Century Spanish Poetry (4) III. Sánchez-Romero Lecture—3 hours; term paper. Prerequisite: course 28 or 7C. Offered in even-numbered years.

124. Chicano Culture (4) I, Rojas Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Study of Chicano culture in the Southwest from 1858 to its present, emphasis on the period after 1848. Lectures and discussions in English; readings in English and Spanish. May not be counted toward major in Spanish. Offered in odd-numbered years.

125. American-Spanish Modernism (4) II. Varani Lecture—3 hours; conferences, reports. Prerequisite: course 100 and 28 or 27 C. Study of the poetry and prose of Spanish-American Modernismo (1880 to 1916). Offered in even-numbered years.

128. Chicano Literature (4) I, Rojas Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Analysis and interpretation of representative works in prose, fiction, essay and drama. Lectures and discussion in English. Offered in odd-numbered years.

129. Contemporary Spanish-American Short Story (4) II. Jahn Lecture—30 pages; term paper. Prerequisite: course 100 and 28 or 27 C. Study of the development of the short story in Spanish America as seen in the representative works of major contemporary authors. Offered in even-numbered years.

132. The Mexican Novel (4) III, Rojas, Jahn Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C or consent of instructor. Major figures in the development of the Mexican novel. Offered in odd-numbered years.

133. Modern Spanish Syllabus (4) I, Kellar Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C or consent of instructor. Study of world relationships in European and American Spanish, with special attention to syntax of verbs.

134. Introduction to Spanish Linguistics (3) III. Tornellía Lecture—3 hours; prerequisite: course 28 or 7C or consent of instructor. Principles of classical phonemics and morphemics together with more recent developments: descriptive stages of various forms. Theoretical and practical comparison with English and other Romance Languages.

135. Spanish Phonetics (3) I, II. Tornellía Lecture—3 hours; prerequisite: course 28 or 7C or consent of instructor. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers.

136. Survey of Spanish Culture (4) I, Gonzalez Lecture—3 hours; paper. Prerequisite: course 28 or 7C or consent of instructor. Offered in even-numbered years.

138. Survey of Spanish-American Culture (4) II. The Staff (Chairperson in charge) Lecture—3 hours; term paper. Prerequisite: course 28 or 7C. Major developments in the arts and social institutions of Spanish-American areas other than Mexico. Readings, lectures and discussions in Spanish.

139. Comparative Spanish-English Morphology (4) II. The Staff (Tornellía in charge) Lecture—3 hours; individual and group conferences; term paper. Prerequisite: course 28 or the equivalent; Linguistics 1 or 150 recommended. Prerequisite or consent of instructor. Comparative grammatical analysis of English and Spanish, error analysis, introduction to methods and concepts of structuralist and transformational linguistics, the historical and sociological evolution and typology, constituent elements of the noun and verb phrases.

140. Contemporary Spanish-American Drama (4) II. Kellar Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Study of major authors, significant trends, as well as origins and development of the genre.

145. Latin-American Literature in Translation (4) III. The Staff Lecture—3 hours; term papers. Prerequisite: course 100. Reading, lectures and discussion in English of works by Neruda, Vallejo, Borges, Garcia Marquez, Paz, and others. May not be counted toward major in Spanish. Offered in odd-numbered years.

148. Masterpieces of Spanish Literature (4) I, Scari Lecture—3 hours; term paper. Prerequisite: course 28 or 7C. Selections from the best of Spanish prose and poetry. Offered in odd-numbered years.

149. Major Writer (3) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 28 or 7C. May be repeated for credit with consent of instructor.

150. Spanish Fiction (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 28 or 7C. Major authors and their works. Offered in odd-numbered years.

151. Special Project for Advanced Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge) Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

Graduate Courses

200. Techniques of Literary Scholarship (4) III. Armistead Seminar—3 hours. Elements of bibliography and fundamental methods of literary research. (SU grading only.)

205. Literary Theory and Criticism: Prose Fiction (4) III. Varani Seminar—2 hours. Study of contemporary literary theories and their application to twentieth-century Spanish American prose fiction. (P/NP grading only.)

210. Literary Criticism: Poetry (4) I. Seminar—3 hours. Offered in odd-numbered years.

220A. History of the Spanish Language (4) I, Torneblanca Seminar—3 hours. Prerequisite: Latin I.

220B. History of the Spanish Language (4) II, Torneblanca Seminar—3 hours. Prerequisite: Latin I.

221. Hispanic Dialectology (4) III. Torneblanca Seminar—3 hours. Prerequisite: course 220A or consent of instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects.

225A. Masterworks of Medieval Spanish Literature (4) I. Armistead Seminar—3 hours. Prerequisite: course 220A or consent of instructor. Study of medieval Spanish literature and the evolution of the castilian language. Offered in even-numbered years.

225B. Masterworks of Medieval Spanish Literature (4) II. Armistead Seminar—3 hours. Prerequisite: course 220A or consent of instructor. Study of late medieval prose works: didactic prose, seminal and chivalric novel, Le Celestial. Offered in even-numbered years.

225C. Medieval Spanish Epic (4) III. Armistead Seminar—3 hours. Prerequisite: course 220A or consent of instructor. Study of the epic poetry from its origins through the golden age of the genre in the fifteenth century. Offered in odd-numbered years.

225D. Medieval Lyric (4) I. Armistead Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of representative early lyric poetry in the various regional languages. Offered in odd-numbered years.

226. El libro de buen amor (4) II. Armistead Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of the fourteenth-century didactic poem, El libro de buen amor (The Book of Good Love) by Juan Ruiz, Archpriest of Hita. Offered in odd-numbered years.

227. El Romancero (4) III. Armistead Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of the various genres of oral traditional literature among the Hispanic peoples. Offered in even-numbered years.

228. Folkliterature of the Hispanic World (4) I, Armistead Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of the various genres of oral traditional literature among the Hispanic peoples. Offered in even-numbered years.


231C. Spanish Literature of the Golden Age: Literature of Ideas (4) II. The Staff Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

231D. Spanish Literature of the Golden Age: Narrative (4) II. The Staff Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

231E. Spanish Literature of the Golden Age: The Drama (4) II, Sánchez-Romero Seminar—3 hours. Major works of the dramatists. Offered in odd-numbered years.


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.

236. Twentieth-Century Spanish Thinkers (4) III. Scari Seminar—3 hours. Major thinkers from Garland to Unamuno and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in even-numbered years.

237. Twentieth-Century Spanish Drama (4) I. Seminar—3 hours. Major Spanish dramatists from Valle-Inclán to the present.

238. Spanish Romanticism (4) I, Scari Seminar—2 hours. Sources and development of Romanticism in Spain, particularly in poetry and drama.

239. Gasca and Spanish Realism (4) II, Scari Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

240. Twentieth-Century Spanish-American Drama (4) III. Kellar Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sanchez to the present. Offered in even-numbered years.

241A. Spanish-American Novel, 1900-1950 (4) I, Varani Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Spanish-American literature in the first half of the twentieth century. Offered in even-numbered years.
Statistics

(Intercollege Division)

Robert H. Shumway, Ph.D., Acting Chairperson of the Division and Associate Dean of Statistics

Division Office, 489 Kerr Hall (752-2361)

Faculty

P.K. Bhattacharya, Ph.D., Professor
Alan P. Fenech, Ph.D., Associate Professor
Charles E. Franti, Ph.D., Professor (Statistics, Community Health)

Wesley O. Johnson, Ph.D., Assistant Professor
Y.P. Mack, Ph.D., Assistant Professor
Norman S. Matloff, Ph.D., Associate Professor
(Statistics, Electrical and Computer Engineering)

Francisco J. Samaniego, Ph.D., Professor
Robert H. Shumway, Ph.D., Professor
Jessica M. Utts, Ph.D., Assistant Professor
Alvin D. Wiggins, Ph.D., Professor
Neil H. Wilkins, Ph.D., Assistant Professor

NOTE: For key to footnote symbols, see page 124.

Statistics

Statistics is a subject which touches our lives virtually every day in a variety of ways, from the amount of time we spend on the television shows which are left on the air. It has been developed to enable us to make inferences about entire populations, based on samples extracted from those populations. Thus, statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, social, engineering, and medical sciences.

The Division of Statistics offers courses to fulfill needs at all levels. A minor in statistics gives the student a basic grounding in both theory and applications and would be a valuable complement to almost any major program. An undergraduate major in statistics is sufficient preparation for either a career or graduate study in the field.

Entry-level courses for students are as follows:

(a) Statistics 133, 32, and 102. These three courses are essentially equivalent in content, each designed as an introduction to the basic concepts and methods of probability and statistics.

(b) Statistics 133A-130B and 131A-131B. These courses require calculus, and present both methods of statistics and the probablistic background from which the methods are derived. The two sequences cover the same material, but the 131 course sequence goes into more depth. Neither sequence, course 130 or 131, requires a prerequisite from the set, courses 133, 32, and 102, discussed above, but students often find such a background helpful.

The Major Programs

Probability models and statistical methods are used in a great many fields, including the biological and social sciences, business, and engineering. The widespread applicability of statistics has created in both the public and private sectors a strong demand for graduates with statistical training. The Bureau of Labor Statistics has estimated that the demand for trained statisticians in government and industry will exceed the supply by at least 1,900 through the year 1985. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial series within an insurance company or in the data management unit in a health science facility), and teaching positions.

The major programs in statistics are designed to make possible a wide variety of career choices. The Bachelor of Arts degree is very flexible, facilitating a double major or an extensive elective coursework in a field in which statistics is applied. The Bachelor of Science degree program has two options: one emphasizes mathematics and is especially recommended as preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied coursework and emphasize the strong interdisciplinary character of statistical theory and the applications of statistics.

The concurrent study of statistics and a field of applications at an advanced level will serve students well either in preparing for a career in an area of application or in preparing for graduate study. Students with a strong interest in a quantitative discipline are encouraged to pursue a double major combining statistics and this discipline.
Statistics (general) option

Depth Subject Matter

48-51

Analysis of variance, multiple regression, and time series

9

Introduction to probability, mathematical statistics, statistics 131A, 131B, 131C or the equivalent

12

Four Statistics courses having Statistics 131A as a prerequisite

11-12

Linear Algebra, Mathematics 167

3

Three upper division Math courses selected from 106A, 127A/B/C, 127D, 128A-128B-128C, 128D, Mathematics 127 strongly recommended for students considering graduate work in Mathematics or Statistics

9-11

Related elective courses

6

Two upper division courses approved by major advisor. These may be in mathematics, computer science or in quantitative aspects of a substantive discipline.


Total Units for the Major

72-75

Computer Science option

Depth Subject Matter

62-64

Analysis of variance, multiple regression, and time series

106, 107

Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C

12

Two courses having Statistics 131A as a prerequisite

12

Statistical Computing, Statistics 141

3

Discrete event simulation, Computer Science 170

3

Data structures, Mathematics 128A

3

Computer structure and assembly language, Computer Science 174

4

Numerical analysis, Mathematics 128A, 126B

8

One course from Mathematics 128B, Electrical and Computer Engineering 160B, Mathematics 170

4

Total Units for the Major

72-64

Major Advisers

A.P. Fenech, N.S. Matoff

Sometime before or during the first quarter of the junior year, students planning to major in statistics should consult with a faculty advisor to plan the remainder of their undergraduate programs. Students are encouraged to meet with an advisor to plan a program as early as possible.

Minor Program Requirements:

The Division offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of those widely used applied statistical methods.

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<th>UNITS</th>
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<tr>
<td>Statistics 106, 108, and 130A-130B or 131A-131B</td>
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<td>15</td>
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<tr>
<td>One course in Statistics having Statistics 130B or 131B as a prerequisite</td>
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<td>3</td>
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Graduate Study. The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information concerning financial aid and other opportunities, is available from the Division of Statistics.

Graduate Advisers

P.K. Bhattacharya, F.J. Samaniego

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (2-2009) or the Division Office (2-2361).

Courses in Statistics

Lower Division Courses

12. Introduction to Discrete Probability (3) I. Staff Lecture—3 hours. Prerequisite: two years of high school algebra. Random experiments; countable sample space; elementary probability axioms; counting formulas; conditional probability; independence, Bayes' theorem; expectations; counting principles; recurrence relations; Markov chains. Applications in the social, biological and engineering sciences. Offered in even-numbered years.

13. Elementary Statistics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra; Measures of central tendency and dispersion; binomial, normal, student t and Chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. (Students having had courses 103B or 131A may not take course for credit.)


15. Directed Group Study (1-5) I, II, III. The Staff (Chairpersons in charge) Prerequisite: consent of instructor. Special topics in statistics appropriate for study at the upper division level. (P/N grading only.)

Upper Division Courses

102. Introduction to Probability Modeling and Statistical Inference (4) I, II. I. Staff Lecture—4 hours; discussion—1 hour. Prerequisite: two years of high school algebra, and upper division standing. Introduction to probability and statistics at a rigorous yet precalculus level. Topics include: probability models—binomial, Poisson, geometric, normal and sampling distributions; data analysis; graphical data analysis; descriptive and nonparametric statistics; regression, analysis of variance; correlation; computing with MINITAB package. Students who have had course 131C may receive only 2 units of credit for course 102.

103. Applied Statistics for Business and Economics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13 or 132 or 102. Descriptive statistics: probability; random variables: expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem: properties of estimators; linear combinations of random variables; testing and estimation; MINITAB computing package.


105. Applied Statistical Methods: Analysis of Variance (4) I, II. II. Staff Lecture—4 hours. Prerequisite: course 13, 32, or 102. One-way analysis of variance, comparison of variables, randomized complete and incomplete block design, Latin squares. Multiple comparisons procedures. One-way random effects model.

106. Applied Statistical Methods: Regression Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: course 13, 32, or 102. Simple linear regression, multiple regression, variable selection techniques, stepwise regression, analysis of covariance.


130A-130B. Mathematical Statistics, Brief Course (4-4) I-II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A or equivalent. Mathematical statistics for non-majors. Concepts of probability and sampling, principles of estimation, properties of estimators, sampling distributions, central limit theorem, large samples, the normal distribution. Students who have had Mathematics 131 may not receive credit for Statistics 131A.

131A-131B. Introduction to Mathematical Statistics (4-4) I-II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A or Mathematics 131. Sampling, point estimation, exact sampling distributions, confidence intervals, hypothesis testing, linear regression and analysis of variance.

134. Nonparametric Inference (3) III. III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Selection of appropriate nonparametric techniques for a one-sample and a k-sample point of view. Topics include: sign, rank, Wilcoxon, Mann-Whitney, Kruskal-Wallis tests; confidence intervals for quantiles, location parameters; rank tests. Dispersions tests, efficiency. Offered in odd-numbered years.

153. Multivariate Data Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Qualitative descriptions and analysis of social and biological phenomena. Multivariate statistical procedures implemented through computer methods. Applied time series, factor and cluster analysis.

157. Applied Time Series Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B or the equivalent. Auto- and cross-correlation, spectral analysis, coherence, transfer functions, linear tests, seasonal adjustment, mean square convergence, autoregressive moving average models, forecasting, Box-Jenkins methods, special analysis of variance, and signal detection and discrimination methods.

158. Analysis of Categorical Data (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B, or courses 106 and 108. Varieties of categorical data, cross-classifications, contingencies, and experience. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness of fit. Logit models, linear logit models, log-linear models, log-linear models of association. Marginal homogeneity and symmetry in square tables.

114. Statistical Computing (3) III. The Staff Lecture—3 hours. Prerequisite: course 130A or 131A or the equivalent; one course from Elective and Computer Engineering 18 or Mathematics 24A or Engineering 11; knowledge of regression analysis and matrix algebra. Computational aspects of linear models, linear models, development of packaged statistical programs; simulation techniques; graphics. Offered in odd-numbered years.

142. Reliability (3) III. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B or consent of instructor. Stochastic modeling and inference for reliability systems. Topics include: coherent systems, statistical failure models, notions of age, maintenance policies and their optimization. Offered in odd-numbered years.

144. Sampling Theory of Surveys (3) II. The Staff Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with applications in the social and biological sciences, stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in even-numbered years.

192. Internship in Statistics (1-2) I, II, III. The Staff (Chairpersons in charge) Internship—3-6 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (P/N grading only.)

196. Directed Group Study (1-5) I, II, III. The Staff (Chairpersons in charge) Prerequisite: consent of instructor. Special topics in statistics appropriate for study at the upper division level. (P/N grading only.)

198. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) Special topics in statistics appropriate for study at the upper division level. (P/N grading only.)

Graduate Courses

205. Statistical Methods for Research (3) III. The Staff Lecture—3 hours. Prerequisite: course 106 or the equivalent. Statistical methods include: analysis of variance, correlation, regression, chi-square statistics, Sylvest polynomial, latent squares, Yulean squares, balanced and partially balanced incomplete block designs, factorial experiments, conformed designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, optimal designs based on various criteria, analysis of covariance.

230. Brief Advanced Mathematical Statistics (3) III. The Staff Lecture—4 hours. Prerequisite: Statistics 131A, 131B, 131C, or Mathematics 167 or the equivalent. Distribution theory, modes of convergence, laws of large numbers, central limit theorem, Slutsky's theorem, consistency, asymptotic normality of maximum likelihood ratios, Pitman efficiency, concepts of decision theory, Bayesian inference. Students who have received credit for courses 231A, 231B, or 231C may receive only 2 units. 1 unit, or no credit respectively for course 236.

322
Statistics (A Graduate Group)

Robert H. Shumway, Ph.D., Acting Chairperson of the Group
Group Office, 496 Kerr Hall (752-2361)

Faculty
The Group has approximately thirty faculty members from all colleges, schools, and divisions, including twelve from the Intercollege Division of Statistics.

Graduate Study. The Graduate Group in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information, see the Announcement of the Graduate Division, or contact the Chairperson of the Group.

Graduate Advisers. P.K. Bhattacharya (Statistics), M.S. degree; F.J. Samaniego (Statistics), Ph.D. degree.

Subject A

See under University Requirements, page 61; or English A course, page 204

Surgery

School of Veterinary Medicine

Eugene P. Steffey, V.M.D., Ph.D., Chairperson of the Department
Department Office, 2112 Medical Science 1A (752-3599)

Faculty
Cleta S. Bailey, D.V.M., Ph.D., Assistant Professor
Eugene M. Breznock, D.V.M., Ph.D., Associate Professor
Ned Buyukirmci, V.M.D., Assistant Professor
Robert M. Cello, D.V.M., Professor
I. M. Gouley, D.V.M., Ph.D., Professor
Steve C. Haskins, V.M.S., M.S., Associate Professor
Terrell A. Holliday, D.V.M., Ph.D., Professor
Andrew B. Kelly, J.V., Assistant Professor
Robert L. Leighton, V.M.D., Professor Emeritus
Bruce R. Madewell, V.M.D., Associate Professor
Susan V. Manley, D.V.M., Assistant Professor
Dennis M. Meagher, D.V.M., Ph.D., Professor
Harold R. Parker, D.V.M., Ph.D., Professor
John R. Pascoe, B.V.Sc., Assistant Professor
Harold D. Snow, D.V.M., Associate Adjunct Professor (School of Medicine, Los Angeles campus)
Eugene P. Steffey, V.M.D., Ph.D., Professor
Gordon H. Thelen, D.V.M., Professor
Philip Vasseur, D.V.M., Assistant Professor
John D. Wheat, D.V.M., Professor
Aida P. Wind, D.V.M., Lecturer

Courses in Surgery

Upper Division Course
199. Special Study for Advanced Undergraduates (1-5) (I, II, III). The Staff (Steffey in charge) (P/NP grading only)

Graduate Courses
228. Anesthesia in Research (I) III. Steffey Lecture—1 hour. Prerequisite: graduate or professional student, or consent of instructor. Lecture series offered by the School of Veterinary Medicine directed at graduate and professional students interested in broadening their knowledge of the principles of anesthesia as related to biomedical research.

291. Anesthesia/Critical Care Basic Science Conference (I, II, III). The Staff (Steffey in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Course presented to teach basic scientific foundations of animal anesthesia and critical care. Format is directed by discussion following reading of assigned material emphasizing foundations in pharmacology and physiology. (SU grading only)

293. Anesthesia/Critical Care Case Management Conference (I, II, III). The Staff (Steffey in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Discussion of VMTH case material to illustrate specific medical problems and their preventive and corrective management. (SU grading only)

298. Group Study (1-5) (I, II, III). The Staff (Steffey in charge)

Research (I-12) (I, II, III). The Staff (SU grading only)

Professional Courses
410. Small Animal Surgery (1/2 per week) (I, II, III). The Staff (Leighton in charge) Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for preoperative preparation of hospital patients, assistance at operating and postoperative care under the supervision of the senior surgical staff. Provides experience in orthopedic and general surgery in small animals. May be repeated for credit. (SU grading only)

411. Surgery (1/2 per week) (I, II, III). The Staff (Leighton in charge) Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for care of pet animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only)

412. Large Animal Surgery (1/2 per week) (I, II, III). The Staff (Wheat in charge) Laboratory—50 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for care of farm animal surgical patients in the hospital and outpatient clinic including physical examinations, presurgical work-ups, assistance at operations, surgery, post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only)

414. Veterinary Anesthesiology (1/2 per week) (I, II, III). The Staff (Steffey in charge) Laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for anesthetic care of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (SU grading only)

420. Veterinary Neurology (1/2 per week) (I, II, III). Holiday Laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible...
for care of hospital and outpatient clients including history taking, neurologic examinations and special diagnostic and therapeutic procedures, under the direction of the staff neurologists. (SU grading only.)

422. Veterinary Ophthalmology (94 to 1/2 per week) I, II, III, Cello.
Laboratory—25-50 hours. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents responsible for the care of animals in the hospital and outpatient clinic including history taking, ophthalmologic examination, special diagnostic techniques, assistance at ophthalmologic surgery and medical and post-surgical care under the direction of the staff ophthalmologists. May be repeated for credit. (SU grading only.)

422. Large Animal Grand Rounds (Pa) I, II, III. The Staff (Wheat in charge)
Discussion—1 hour. Prerequisite: professional standing; intern or resident in Veterinary Medical Teaching Hospital or consent of instructor. Interns and residents take an active part in the presentation and discussion of selected cases from the large animal and avian clinics. (SU grading only.)

Swedish
See Scandinavian

Textiles (A Group) Graduate Program

S. Haig Zeronian, Ph.D., D.Sc., Chairperson of the Group

Group Office, 129 Everson Hall (752-6650)

Faculty. The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Adviser, S. H. Zeronian (Textiles and Clothing).

The Major Program

The Textiles and Clothing major is concerned with the study of the socioeconomic and physical science aspects of textiles and clothing including physical, chemical, mathematical and statistical properties, applications, structure, and care of fibers and fabrics, and their production and end-use. All students in the major are required to take a common core of preparatory subject matter balanced between the social sciences-humanities and physical sciences and the humanities and sciences and depth subject matter in textiles and clothing as well as in business. The student is expected to have a particular area of emphasis in textiles through careful selection of restricted electives in consultation with an adviser. This major prepares you for a career in textiles and clothing and related fields including merchandising and marketing, production, testing, quality control and quality assurance, textile design and design. Those interested in careers in fashion design and marketing should consult with their adviser. Graduates are qualified to enter the graduate program in Textiles, and Textiles and Clothing or Textile Science programs at other universities.

Textiles and Clothing

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Cultural anthropology (Anthropology 2)</td>
<td>4</td>
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<tr>
<td>Introductory psychology (Psychology 1)</td>
<td>4</td>
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<tr>
<td>Sociology (Sociology 1)</td>
<td>5</td>
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<tr>
<td>Economics, including general principles and</td>
<td>4-5</td>
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<tr>
<td>accounting (Economics 1A-1B, 11A-11B)</td>
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<tr>
<td>Written expression (English 2)</td>
<td>8</td>
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<tr>
<td>General chemistry, including organic (Chemistry 1A, 1B, 8A, 8B)</td>
<td>16</td>
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<tr>
<td>Physics (Physics 1A, 1B)</td>
<td>6</td>
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<tr>
<td>Computer Science (Mathematics 1B)</td>
<td>3</td>
</tr>
<tr>
<td>History of art or design, one course</td>
<td>3-4</td>
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<tr>
<td>Textile and Clothing 6, 7, 8</td>
<td>48</td>
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<tr>
<td>Agricultural Economics 18, 112, 113</td>
<td>12</td>
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<td>Design 144</td>
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<td>Restricted Electives (20)</td>
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<td>Total Units for the Major</td>
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Minor Program Requirements:

The Division of Textiles and Clothing offers two minor programs for non-majors interested in satisfying secondary career objectives.

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>Textiles and Clothing 6, 7, 8</td>
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<td>Textiles and Clothing</td>
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<tr>
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<td>161-161L or 163-163L, 162-162L, 164, 165, 170, 173, 176</td>
<td>10-15</td>
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<td>Design 143</td>
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Minor Adviser, M.H. Rucker.

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<th>Course</th>
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<tr>
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<tr>
<td>100.-161-161L, 162-162L, 163-163L, 166</td>
<td>14</td>
</tr>
<tr>
<td>Minor Adviser, S. H. Zeronian</td>
<td></td>
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</tbody>
</table>

Graduate Study. A program of study is offered leading to the M.S. degree in Textiles. Information can be obtained from the graduate adviser. Also see page 95.

Related Courses. See courses in Consumer Science and Design.

Courses in Textiles and Clothing

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing.

(See—Each course is listed under one of these groups: a. Clothing; b. Textiles; c. Field, Group, and Special Study.)

a) Clothing

7. Social and Psychological Aspects of Dress (3) I, II, III
Kaiser Lecture—3 hours. Prerequisite: introductory courses in anthropology, sociology and/or psychology recommended; a study of dress in relation to culture, society and the individual.

8. The Textiles and Apparel Industry (3) I. Rucker Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods.

17. Introduction to Clothing Structure (3) II. Hsieh Laboratory—2 hours; Lecture—2 hours. Prerequisite: course 17 may be taken concurrently. Development of basic foundation patterns for clothing structure from basic patterns by flat pattern manipulation. Pattern evaluation, modification, alteration, and transferring techniques included.

170. Advanced Clothing Structure (4) III. Hsieh Lecture—2 hours; Laboratory—6 hours. Prerequisite: course 17. Analysis of cutting, flat pattern, and draping principles and the combined utilization and application of these principles. Comparative analysis of the relationships of clothing structure development for efficient and functional application.

173. Principles of Fashion Marketing (3) II. Rucker Lecture—3 hours. Prerequisite: course 8. Economics 1A, Agricultural Economics 113 or 136. Study of basic elements of fashion marketing including philosophy and objectives. Organization, merchandising, pricing, promotion and personnel.

177. Clothing and Social Perception (3) III. Kaiser Lecture—3 hours. Prerequisite: course 7. Sociology 1, Psychology 1. Social and cognitive processes related to the meanings people assign to clothing cues when perceiving another one. Particular attention to the following appearance-related stereotypes: age, sex, physical attractiveness, status, ethnicity. Influences of clothing and appearance on social interaction.

Textiles (Graduate Group); Textiles and Clothing
NOTE: For key to footnote symbols, see page 124.
Vegetable Crops
(College of Agricultural and Environmental Sciences)

Lawrence Rappaport, Ph.D., Chairperson of the Department
Office, 152 Hunt Hall (752-0516)

Faculty
Arnold J. Bloom, Ph.D., Assistant Professor
Kent J. Bradford, Ph.D., Assistant Professor
James F. Harrington, Ph.D., Professor Emeritus
John D. Hewitt, Ph.D., Assistant Professor
Frederick G. Litz, Ph.D., Associate Professor
Richard A. Jones, Ph.D., Associate Professor
Oscar A. Lorenz, Ph.D., Professor Emeritus
James M. Lyons, Ph.D., Professor
Richard W. Michelmore, Ph.D., Assistant Professor
John H. MacGillivray, Ph.D., Professor Emeritus
Leonard L. Morris, Ph.D., Professor Emeritus
Thomas J. Merton, Ph.D., Assistant Adjunct Professor
Harlan K. Pratt, Ph.D., Professor Emeritus
Lawrence Rappaport, Ph.D., Professor
Charles M. Rich, Ph.D., Professor
Vincent Rubatzky, Ph.D., Adjunct Lecturer
Mikal E. Salvetat, Ph.D., Adjunct Professor
William L. Sims, Ph.D., Adjunct Lecturer
Paul G. Smith, Ph.D., Professor Emeritus
Arthur R. Spurr, Ph.D., Professor
Herman Timm, Ph.D., Adjunct Lecturer
Ronald E. Voss, Ph.D., Adjunct Lecturer
James E. Weller, Ph.D., Lecturer Emeritus
Masatoshi Yamaguchi, Ph.D., Professor Emeritus
Shang Fei Yang, Ph.D., Professor
Graduate Adviser, A.R. Spurr, J.D. Hewitt.

Courses in Vegetable Crops

Questions pertaining to the following courses should be directed to the instructor or to the Teaching Services, 256 Hunt Hall.

Lower Division Course
92. Internship in Vegetable Crops (1-4) I, II, III. The Staff (Department Chairperson in charge)
Laboratory—36 hours. Work-experience off or on campus in all subject areas pertaining to vegetable crops.
Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (SP grading only.)

Upper Division Courses

101. Principles of Vegetable Crops Production (4) I, II. Lyons Lecture—1 hour. Prerequisite: Botany 2 and/or Plant Science 2. Fundamentals of vegetable crop production, handling, processing, utilization and distribution.

105. Systematic Orniculture (4) I. Salvetat Lecture—2 hours, laboratory—4 hours, field trips and written and oral reports. Prerequisite: Botany 2. Botany 108 recommended. Taxonomic and horticultural classification of the more important vegetable cultivars, their origin, morphology, nomenclature, and description; wild vegetable species, minor and exotic vegetables, and trends in development of new cultivars.

118. Seed Physiology and Production (3) II. Bradford Lecture—3 hours. Prerequisite: Botany 111B. Physiological factors affecting germination of seeds, seed development, viability and longevity of seed. Principles of seed production. One or more field trips.

130. Mushrooms of California (3) II. Howard Lecture—2 hours, discussion—1 hour, laboratory—2 hours, field trips. Prerequisite: upper-division standing or consent of instructor. Introduction to the culture, food value and culinary aspects of mushroom species, and techniques of identification of wild mushrooms. Oral and written reports and a final examination form the basis for grading.

150. World Vegetable Crops (3) III. The Staff Lecture-discussion—3 hours. Prerequisite: Plant Science 2 or Botany 2. 150 surveys the vegetable crops of the world with emphasis on tropical, sub-tropical, and exotic vegetables. Principle topics considered are botany, origin, geography, distribution, morphology, physiology, current research, and use. Written and oral reports are made on vegetable production of a region or country or on selected vegetable crops.

192. Internship in Vegetable Crops (1-12) I, II, III, The Staff (Department Chairperson in charge) Laboratory—36 hours. Prerequisite: consent of instructor. Work-experience in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (SP grading only.)

195. Field Study of Vegetable Industry (1) III. Rubatzky Field Study. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research and extension operations, farm stations, Extension Service, marketing, processors, equipment, etc. To be given in fall-summer and spring quarters. Considered a spring course for preRegistration. (SP grading only.)

197. Tutoring in Vegetable Crops (1-3) I, II, III, The Staff (Chairperson in charge) Laboratory—1 hour. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and auto-tutorials, develop and conduct demonstrations and discussions, and be involved in testing. May be repeated up to a total of 6 units.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (SP grading only.)

Graduate Courses

212. Postharvest Physiology of Vegetables (4) III. Yang, Salvetat 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, composition, and morphological and physiological changes, senescence, and postharvest disorders; lecture stresses species responses and requirements; laboratory stresses concepts and research procedures.

220. Vegetable Genetics and Improvement (4), Michelmore Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B. Course offers depth in vegetable genetics as affected by self-incompatibility, flower structure, pollen vectors, and other reproductive factors. Problems of chromosomal number and structure, heterosis, pest resistance, and species hybrids peculiar to vegetable improvement.

230. Selected Methods in Vegetable Research (3) III. Yang and staff. Lecture—1 hour, laboratory—6 hours. Prerequisite: one course from Plant Science 102, Botany 111A, 111B, Biochemistry 101A-101B, or 101L. Survey of the theory and practice of certain laboratory methods and techniques used in vegetable/plant research, with emphasis on determination of plant constituents, physiological functions and cell/tissue culture.

232. Seminar (1) I, II, III. Bradford, Michelmore Discussion—1 hour. (SP grading only.)

239. Special Topics in Vegetable Crops (2) II, Bradford Lecture—1 hour. Discussion—1 hour. Prerequisite: graduate standing. In-depth coverage of selected topics in vegetable crops and related disciplines. Topics and course content vary from semester to semester. Assignments may include reports analyzing and evaluating selected lectures. May be repeated for credit. (SU grading only.)

250. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Current concepts, techniques, and procedures applicable to research and to the production of vegetables.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

300. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge) Tutoring—9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience, but who are not teaching assistants. Students under supervision may give lectures, prepare laboratories, demonstrate material and equipment, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (SU grading only.)

Veterinary Medicine, School of

Edward A. Rhode, D.V.M., Dean of the School
Donald G. Low, D.V.M., Associate Dean
Instructor
Bennie I. Osbourn, D.V.M., Ph.D., Associate Dean—Resident
Robert J. Hansen, Ph.D., Associate Dean—Student Services
William J. Winchester, D.V.M., Assistant Dean
Office, 1024 Haring Hall (752-1380)

Courses in Veterinary Medicine

Upper Division Course

192. Work-Study Experience in Veterinary Science (1-12) I, II, III, Low Work-experience—36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in Veterinary Medicine. (SP grading only.)

Graduate Courses

226. Advanced Small Animal Cardiology (1) II. Thomas Lecture—15 hours total for course. Prerequisite: course 4252B or equivalent. Cardiovascular diseases of canine and feline species.

248. Summer Clinics (5 or 16) Extra-session summer. Firepo Active participation in clinic—40 hours (either four or six weeks). Prerequisite: completion of first-year study of School of Veterinary Medicine. Diagnosis and treatment of animal diseases. Students responsible for case records, care of patients, physical examinations, and participation in surgery. Graded by the teaching faculty by observation of student’s performance of assigned duties, by rounds and discussions, the preparation of case records, and the care and treatment of the patients in the case of patients. In some sessions, students serve in the emergency, on-call capacity. Student has option of completing one to two sessions. (SU grading only.)

Professional Courses

404A. Veterinary Medicine Orientation (no credit) I, McGowan Discussion—eight 2-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of Instructor. An overview of the veterinary medical profession emphasizing its many integrants and publics. (SU grading only.)

404B. Veterinary Medicine Orientation (I, III). Laboratory—eight 2-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of Instructor. Recognition of animal breeds, breed characteristics and purpose in animal species of veterinary importance. Introduction and practice of procedures of animal handling and restraint and selected techniques of diagnostic examination and therapy. (SU grading only.)

401. The Normal Animal, Examination and Topographic Anatomy (3) I, Kilchel Lecture—10 hours; discussion—ten 2-hour sessions; laboratory—ten 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Anatomic structures, features and landmarks fundamental to an integrated study of organ systems, the performance of physical examination, routine diagnostic and therapeutic procedures.
Academic Biology (3.5) I. Popper
Lecture—22 hours, discussion—five 2-hour sessions, laboratory—eight 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. This course introduces students to the study of the physiology and function of the animal body. It covers the basic principles of cell biology, biochemistry, and molecular biology.

Principles of Pharmacology (1.7) II. Joy
Lecture—20 hours, demonstration—three 1-hour sessions, laboratory—seven 1-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of pharmacology, including the mechanisms of drug action and the effects of drugs on the body.

Epidemiology (3.5) III. Hard
Lecture—20 hours, discussion—five 2-hour sessions, laboratory—eight 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of epidemiology and its applications in veterinary medicine.

Veterinary Toxicology (2.8) III. Fowler
Lecture—28 hours, laboratory—eight 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of veterinary toxicology, including the identification and management of toxic substances in animals.

Laboratory Animal Medicine (2) I. The Staff
Lecture—20 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of laboratory animal medicine, including the care and management of laboratory animals.

Laboratory Animal Medicine (2) II. The Staff
Lecture—20 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of laboratory animal medicine, including the care and management of laboratory animals.

Physiological Chemistry (3.8) III. Wong
Lecture—22 hours, demonstration—ten 2-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of physiological chemistry, including the mechanisms of drug action and the effects of drugs on the body.

Medical Primatology (2) III. Hard
Lecture—12 hours, discussion—three 2-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of medical primatology, including the care and management of primates.

Management and Disease of Captive Wildlife (2) II. Fowler
Lecture—20 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of management and disease of captive wildlife, including the care and management of captive animals.

Aquatic Animal Medicine (2) II. Amend
Lecture—20 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of aquatic animal medicine, including the care and management of aquatic animals.

Cage Bird Medicine (2) II. Fowler
Lecture—20 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of cage bird medicine, including the care and management of cage birds.

Diseases of Free Living Wildlife (2) II. Fowler
Lecture—20 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of diseases of free living wildlife, including the care and management of free living animals.

Behavior Therapy in Small Animal Practice (3) III. Hart
Lecture—5 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of behavior therapy in small animal practice, including the care and management of behavioral problems.

Principles of Anesthesia (1.5) III. Steffey
Lecture—15 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of anesthesia, including the care and management of anesthesia in small animals.

Equine Internal Medicine (3) III. Carlson
Lecture—30 hours, laboratory—five 2-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. This course covers the principles of equine internal medicine, including the care and management of equine internal medical problems.
424A. Herd Health Management of Beef, Cattle, Swine, Sheep and Goats (4) I. Jersey
Lecture—1 session total; laboratory—2 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary service to feedlot, confinement, dairy, and goat production operations are considered, with emphasis on prevention and control of disease.

428B. Dairy Herd Health Management (2) II. Jersey
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary services to dairy farms are considered, with emphasis on prevention and control of disease.

430A. Structure and Function of the Gastrointestinal System (3.5) III. Curry
Lecture—34 sessions total; laboratory—11 sessions total. Prerequisite: first-year standing in School of Veterinary Medicine; Structure and function of the normal gastrointestinal system as a basis for understanding the disease process. Emphasis will be placed on integrating morphology and physiology with respect to gastrointestinal secretions, motility, absorption, and allied processes.

430B. Gastrointestinal Diseases: Gastroenterology (Abnormal) (5) II. H. Stormbeck
Lecture—1 session total. Prerequisite: second-year standing in School of Veterinary Medicine; Abnormal function of the digestive system and diseases affecting the digestive system as a whole. The manifestations and pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatments of gastrointestinal disease including diseases of the liver and pancreas.

431. Metabolism (1.5) II. B. Freedland
Lecture—15 hours total. Prerequisite: first-year standing in School of Veterinary Medicine; Introduction of carbohydrate, lipid, and protein metabolism with emphasis on physiological control mechanisms in animals, factors affecting metabolic control, including hormones, nutrition, and development; adaptations involved in homeostasis. Significance of these processes in health and in disease.

432. Infectious Diseases (5.4) III-II. D. Arden
Lecture—1 session total. Prerequisite: third-year standing in School of Veterinary Medicine; An overview of select infectious diseases of companion and food animals including disease definition, grading only, pending completion of two-quarter sequence.

435. Veterinary Pathology (5.5) II. Jain
Lecture—1 session total; laboratory—23 three-hour sessions total. Prerequisite: sophomore standing in the School of Veterinary Medicine; Tissue histopathologic system of animals in health and disease; development of the system; regulatory mechanisms of the system; basic organization and structure; function and methods of evaluation, effects of disease upon the system and diseases of the system.

438. Medical Laboratory (2) I. H. Vermeersch
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor; Introduction to the nature of the veterinary laboratory as it relates to zoonoses, environmental hygiene and the safety of foods of animal origin.

439. Tissue Culture Nutrition (1) III. H. Vermeersch
Lecture—1 hour. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Economically sound methods for meeting nutrient requirements of feedlot and pasture beef cattle (including computer-assisted methods). Strategies for preventing nutritional and ration-associated diseases of beef cattle.

440. Endocrine System Normal and Abnormal Structure and Function (2.5) I. H. Vermeersch
Lecture—2 hours total; discussion—three 3-hour sessions; laboratory—one 3-hour session. Prerequisite: second-year standing in School of Veterinary Medicine. A correlated presentation of the structure and function of the normal and diseased endocrine glands of domesticated animals.

445A. Reproduction (6.9) II, III. Staeneker and staff
Lecture—44 hours total; laboratory—22 hours total. Prerequisite: second-year standing in School of Veterinary Medicine; An introduction to the structural and functional aspects of reproduction (normal and abnormal).

445B. Small Animal Theriogenology (1) III. J. Felman
Lecture—12 sessions total. Conditions affecting the reproductive system of small animals, including diagnosis, therapy, and control, with emphasis on endocrinology, pathophysiology and treatment; Development of diagnostic and therapeutic approaches to the clinical patient will be stressed.

445C. Food Animal Theriogenology (3) II. B. Doane
Lecture—2 hours; laboratory—3 hours. Prerequisite: student of School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe and goat, with emphasis on symptoms, pathophysiology, treatment, and control, prevention and control, production implications.

450D. Equine Theriogenology (3) II. Hughes
Lecture—2 hours; laboratory—3 hours. Prerequisite: third-year student in School of Veterinary Medicine or consent of instructor. Disorders of the equine reproductive system with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings.

450E. Immunology (3.3) II. Oasbold
Lecture—21 sessions total; laboratory—12 two-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine; Concepts of Immunology. Dynamics of Infection and inflammation. Pathologic mechanisms in immunologic diseases, allergy, cancer, immunology.

451. Veterinary Bacteriology and Mycology (5.7) II. Biberstein, S. Biberstein
Lecture—37 hours total; laboratory—20 two- and one-half hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. An introduction to the nature of bacteria and fungi, their relation to animal disease, and the methods of diagnosing bacterial and mycotic diseases. (Deferred grading only, pending completion of two-quarter sequence.)

452. General Pathology (4.2) II. Moore, Mouton
Lecture—24 sessions total; laboratory—36 sessions total. Prerequisite: second-year standing in School of Veterinary Medicine. Basic pathologic processes, especially their nature and pathogenesis. Includes degenerative changes, circulatory disturbances, inflammation and repair, abnormalities of cell growth and differentiation, and basic immunopathology.

453. Viral Pathology of Animals (2.8) II. Zieb
Lecture—20 sessions total; laboratory—10 one-half hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. The biology of infectious diseases caused by viruses. Virus-host relationship with emphasis on pathogenesis, immunity and diagnosis.

455. Integumentary System (4.9) II. Starnard
Lecture—45 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Structure, function, and pathologic and clinical aspects including therapeutics of the integumentary system and diseases of the integumentary system of animals. (Deferred grading only, pending completion of course.)

456. Jurisprudence and Law for the Veterinarian (2) II. Wilson
Lecture—20 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities.

457. Veterinary Business Management (2) II. Wilson
Lecture—20 one-hour sessions total (10 weeks). Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Introduction to the principles of effective business management and the general business environment. Topics to be covered include: market research, accounting, retail management, business and personal insurance, client relations and tax law (6.5 grading, deferred, pending completion of course.)

458. Veterinary Clinical Pathology (1) I. Zirkle
Lecture—8 hours total; laboratory—7 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. An introduction to the practical and essential concepts of care for emergency and critically ill patients.

459. Small Animal Orthopedics (1.6) II. Wind
Lecture—14 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Surgical approaches to joints of the shoulder, elbow and stifle, and fractures of the humerus, radius ulna, pelvis, femur, and tibia.

460. Radiographic Diagnosis: Small Animal (2.5) II. Gomez
Lecture—25 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine. Diagnostic radiography of small animals for the student electing small animal and mixed tracks. Non-contrast radiology and special procedures will be discussed as they relate to the thorax, abdomen, and musculoskeletal system.

461. Mixed Large Animal Anesthesia (1.5) II. Manley
Lecture—15 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Applied clinical anesthetic for veterinary students. Special techniques and consideration for anesthetizing a variety of species including horses, swine, ruminants, large and small ruminants and small animals. Clinical applications, indications and contraindications, and methods of use of common anesthetic drugs and techniques will be discussed.

462. Equine Lameness and Radiology (4) III. Meagher, O'Brien, Pool, Loha
Lecture—4 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiologic diagnosis of conditions that cause lameness in the equine will be covered. Both digital and standard radiography will be illustrated and latest technique for treating equine lameness will be discussed. Anatomy and pathology of areas of the musculoskeletal system will also be presented.

465A. Equine Lameness and Radiology (1) I. Meagher, O'Brien, Pool, Loha
Lecture—4 hours. Prerequisite: course 466 (concurrent). Priority enrollment for students in equine track; others with consent of instructor. Limited enrollment.

466A. Equine Surgery (2) III. Lehr
Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Designed to allow third-year veterinary students additional training and experience with surgical procedures in the horse.

466B. Equine Surgery Laboratory (1) III. Lehr
Laboratory—3 hours. Prerequisite: course 466 (concurrent). Specific surgical procedures of the horse are demonstrated and performed by students. Participants in course work in groups of three on rotating basis. Limited enrollment.

470A-470B-470C. Hospital Practices
Clinical—8 hours. Prerequisite: third-year standing in School of Veterinary Medicine, open to graduate students. Assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital. (SU grading only, pending completion of three-quarter sequence.)

471. General Practice Clinics (2.5-15) I-II-III. Summer Sessions I and II. H. Vermeersch
Veterinary clinical practices—40 hours, plus animal patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical technician in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of Veterinary Medical Teaching Hospital with emphasis on those services related to urban veterinary practice. May be repeated for credit. Students in combined DVM/NPM program enroll for the Summer Session I and I sequence. (SU grading only, pending completion of three-term sequence.)

472. Urban Practice Clinics (2.5-15) I-II-III. H. Vermeersch
Veterinary clinical practices—40 hours, plus animal patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of Veterinary Medical Teaching Hospital with emphasis on those services related to urban veterinary practice. May be repeated for credit. Students in combined DVM/NPM program enroll for the Summer Session I and I sequence. (SU grading only, pending completion of three-term sequence.)

473. Large Animal Practice Clinics (2.5-5) I-II-III. H. Vermeersch
Veterinary clinical practices—40 hours, plus animal patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of Veterinary Medical Teaching Hospital with emphasis on those services related to large animal veterinary practice. May be repeated for credit.
VETERINARY MICROBIOLOGY AND IMMUNOLOGY; VETERINARY PHARMACOLOGY AND TOXICOLOGY

Courses in Veterinary Microbiology and Immunology

Upper Division Courses

128. Fundamentals of Immunology (3) I. Buchanan, Hirsh Lecture—three weeks alternate weeks with lecture—two hours and discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

128L. Immunology Laboratory (2) I. Gerashin Laboratory—four hours. Prerequisite: course 128. Laboratory procedures in immunology. The immune response to antigen, antigen-antibody interactions, hypersensitivity mechanisms, and immune-mediated diseases.

127. Medical Bacteria and Fungi (5) III. Biberstein in charge. Lecture—three hours; laboratory—four hours. Prerequisite: general microbiology. An introduction to the bacterial and mycotic diseases of man and animals, with emphasis on pathogenic mechanisms and the ecology and epidemiology of infectious diseases. Limited enrollment.

128. Biology of Animal Viruses (3) III. Zee, Pritchett, Manning (Bacteriology) Lecture—three hours. Prerequisite: Biochemistry 101A or the equivalent. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses.

132. Introduction to Parasitology (5) III. Wong Lecture—three hours; laboratory—four hours. Prerequisite: Zoology 2-2. The nomenclature of human and animal parasites, their general morphology, life cycles, epidemiology, diagnostic techniques, and host-parasite relationships. Individual laboratory studies supplemented with demonstrations.

198. Directed Group Study (1-5) I, II, III. The Staff (Zee in charge) Prerequisite: consent of instructor. (PNP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Zee in charge) (PNP grading only.)

Graduate Courses

228. Molecular Biology of Animal Virus (3) II. Pritchett Lecture—three hours. Prerequisite: course 128 or Biological Sciences 162 or the equivalent. Current status of molecular biology of the major groups of animal viruses. Topics of major emphasis include virus genome structure, strategy of genome replication and transcription, and regulation of genome expression.

270. Advanced Immunology (6) III. Osebold, Gerashin Lecture—three hours; laboratory—eight hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement. Biology of lymphocytes, cell-mediated immune reactions, immunogenetics, hypersensitivity, Pathogenic mechanisms in immunological diseases, immunological unresponsiveness, cancer immunology, Dynamics of infection and resistance. Methods in immunochemistry and immunobiology. Offered in odd-numbered years.


292. Seminar in Animal Virology (1) I, II, III. Zee, Pritchett Seminar—1 hour. A discussion of the current topics in animal virology. (Same course as Bacteriology 286.)

293. Seminar in Infectious Diseases (1) I, II, III. Biberstein, Hirsh Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (SU grading only.)

VETERINARY PHARMACOLOGY AND TOXICOLOGY

(School of Veterinary Medicine)

J. Desmond Baggot, M.V.M., Ph.D., D.Sc.,
Acting Chairperson of the Department

Department Office, 2165 Haring Hall (752-1059)

Faculty

J. Desmond Baggot, M.V.M., Ph.D., D.Sc., Professor
Gaylord M. Conzelman, Jr., Ph.D., Professor
Shih N. Gill, B.V.Sc., Ph.D., Professor
Robert M. Joy, Ph.D., Associate Professor
Henry J. Segall, Ph.D., Associate Professor

Courses in Veterinary Pharmacology and Toxicology

Upper Division Course

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PNP grading only.)

Graduate Courses

223. Clinical Pharmacokinetics: Concepts and Applications: (3) II. Baggot Lecture—1 hour; discussion—1 hour. Prerequisite: comparative veterinary physiology and general pharmacology. Concepts of pharmacokinetics will be described. Absorption and disposition of various drugs, which are used as therapeutic agents, will be compared in different species (man and domestic animals). Course will provide background for research in clinical pharmacology.

253. Drug Metabolism (2) III. Giri Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B; consent of instructor. General pathways of drug metabolism and factors influencing the drug metabolism. Emphasis will be placed on the species, age, and genetic differences affecting the biological disposition of the drugs. Offered in even-numbered years.

258. Drug Receptors (2) III. Joy Lecture—2 hours. Prerequisite: pharmacology 200, 201 or the equivalent. Theories of drug-receptor interactions and their application to known receptor systems stressed. Present concepts of adrenergic, cholinergic, opiate, and other receptors considered in conjunction with their functional importance. Offered in odd-numbered years.

NOTE: For key to footnote symbols, see page 124.
Courses in Viticulture and Enology

Lower Division Courses
3. Introduction to Wine Making (3) I, II, III. Kunkee, Singleton Lecture—2 hours; discussion—1 hour. An introduction to wine technology, including effects of alcohol, history of wine, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

98. Special Study for Undergraduates (1-5), I, II, III. The Staff (Ough in charge) (P/NP grading only)

Upper Division Courses
100. Grape Growing (3) I, Weaver Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2, Botany 2, or consent of instructor. Grape growing including botany and morphology; distribution and domestication, propagation, varieties and uses, climatic requirements, disease control, and adaptation to California climate.

109. Systematic Viticulture Including Fruit Maturation and Handling (3) I, II. Lider, Meredith Lecture—1 hour; laboratory—6 hours. Prerequisite: Plant Science 2 or consent of instructor. Principles of crop production, varieties, methods of production, and postharvest handling of grapes.

110A. General Viticulture (3) II. Kunkee Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or consent of instructor. Principles of pruning, trellising, irrigation, and pest management of grapevines; environmental effects of climate and soil; establishment of vineyards.

110B. General Viticulture (3) III. Kunkee Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or consent of instructor. Principles of crop production, varieties, methods of production, and postharvest handling of grapes.

123. Analysis of Musts and Wines (3) I, Ough Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 6; Food Science and Technology 103 recommended. Open to undergraduate students in the Food Science and Technology major.

124. Wine Production (3) I. The Staff (Ough in charge) Lecture—2 hours; laboratory—3 hours. Prerequisite: Food Science and Technology 103 recommended. Open to undergraduate students in the Food Science and Technology major.

125. Wine Types and Sensory Evaluation (3) II. Noble Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 124, Agricultural and Management 150, and consent of instructor. Open to undergraduate students in the Food Science and Technology major. Major types of wines and the factors influencing their quality: principles of sensory evaluation.

130. Wine Processing (3) I. Bolton Lecture—2 hours; laboratory—4 hours. Prerequisite: Food Science and Technology 103, and consent of instructor. Open to undergraduate students in the Food Science and Technology major.

135. Wine Processing Equipment (1) I. Bolton Lecture—1 hour; field trip. Prerequisite: courses 124, Food Science and Technology 110A. Recommended. A course for graduates which provides a systematic description of unit operations and processing equipment used in modern commercial winemaking. Emphasis is given to the principles and techniques of operation and to the performance of this equipment with grapes, juices and wines.

140. Distilled Beverage Technology (3) III. Williams Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 88, Food Science and Technology 110A, or the equivalent. Distillation principles and practices; production technology of brandy, whiskey, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging; chemical analysis and sensory evaluation.

182. Internship (1-12) I, II, III. The Staff (Ough in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units. Work-term experience related to the Food Science and Technology major. Internships must be approved and supervised by a member of the Department or Major faculty, but are arranged by the student. (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Ough in charge) Prerequisite: consent of instructor. (P/NP grading only)

Viticulture and Enology

(College of Agricultural and Environmental Sciences)

Cornelius S. Ough, D.Sc., Chairperson of the Department
Department Office: Department Office, 1023 Wickson Hall
(752-0386)

Faculty

Maynard A. Amerine, Ph.D., Professor Emeritus
Harold W. Berg, M.S., Professor Emeritus
Roger B. Boulton, Ph.D., Associate Professor (Viticulture and Enology, Chemical Engineering)

James A. Cook, Ph.D., Professor
Richard E. Kepner, Ph.D., Professor (Chemistry)
W. Mark Kunkee, Ph.D., Professor
Ralph E. Kunkee, Ph.D., Professor
Lloyd A. Lider, Ph.D., Professor
Mark A. Matthews, M.S., Assistant Professor
Carole P. Meredith, Ph.D., Assistant Professor
Klayton E. Nelson, Ph.D., Professor
Ann C. Noble, Ph.D., Associate Professor
Harold P. Olmo, Ph.D., Professor Emeritus
Cornelius S. Ough, D.Sc., Professor
Dewaye D. Pup, Ph.D., Maynard A. Amerine Professor of Viticulture and Enology (Chemical Engineering, Viticulture and Enology)

Vermont: Singleton, Ph.D., Professor
Robert J. Weaver, Ph.D., Professor
A. Dinsmore Webb, Ph.D., Professor Emeritus
Larry E. Williams, Ph.D., Assistant Professor
Lynn A. Williams, Ph.D., Assistant Professor
Albert J. Winkler, Ph.D., L.L.D., Professor Emeritus

The Program of Study. Enology is a specialization within the Fermentation Science major (see page 272). Viticulture is a specialization within the Plant Science major (see page 297).

Related Major Programs. See Biochemical Engineering (page 185).

Related Courses. See Food Science and Technology 206; Plant Science 112, 112L; and Chemical Engineering 160, 226.
Water Science

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Land, Air and Water Resources.

Related Major Program. See the major in Soil and Water Science, p. 751.

Graduate Study. A program of study is offered leading to the M.S. degree in Water Science. Detailed information can be obtained from the graduate advisor. Also see page 95.

Graduate Adviser. W. O. Pruitt. (Land, Air and Water Resources).

Courses in Water Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall, 752-1669.

Lower Division Courses

10. Water and Man (3) III. Hegan
   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.

41. Ecology of Polluted Waters (3) II. Knight
   Lecture—2 hours. Prerequisite: Biological Sciences 1 or the equivalent. Causes and effects of wetlands. Effects of pollutants to aquatic biota. Topics include aquatic ecosystems, trophic levels and interactions. Prerequisite: Biology 2A or equivalent.

92. Water Science Internship (1-12) I, II, III, The Staff (Chairperson in charge)
   Laboratory—0-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience offered on and off campus in water science. Internship supervised by a member of the faculty. (P/N grading only.)

Upper Division Courses

100. Principles of Water Sciences (4) II. Silk
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A, Physics 2A, and Botany 2 or Plant Science 2. Chemistry 1B and Physics 2B recommended. Introduction to basic principles as applied to water and water resource problems. Topics include: hydrology (surface and groundwater), water resources, water quality, and environmental impact of water resources. Prerequisite: MA 103 or consent of instructor.

103. Water Quality, Self Control and Reclamation (4) L. Biggar
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course in soil or water chemistry or consent of instructor. Water quality parameters, water analysis and sampling control in relation to soil and plant factors, pollution of soil and disposal of waste water, and their effects on receiving waters. Regional and regional basin problems in relation to salinity control and water quality.

104. Plant-Water Soil Relationships (4) III. Hisao
   Lecture—3 hours. Discussion—1 hour; two mid-quarter examinations to be arranged. Prerequisite: course 100 or the equivalent preparation in elements of water in soil and plant, Soil Science 100 and one additional course in soils or plant physiology, or consent of instructor. Principles of plant interactions with soil and water environments and their applications in crop and environmental management, including nutrient and water uptake and transport; transpiration; soil processes affecting supplies; deficiencies and plant responses.

110. Irrigation Principles and Practices (3) II. Henderson
   Lecture—3 hours. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Applies principles of movement and storage, plant responses to irrigation regimes, water use by crops, and procedures for determining frequency and depth of irrigation, drainage.

111. Introduction to Irrigation Systems (3) I, Pruitt
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 2B or equivalent. General course for agricultural and engineering students introducing irrigation systems, descriptions and design application. Laboratory exercises include field evaluation of surface, sprinkler, and trickle irrigation, measurement and pump performance.

110B. Irrigation Principles and Practices (3) I.
   Lecture—3 hours. Prerequisite: introductory course for agricultural and engineering students dealing with engineering aspects of irrigation on the farm. Irrigation design principles, equipment, use of water, water application methods, land grading.

120. Biology of Running Waters (3) I, Knight
   Lecture—2 hours; discussion—2 hours. Prerequisite: introductory course in biology or consent of instructor. Course covers running water ecosystems, the plants and animals that inhabit them, and the processes that shape these ecosystems. Prerequisite: biology 1A or equivalent.

122. Biology of Running Waters Laboratory (2) I, Knight
   Laboratory—2 hours (including 2 or 3 weekend field trips).
   Prerequisite: introductory course in biology or consent of instructor. Course covers running water ecosystems, the plants and animals that inhabit them, and the processes that shape these ecosystems. Prerequisite: biology 1A or equivalent.

130. Geoscientists (3) III. Andersen
   Lecture—3 hours. Prerequisite: Engineering 103A or consent of instructor. Course covers surface water systems, measurement of hydraulic conductivity; seepage through underground structures; anisotropy flow nets, drainage design for water table, and soil control. (Same course as Engineering 140.)

140. Hydrology (3) II, Bury
   Lecture—3 hours. Prerequisite: consent of instructor. Principles of hydrology; analysis including consideration of precipitation, evaporation, and riverine systems.

142. Hydrologics (3) III, Scott, Bury
   Lecture—2 hours; laboratory—discussion—3 hours. Prerequisite: Physics 2A; course 100 recommended. An introductory course for non-engineers. Physical properties of water, fluid statics, principles and equations of flow, continuity, and conservation; flow in pipes and open channels, flow measurements; and pump performance and selection.

149. Groundwater Hydrology (3) I, Marho
   Lecture—3 hours. Prerequisite: Mathematics 16A-16B and course 100; course 142 or Engineering 103A recommended. Occurrence, distribution, 0030 (nonmechanical) groundwater. Steady and transient groundwater flow systems. Aquifer test. Well construction, operation, and maintenance. Groundwater exploration, quality, and contamination. Offered in even-numbered years.

150. Water Law and Water Institutions (3) II. Schneider
   Lecture—3 hours. Introductory course in water law and institutions. Current problems. Basic principles with utilization of case studies to illustrate the effects of current water law and institutions. Prerequisite: consent of instructor.

152. Water and Related Resources Allocation from Economic Principles (2) I, Grimes
   Lecture—2 hours. Prerequisite: Mathematics 15A or consent of instructor. An examination of information needed for analysis and basic procedures of production economics as applied for resource allocation and resource management in agriculture. Cost minimization in production and alternative goals are considered.

160. Water Surface Applications Systems (3) II. Walender
   Lecture—3 hours. Prerequisite: courses 110, 111, and 112; and course Mathematics 16A. An introduction to mathematically based principles of design, construction, operation and maintenance of surface irrigation systems, including planning for on-the-farm land leveling and water delivery.

170. Field Studies in Irrigation and Drainage Management (1) Extra session summer. Robinson in charge
discussion and field observations—7 days. Prerequisite: consent of instructor. Field observations and discussions on irrigation and drainage systems in the San Joaquin Valley.

172. Farm Irrigation Management (3) III. Henderson
   Lecture—3 hours; one field trip. Prerequisite: course 104 or consent of instructor. The water budget is used as a means of ordering analysis of plant, soil, climatic, systems, and operational factors to develop a rationale for farm irrigation practices. Plant and soil factors are emphasized.

180. Chemistry of the Hydrosphere (3) III. Tanji
   Lecture—3 hours. Prerequisite: Chemistry 5 or introductory course in geology, soils, hydrology, or meteorology. To provide an understanding of various mechanisms and processes regulating the chemistry of natural waters. Linkage between hydrologic and geochemical cycles is stressed. Covered are chemical characteristics of rainwater and snow, and streams and rivers, lakes, ground waters, estuaries, and oceans.

182. Water Science Internship (1-12) I, II, III, The Staff (Chairperson in charge)
   Laboratory—3 hours. Prerequisite: completion of 94 units and consent of instructor. Work experience offered on and campus in water science. Internship supervised by a member of the faculty. (P/N grading only.)

190. Independent Study (1-5) I-I, II, III. The Staff (Chairperson in charge)
   Prerequisite: senior standing. (P/N grading only.)

Graduate Courses

200. Water-Soil-Plant Relationships in Irrigation Programming (3) III. The Staff
   Lecture—3 hours. Prerequisite: course 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.

210. Advanced Plant-Water Relations (3) I, Hisao
   Lecture—3 hours; discussion sessions. Prerequisite: course 104 or Plant Sciences 101 or 111A; elementary knowledge of metabolism and regulation of thermodynamics in concurrent enrollment in course 298 with instructor. Chemical and component aspects of plants, quantitative aspects of water transport to, from, and from plants, energy, regulation, and environmental factors affecting plant water status; metabolic and other characteristics associated with efficient water use, and xerophytes; responses to water deficit and salinity. Offered even-numbered quarters (Fall 1963).

220. Evapotranspiration (2) II. Pruitt
   Lecture—2 hours. Prerequisite: Atmospheric Science 20-20L or 105, or consent of instructor. Radiation and energy balances of water, soil, vegetation, and the effects of wind, temperature, humidity, thremore. lysimeter and other measurement techniques. Prediction of evapotranspiration from aerodynamic, energy balance, and empirical approaches.

   Lecture—3 hours. Prerequisite: Mathematics 22A or consent of instructor; course 141 or the equivalent. Applications of deterministic linear and dynamic programming techniques to water-resource systems design and operating policy models of reservoirs. Water quality management models. Offered in odd-numbered years.

240. Advanced Topics in Water and Soil Chemistry (3) II. Hisao
   Lecture—3 hours. Prerequisite: course 205 and Statistics 131A, or consent of instructor. Applications of stochastic linear and dynamic programming. Markov chains, and inventory theory to water-resource systems design. Design and operating policy models of reservoirs. Water quality management models. Offered in odd-numbered years.

270. Water Resources Systems Analysis: Stochastic Models (3) I, Marho
   Lecture—3 hours. Prerequisite: course 205 and Statistics 131A, or consent of instructor. Applications of stochastic linear and dynamic programming. Markov chains, and inventory theory to water-resource systems design. Design and operating policy models of reservoirs. Water quality management models. Offered in odd-numbered years.

275. Hydrochemical Models (3) II. Tanji
   Lecture—2 hours; laboratory—3 hours. Prerequisite: physical chemistry, basic chemistry and mathematics. Course is for graduate students in water and soil sciences. Topics include electro-kinetic properties of clays, membrane phenomena, rate processes and thermodynamics, pH processes and the water soil system. Offered in odd-numbered years.

280. The Biology of Streams (5) III. Knight
   Lecture—2 hours; seminar—1 hour; laboratory—6 hours (includes field trips). Prerequisite: courses in aquatic ecology, entomology, limnology, and physiology. Course will relate various environmental factors to the ecology and productivity.

NOTE: For key to footnote symbols, see page 124.
Water Science (A Graduate Group)

Verne H. Scott, Ph.D., Chairperson of the Group
(752-0690)

Group Office, 113 Velmeyer Hall (752-0453)

Faculty. The Group includes faculty from four departments in the areas of hydrology, engineering, and environmental sciences, and other disciplines.

Graduate Study. The Graduate Group in Water Science offers the M.S. degree in five broad areas of specialization: (1) hydrology, (2) irrigation and drainage, (3) water quality and pollution, (4) water resources management, and (5) biometeorology. These options focus on either the physical, chemical, and biological processes that interact within water systems or on the integrated behavior of water systems as a whole.

Preparation. Students may enter this program with undergraduate training in biology, mathematics, chemistry, physics, soils, engineering, or related areas. The curriculum consists of core courses in hydrology, fluid flow, hydrochemistry, hydrobiology, and social and economic aspects of water.

Graduate Advisor: W. O. Pruitt (Land, Air and Water Resources), Temporary 125 (752-1833).

Related Courses. Many departments, on campus offer courses which are appropriate for programs of study. The principle departments are Land, Air and Water Resources, Civil Engineering, Agricultural Engineering, Environmental Studies, Botany, Agricultural Economics and others. A list of courses is available at the Group Office.

Wildlife and Fisheries Biology

(College of Agricultural and Environmental Sciences)

Peter B. Moyle, Chairperson of the Division
Division Office, 66 Briggs Hall (752-6566)

Faculty

Daniel W. Anderson, Ph.D., Professor
Louis W. Babst, Ph.D., Assistant Professor
Joseph S. Cech, Jr., Ph.D., Associate Professor
Ronald E. Cole, B.S., Adjunct Lecturer
Walter E. Howard, Ph.D., Professor
Katherine J. Jacobsen, Ph.D., Associate Professor
David L. Kott, Ph.D., Professor
Rex E. Marsh, A.B., Adjunct Lecturer
Peter B. Moyle, Ph.D., Professor
Dennis G. Raveling, Ph.D., Professor
Robert G. Schwab, Ph.D., Associate Professor

The Major Program

The Wildlife and Fisheries Biology major deals with the relationships among the needs of man and the requirements of wildlife. Understanding these relationships is vital for the management of wildlife, recreational resources, and food supplies for future generations. Certain species of wildlife are threatened because they cannot adapt to man’s activities, whereas others have thrived so well under man-made changes in the environment that their numbers must be controlled. A third wildlife problem is the optimal management of recreational or commercial harvests.

Because of the diversity of problems in the field, emphasis in the major is placed on broad training in biological and physical sciences. Specialization in wildlife or fisheries is the major selected primarily for students interested in eventually becoming professionals in wildlife and fisheries biology, but its breadth of course requirements, when combined with suitable electives, also make it suitable as a preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as the Wildlife Society, American Fisheries Society, or the Ecological Society of America or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty advisor.

Graduate training in the Division of Wildlife and Fisheries Biology leads to M.S. or Ph.D. degrees in such disciplinary fields as Ecology, Physiology, and Animal Behavior under the supervision of a Wildlife and Fisheries Biology faculty member.

Positions now held by graduates in this major include wildlife, fisheries, animal control, and service biologists and managers with local, state, and federal agencies. Some graduates are biologists or consultants with private industries such as commercial fishing businesses, electrical utilities, sportsman’s clubs, aquaculture operations, and environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions. Most of these positions have been attained after further study and relevant experience.

Wildlife and Fisheries Biology

B.S. Major Requirements:

For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.

UNITs

Preparatory Subject Matter

Biological Sciences 1

Botany (Botany 2)

Chemistry 1A, 1B, 8A, 8B

Computer science (Engineering 5, or Mathematics 19)

Mathematics (Mathematics 16A, 16B)

Physics (Physics 2A, 2B, 2C)

Statistics (Statistics 13, 102, 1F Agricultural Science and Management 150)

Zoology (Zoology 2-5L)

Depth Subject Matter

Chemistry and Biochemistry 101A-101B or Physical Sciences 101A-101B

Ecology (Environmental Studies 100, Entomology 104, or Zoology 125)

Genetics (Genetics 120 or 120A-120B)

Zoology (Zoology 100)

Wetland and Wildlife Field Practicum 108-108P

Evolution (Zoology 148, 149, Genetics 103)

Broad Subject Matter

Biology 1, English 1 or Psychological 1 or the equivalent

Social sciences and American studies

Courses in the Major

Wildlife and Fisheries Biology 122, 130, 140

Additional Courses (select Plan I or Plan II)

Plan I: Wildlife Biology specialization

Wildlife biology (101, 102, 108, 117)

Zoology, one upper division course

Wildlife biology (Wildlife and Fisheries Biology 100, 110, 111, 111L)

Plan II: Fisheries biology specialization

Aquatic entomology/vertebrate zoology (Entomology 116 or Zoology 12A with advisor’s approval)

Fisheries biology (Wildlife and Fisheries Biology 120, 121, 121L)

Limnology/oceanography (Environmental Studies 116, 150C, or 151)

Statistics, upper division courses

Unrestricted Electives (variable)

Total Units for the major (minimum) 180


Graduate Study. See page 95.

Related Courses. A selection of courses may depend on each student’s special interests. A set of related courses is available from advisors.

Courses in Wildlife and Fisheries Biology

Lower Division Course

Wildlife Biology 4 (1). The Staff

Lecture—4 hours. Prerequisite: Biological Sciences 1 recommended. Introduction to the biology and ecology of aquatic and terrestrial wildlife, and basic principles of management.

Internship (1-6). II, III, The Staff (Department Chairperson in charge)

Laboratory—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work experience and research on campus and at all subject areas offered in the department. Internships supervised by a member of the faculty. (P/N grading only.)

Units earned in satisfactory completion of the Social Sciences and Humanities requirements.

332
Women’s Studies Program

Upper Division Courses

100. Field Methods in Wildlife Biology (3) I. The Staff
Lecture—10 hours total; laboratory—40 hours total (5 days). Prerequisite: 110 or 111-111. Zoology 125 or the equivalent; consent of instructor. Intensive course on methods of studying and reporting data obtained from free-ranging wild animals in natural and semi-natural environments. Considered a spring course for pre-enrollment. Limited enrollment. (P/NP grading only.)

102. Field Studies in Fisheries Biology (6) Extra-credit summer. Joyce A. M. W. Discussion—1 hour; laboratory—40-60 hours. Prerequisite: upper division course in marine science and fisheries biology; consent of instructor. An intensive study of the biology of freshwater and marine fishes in the field. Topics vary from year to year depending on organism availability and student interest. (P/NP grading only.)

106. Mammalogy and Ecology (5) III. Schwalbe
Lecture—4 hours; laboratories—1 hour. Prerequisite: Zoology 101 or 111. An introduction to mammalian biology, emphasizing the role of mammals in their environment, and research methods in mammalogy.

111. Biology of Fish (4) II. Moyle
Lecture—3 hours; laboratory—2 hours. Prerequisite: Zoology 102 or the equivalent. Introduction to biology, reproduction, behavior, and energetics of freshwater and marine fishes. (P/NP grading only.)

112. Population Dynamics and Estimation (4) I. J. Botlott
Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 120 or the equivalent. An introduction to population biology, including population dynamics, estimation, and the role of population parameters in ecological and evolutionary processes. (P/NP grading only.)

113. Ecological Psychology of Wildlife (3) I. Jacobsen
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 110 or 111 or 125. An introduction to ecological psychology, focusing on the role of behavior and cognition in shaping ecological interactions. (P/NP grading only.)

114. Ecology and Evolution of Vertebrate Social Organization (4) I. Lott
Lecture—4 hours. Prerequisite: Zoology 2 and upper division ecology (Zoology 125 or the equivalent). An introduction to the study of vertebrate social behavior, including the role of social structure and ecology in the evolution of social systems. (P/NP grading only.)

120. Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Seminar in research on current topics in the physiological functioning of fishes. Limited enrollment. (P/NP grading only.)

129. Group Study (1-5) I, II, III. The Staff
Lecture—2 hours; discussions—15 hours. Prerequisite: consent of instructor. Seminar in research on current topics in the physiological functioning of fishes. Limited enrollment. (P/NP grading only.)

130. Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Seminar in research on current topics in the physiological functioning of fishes. Limited enrollment. (P/NP grading only.)

Women's Studies Program

Committee in Charge

Virginia H. Bennett, Ph.D. (Russian)
Lyn Lofland, Ph.D. (Sociology)
Karen E. Paige, Ph.D. (Psychology)
Stephanie A. Shields, Ph.D. (Psychology)
Chairperson
Evelyn M. Silvia, Ph.D. (Mathematics)
Lenora A. Timm, Ph.D. (Linguistics)

Faculty

Virginia H. Bennett, Ph.D., Assistant Professor
William M. Bowsky, Ph.D., Professor
Cynthia L. Brantley, Ph.D., Associate Professor
Susan Crookenberg, Ph.D., Associate Professor
Joanne D. Dietrich, Ph.D., Professor
Elizabeth W. Edgar, Ph.D., Associate Professor
Jack D. Forbes, Ph.D., Professor (Anthropology, Applied Behavioral Sciences)
Diana A. Gilbert, Ph.D., Professor
Sarah V. Hutchison, M.Ed., Lecturer (Applied Behavioral Sciences)
Suad Joseph, Ph.D., Associate Professor (Anthropology)
Jacqueline Mitchell, Ed.D., Assistant Professor (Afro-American Studies, Applied Behavioral Sciences)
Karen E. Paige, Ph.D., Associate Professor (Psychology)
Don C. Price, Ph.D., Professor (History)
Ruth E. Rosen, Ph.D., Associate Professor (History)
Barbara Sommer, Ph.D., Lecturer (Psychology)
Adaliza Sosa-Riddell, Ph.D., Lecturer (Chicano Studies)
Judith Stacey, Ph.D., Assistant Professor (Sociology)
Lenora A. Timm, Ph.D., Associate Professor (Linguistics)
Marian B. Ury, Ph.D., Associate Professor (Comparative Literature)

Graduate Courses

201. Field Research in Wildlife Biology (6) Extra-credit summer. The staff
Lecture—1 hour; laboratory—40 hours; individual research projects and oral and written reports. Prerequisite: courses 110, 111 or 111-111. Zoology 125, Statistics 102, or the equivalent; consent of instructor. Field research in wildlife biology, focusing on the design and execution of the study, data collection, and preparation of suitable written and oral reports. Limited enrollment. (P/NP grading only.) Preference given to graduate students in the areas of wildlife and fisheries.

222. Advanced Population Dynamics (3) I. Botlott
Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Zoology 125). Population dynamics (e.g., course 122), and one year of calculus. Familiarity with matrix algebra and partial differential equations recommended. Limited enrollment. (P/NP grading only.)

293. Seminar (1-3) I, II, III. The Staff
Lecture—1 hour. Prerequisite: consent of instructor. Seminar for doctoral students interested in any area of wildlife or fisheries biology. Special topics selected for each quarter will vary depending on instructor and students. (P/NP grading only)
The Major Program

"What do women want?" asked Sigmund Freud more than half a century ago, but the famous psychoanalyst couldn't answer his own question. Today, however, he could take a course in Women's Studies and begin to outline some tentative solutions to the problem that the situation of the so-called "second sex" seemed to him to pose. For Women's Studies is a new field devoted to just the kind of topic that puzzled Freud as well as many of his contemporaries and precursors.

From the Greek philosopher Aristotle to the Enlightenment feminist Mary Wollstonecraft, from the German romantic poet Johann Wolfgang von Goethe to the contemporary French theorist Simone de Beauvoir, important thinkers have speculated about the nature and position of women, and about the relations between the sexes. Aristotle misogynistically claimed that femininity was a "defect" of nature, whereas Wollstonecraft demanded education and liberation for women, insisting on female equality. Goethe sentimentally believed that the "eternal feminine" should be a model of "selflessness and purity of heart," while de Beauvoir wrote an eight-hundred page treatise on the problems and prospects of The Second Sex. Even de Beauvoir and Wollstonecraft, however, were analyzing only certain aspects of their subject and, like many other feminists in the past, neither could establish the "truth" about women because, of course, there was (and is) no one "truth."

Now, though, scholars from many disciplines have come together to pool their knowledge about many aspects of the female experience and explore many truths about women. Examining women's artistic and intellectual achievements, women's political and sociocultural history, and women's ways of living in cultures and societies all over the world—subjects that students and teachers at universities have almost never seriously researched before—these scholars have begun to define the ways in which the pressures of femininity (and maleness) have affected not only women's (and men's) cultural achievements, but also the historic events and socioeconomic structures in which both sexes participate.

Thus, the interdisciplinary major in Women's Studies explores the ways in which, especially for women, but also for men, gender has affected cultural achievements, historical events, and socioeconomic structures. Students majoring in this field may take courses in Afro-American studies, Asian-American studies, anthropology, comparative literature, English, history, linguistics, Mexican-American (Chicano) studies, political science, psychology, Russian, sociology, Asian American studies, human development, Native American studies, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an advisor.

Career Alternatives. Preprofessional students who major in Women's Studies will discover that it offers useful undergraduate training for schools of medicine and law, particularly, in medicine, for specialties in obstetrics/gynecology, family practice, pediatrics or psychiatry; and in law, for specialties in social or family related issues. In addition, students who plan to do practical work in counseling, clinical psychology, social services or political science will find Women's Studies a helpful undergraduate major, while more theoretically inclined students who wish to go on to graduate research in such fields as literature, philosophy, sociology, art history, anthropology, psychology, economics or political science will benefit from a strong undergraduate background in women's studies. Increasingly, too, specialists in this field are being used in industry, higher education, insurance companies and personnel firms. Lately, moreover, state and federal government agencies require people who have special training in understanding the problems that women face in society. Finally, educational institutions need specialists to develop and administer women's studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

Women's Studies

A.B. Major Requirements:

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>20-33</td>
</tr>
<tr>
<td>Women's Studies</td>
<td>4</td>
</tr>
</tbody>
</table>

All the preparatory requirements listed for a discipline in area of student's interest (i.e., American studies, economics, English, history, philosophy, political science, psychology, sociology) chosen in consultation with advisor | 12-25 |

**Depth Subject Matter**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-quarter seminar</td>
<td>8</td>
</tr>
</tbody>
</table>

At least 36 upper division units to be chosen with consent of adviser including at least 8 units from Area A, 12 units from Area B, and up to 16 units of special topic courses | 36 |

**Area A:** Women and the Humanities

- Comparative Literature 135, 158C
- English 110, 115, 185
- Linguistics 113
- Russian 121

**Area B:** Gender and Society


**Special topic courses**

| (maximum) 16 |
| (List of acceptable courses offered throughout the University, will be available from major advisors.) |

**Total units for the Major**

64-77

**Recommended Courses:**

The following courses are recommended: American Studies 1F, Biological Sciences 10, Economics 151B, Genetics 10, History 279B, Physiology 10.

**Minor Program Requirements:**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women's Studies</td>
<td>4</td>
</tr>
</tbody>
</table>

Upper division units in women's studies area with courses chosen in consultation with adviser | 20 |

At least 4 units must be from Area A (above) and 8 units from Area B (above). Remaining courses may be elected from Area A and/or B, and/or from relevant special topic courses in the field (current list is available from Women's Studies advisors).

**Courses in Women's Studies**

**Lower Division Courses**

50. Introduction to Women's Studies (4) I, II, III. The Staff. Lecture—3 hours; discussion—1 hour or term paper (instructor's permission required). Introduction to the study of women's roles in society. Survey and integrates literary, anthropological, sociological, psychological, historical, sociological, and political perspectives. (P/NP grading only.)

192. Internship in Women's Studies (1-12) I, II, III. The Staff. Work-experience—3-36 hours, written report. Prerequisites: completion of minimum of 24 units and consent of instructor. Enroll dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions and institutions where gender-related problems arise, for example, a women's center, affirmative action office, advertising agency, or a social welfare agency. Final written report on internship experience. (P/NP grading only.)

168. Directed Group Study (1-5) I, II, III. The Staff (Director in charge). Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

169. Special Study for Advanced Undergraduate (1-5) I, II, III. The Staff (Director in charge). Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**Work-Learn Program**

Civille E. Thompson, Ph.D., Director

Work-Learn and Career Planning and Placement

2nd Floor, South Hall (752-2655)

**Program Areas**

Agricultural and Environmental Sciences

Joe J. Stasulat, Program Coordinator
Education and Graduate Placement

Carolyn Walker, Program Coordinator

Engineering and Physical Sciences

Pamela Held, Program Coordinator
Health and Biological Sciences

Linda R. Hughes, Program Coordinator
Liberal Arts

Donald J. Hagerly, Program Coordinator

**Internship Experience**

This is a campus-wide internship program facilitated through Work-Learn and Career Planning and Placement. All internships, both credit and non-credit, can be taken for Transcript Notation with completion of a required evaluation report. The notation briefly describes the nature and location of the internship experience. Questions pertaining to academic credit and Transcript Notation may be directed to the Work-Learn and Career Planning and Placement Office.

**Course Credit:** Internship courses (numbered 92 and 192) are available for credit on a variable-unit, credit/no credit grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have completed 64 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by Work-Learn staff.

**Zoology**

(College of Letters and Sciences)

David W. Deamer, Ph.D., Chairperson of the Department

Department Office, 2230 Storer Hall (752-1272)

**Faculty**

Peter B. Armstrong, Ph.D., Professor
Ronald J. Baskin, Ph.D., Professor (Zoology, Physiology)
John H. Crowe, Ph.D., Professor
David W. Deamer, Ph.D., Professor
Carol A. Erickson, Ph.D., Assistant Professor
Robert D. Grey, Ph.D., Professor
Richard K. Groseberg, Ph.D., Assistant Professor
Zoology

B.S. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
</tr>
<tr>
<td>Chemistry 8A-BB or 128A-128B-128C</td>
</tr>
<tr>
<td>Biological Sciences 1</td>
</tr>
<tr>
<td>Zoology 2-2L</td>
</tr>
<tr>
<td>Mathematics 16A-16B or 21A-21B</td>
</tr>
<tr>
<td>Physics 2A, 2B, 2C</td>
</tr>
<tr>
<td>One course from Bacteriology 2, 102, or Botany 2</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry 101A-101B or Physiological Sciences 101A-101B</td>
</tr>
<tr>
<td>Genetics 100A-100B or 116 or 120</td>
</tr>
<tr>
<td>Statistics 102 or 130A-130B</td>
</tr>
<tr>
<td>One course from Zoology 141, Genetics 102, Botany 100A-100B</td>
</tr>
<tr>
<td>Additional upper division course in biological science to achieve a total of 36 units or more</td>
</tr>
<tr>
<td>Chemistry 204</td>
</tr>
<tr>
<td>One course from the five Areas of Study shown below</td>
</tr>
</tbody>
</table>

Total Units for the Major

98-114

Recommended

Geology 3, Biochemistry 101A-101B or Physiological Sciences 101A-101B

A. Major Requirements:

Zoology

The Zoology major presents animal biology from the subcellular and molecular to the community and ecosystem levels. As a basic life science major, it is suitable for students who plan to pursue a professional career in Zoology, or to graduate work in Zoology or any other life science, or who intend to apply to professional schools in the health sciences. The major is structured to include the breadth of preparation for which all students in the major, including those planning a career in the health sciences, are required to complete all courses in the major in addition to the major in the major.

Choice of College. The Bachelor of Arts degree is offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

Courses in Zoology

1. General Zoology (a) 4I, 4L; 1. M. Miller, II, 2. L. Miller, II
   Lecture—3 hours, discussion—1 hour. Prerequisite: Biology 101A-101B or 116 or 117. Survey of the diversity of animal life and the basic principles of adaptation, evolution, and interaction in populations.

2. Laboratory in General Zoology (b) 4I, 4L; Stamp, II, 1. M. Miller, II
   Laboratory—3 hours. Prerequisite: course 2 (preferably taken concurrently). Laboratories on the diversity of animal life and the basic principles of organismal biology.

3. Special Study for Lower Division Students (c-d) I, II, III, IV
   The Staff (Chairperson in charge)
   Directed study of a specific topic selected by the student and the instructor.

4. Upper Division Courses

   a. Embryology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of embryology, particularly in the areas of cellular and molecular biology.

   b. Evolutionary Biology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—3 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of evolutionary biology, particularly in the areas of molecular and population genetics.

   c. Ecology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of ecology, particularly in the areas of community and ecosystem ecology.

   d. Behavioral Ecology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of behavioral ecology, particularly in the areas of animal behavior and communication.

   e. Evolutionary Genetics (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of evolutionary genetics, particularly in the areas of molecular evolution and population genetics.

   f. Conservation Biology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of conservation biology, particularly in the areas of conservation strategy and policy.

   g. Comparative Anatomy (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of comparative anatomy, particularly in the areas of evolutionary morphology and systematics.

   h. Biogeography (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of biogeography, particularly in the areas of island biogeography and phylogeography.

   i. Marine Biology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of marine biology, particularly in the areas of marine ecology and evolution.

   j. Neuroethology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of neuroethology, particularly in the areas of animal behavior and cognition.

   k. Behavioral Ecology (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of behavioral ecology, particularly in the areas of animal behavior and communication.

   l. Evolutionary Genetics (a) 4I, 4L; S. Miller, II, L. Miller, III, E. Erikson, IV
   Lecture—4 hours. Prerequisite: Biology 101A-101B or 116 or 117. Recent developments in the field of evolutionary genetics, particularly in the areas of molecular evolution and population genetics.
225. *Biology of Fertilization* (3) I, III. Grey Lecture—2 hours; term paper. Prerequisite: course 121A or the equivalent and consent of instructor. The morphology, biology and biochemistry of gametes and the mechanism and consequences of their union. Offered in odd-numbered years.

226. *Cellular Biology of the Malignant Transformation* (1) I. Armstrong Lecture—1 hour. Prerequisite: course 100, course 121A or 121B or Biochemistry 101A and 101B. Topics include: factors causing the malignant transformation of cells, control of growth of tissue cells (and loss of control in transformed cells) mechanisms of cellular invasion, natural defense mechanisms against transformed cells. Emphasis is at the cellular and molecular levels.

228. *Experimental Animal Ecology* (3) III. Salt Lecture—2 hours; 3 weekend field trips; 2 written critiques. Prerequisite: course in animal ecology. Discussion of means of generating ecological hypotheses and methods of testing those hypotheses. Topics will include analysis of field observation, experimental design in both field and laboratory, and interpretation of results. Offered in alternate years.

236. *Muscle Physiology* (4) III. Bassin Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: Biochemistry 101A or 101B and Mathematics 165B or 21B, or consent of instructor. The physical and chemical aspects of muscle function.

240. *Topics in Cell Biology* (3) I. Deamer Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in the area of cell biology. May be repeated for credit.

241. *Membrane Biology* (3) II. Deamer Lecture—2 hours. Prerequisite: courses 121A and 121B or Biochemistry 101A and 101B recommended, and consent of instructor. Course emphasizes biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of membrane components of cells. Offered in even-numbered years.

243. *Topics in Cellular and Behavioral Neurobiology* (2) III. McLean Seminar—2 hours. Prerequisite: consent of instructor. An advanced examination of several current problems in neurobiology. Topics will vary in different years; may be repeated for credit. (SU grading only.)

252. *Ecology of Arthropod Populations* (2) II. Toft Lecture—1 hour; seminar—1 hour; student presentations. Prerequisite: course 125B or the equivalent; graduate-level background in ecology recommended. In-depth examination of the ecology of arthropod populations, emphasizing population interactions particularly; competition, predation (including parasitism), mutualism. Topics will vary from year to year. Offered in odd-numbered years. (SU grading only.)

254. *Ecology of Parasites* (2) II. Toft Lecture—1 hour; seminar—1 hour; student presentations. Prerequisite: course 125B or Entomology 104B or the equivalent; graduate-level background in ecology recommended. Population dynamics of parasites and parasites, emphasizing species of ecological importance but also including species of medical and economic interest. Offered in even-numbered years. (SU grading only.)

268. *Seminar in Cell Biology* (2) I. Wolfe Seminar—2 hours. Prerequisite: consent of instructor. Discussion of current literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties on the molecular and cellular levels of biological systems.

269. *Research Conference in Developmental Biology* (1) I, II, III. Armstrong, Erickson, Grey, Nuccitelli Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of senior and graduate student research in developmental biology. Intended primarily for graduate students. (SU grading only.)

277. *Seminar in Animal Behavior* (2) II. Stamps Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion of the principles and recent developments in invertebrate and vertebrate animal behavior.

297. *Current Topics in Zoology* (1) I, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (SU grading only.)

300. *Research Conference in Zoology* (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: graduate standing in Zoology and consent of instructor. Concurrent enrollment in course 299. Presentation and discussion of faculty and graduate student research in zoology. May be repeated for credit. (SU grading only.)

343. *Seminar in Developmental Biology* (1) I, III. The Staff (Chairperson in charge) Seminar—2 hours (alternate weeks). Seminar on current topics in developmental biology will be presented and discussed. Speakers will be drawn from University-wide system, and outside the system when feasible. (SU grading only.)

346. *Seminar in Animal Ecology* (3) III. Salt Seminar—2 hours. Prerequisite: course 125B and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals.

352. *Seminar in Marine Invertebrate Zoology* (2) I. Quinn Seminar—2 hours. Prerequisite: either course 112A or 112B, or consent of instructor. Critical review of the literature in selected topics and taxa in the invertebrates. Open to qualified undergraduates.

362. *Seminar in Animal Behavior* (2) II. Stamps Seminar—2 hours. Prerequisite: course 125B or 148B or Genetics 103 or consent of instructor. Recent developments in theoretical and experimental biogeography, the biology of colonizing species, and related topics.


401. *Group Study* (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching zoology and related biological sciences. Includes analysis of tests and laboratory material, discussion of teaching techniques and preparation and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (SU grading only.)

**NOTE:** For key to footnote symbols, see page 124.
Announcement of the School of Veterinary Medicine
A complete statement of the School of Veterinary Medicine requirements for admission into the Doctor of Veterinary Medicine program.
Office of Associate Dean — Student Services, School of Veterinary Medicine, University of California, Davis 95616. (No charge.)

Class Schedule and Room Directory
Issued quarterly. Lists times and place of meeting for specific classes, instructors, and units of credit. Also contains information on registration and enrollment in classes.
Available for 25 cents at the UCD Bookstore. (Not available by mail.)

Summer Sessions Bulletin
Complete information about summer session courses and instruction.
Office of the Summer Sessions, 375 Mrak Hall. (No charge.)

Educational Opportunity Program (EOP) Brochure
Information on applying to the EOP program; application dates.
EOP, Office of Admissions, 175 Mrak Hall. (No charge.)

Financial Aid at UCD
Information on financial aid: grants, loans, and work-study at UCD.
Financial Aid Office, North Hall. (No charge.)

People and Places at UCD
The student orientation handbook giving descriptions of campus services, activities, and information sources.
Available free from Advising Services, South Hall. (Not available by mail.)

Student Viewpoint
Student-compiled evaluations of courses and professors by in-class surveys, ASUCD Catalog of student services and organizations and Student Directory of student names, addresses and phone numbers.
Student Viewpoint Office, 13 Lower Freeborn. (No charge. Available by mail.)

Venture
University Extension quarterly catalog. Complete information about Unex courses, including times and locations.
University Extension, 4445 Chemistry Addition. (No charge.)

City of Davis Information
Chamber of Commerce, 228 B Street, Davis, CA 95616.

Other Useful Publications

Undergraduate Admissions Circular
A complete statement of the University's requirements for admission as an undergraduate.
Office of Undergraduate Admissions, 175 Mrak Hall, or from your high school or community college counselor. (No charge.)

Answers for Transfers
A question-and-answer booklet for students who want to attend a community college before transferring to the University. Gives information about University admission requirements, costs, financial aid, and advice on planning your program and transferring courses to UC.
Available from University Admissions Offices and Relations with Schools Offices, and at community college counseling offices. (No charge.)

UC Davis Poster/Calendar
Information for prospective students about UCD programs and activities, plus a wall poster and calendar marking important dates and UC application deadlines.
Office of Undergraduate Admissions, 175 Mrak Hall. (No charge.)

Announcement of the Graduate Division, UC/Davis
Brief descriptions of the graduate programs and research resources including admission requirements, procedures and dates for filing applications, degrees offered, fields of study, degree requirements, fees and expenses, financial aid and student services, and sources of additional information. Course descriptions are not included.
Dean of the Graduate Division, 252 Mrak Hall. (No charge.)

College of Engineering Bulletin
A detailed description of College of Engineering programs, majors, and course offerings.
College of Engineering Dean's Office, 2120 Bainer Hall. (No charge.)

Graduate School of Administration Bulletin
Admission requirements, description of academic programs, courses of instruction, faculty, and general information.
School of Administration, 308 Voorhies Hall, University of California, Davis 95616. (No charge.)

School of Law Announcement
A detailed description of admissions requirements, academic programs, courses of instruction, faculty, law school activities, and general information about the School of Law.
Office of Admissions, School of Law, University of California, Davis 95616. (No charge.)

School of Medicine Bulletin
A detailed description of academic programs, courses of instruction, faculty, student activities, admissions requirements, and general information about the School of Medicine.
Office of Admissions, School of Medicine, University of California, Davis 95616. (No charge.)
CORRESPONDENCE DIRECTORY

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

Office of the Chancellor
Mrak Hall
752-2063

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

College of Engineering
2132 Bainer Hall
752-0553

College of Letters and Science
150 Mrak Hall
752-0392

Graduate Division
252 Mrak Hall
752-0650

Graduate School of Administration
311 Voorhies Hall
752-7399

School of Law
1011 King Hall
752-0243

School of Medicine
Medical Sciences 1C
752-0331

School of Veterinary Medicine
1024 Haring Hall
752-1360

Office of Summer Sessions
376 Mrak Hall
752-1647

University Extension
4485 Chemistry Annex
752-0880

Admissions
Undergraduate:
Office of Admissions
175 Mrak Hall
752-2971
EOP Office of Admissions
175 Mrak Hall
752-2992

Graduate:
Graduate Division Admissions
252 Mrak Hall
752-0655

Administration:
Graduate School of Administration
311 Voorhies Hall
752-7399

Law:
School of Law Admissions
1011 King Hall
752-0243

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

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

Registrar's Office
124 Mrak Hall
752-2973
(for registration information, transcripts, the General Catalog)

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

Scholarship Office
University House Annex
752-2397
(undergraduate scholarships)

Fellowships and Graduate Scholarships
Graduate Division
252 Mrak Hall
752-0650

Teaching and Research Assistantships
Write to department or group concerned. Addresses given in the Announcement of the Graduate Division.

Housing
Community: Housing Office
752-2484
Residence Hall: Housing Office
752-2038
Student Family
Housing:
752-4000

ASUCD (Associated Students UCD)
3rd floor, Memorial Union
752-1990

Memorial Union Information Desk
752-2222

Office of Public Affairs
334 Mrak Hall
752-1930

Relations with Schools/EOP Outreach Services
11 Mrak Hall
752-1099

Services to Handicapped Students Office
101 Silo Student Center
752-3184 (voice), 752-6TTY (telephone device for the speech and hearing impaired)

Residency Matters, Attorney in
590 University Hall
University of California
Berkeley, CA 94720

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

Information Services Office
129 Mrak Hall
752-0539
(campus tours, maps, and information)
GLOSSARY

Academic Senate The faculty governing body of the University. Consists primarily of the regular faculty and certain administrative officers. Determines conditions for the admission of students and for granting certificates and degrees; develops educational policy; and authorizes and supervises all courses in the University.

Academic year Starts at the beginning of the Fall Quarter, ends at the close of the Spring Quarter, does not include Summer Sessions.

Advanced degree Any degree beyond the bachelor's degree.

AOB Stands for "Academic Office Building," a building that houses administrative and academic offices. AOB is the informal designation until the building is officially named.

ASUCD (Associated Students of the University of California, Davis) The undergraduate student body governing organization at UCD.

College A subdivision of the campus instructional system (e.g., College of Letters and Science). The Colleges are further divided into departments (e.g., English, Zoology, etc.) which offer specialized curricula.

Continuing student One who was registered for the immediately preceding quarter.

Credential A license for public school teaching in California. Programs offering the multiple-subject (elementary) or single-subject (high school) teaching credential are supervised by the Graduate Division in coordination with the Department of Education.

Curriculum (plural, curricula) All the courses of study offered by the University. May also refer to a particular course of study (major) and the courses in that area.

Discipline A branch of knowledge or teaching. Typically refers to an area of study or a major field.

Drop/Add Petition A petition used when you want to drop, change or add a course to your study list.

Enrollment The actual placing of a student in classes; to be on record as officially registered in a class.

Good standing An undergraduate student who has at least a 2.0 grade-point average in all work completed at the University of California, and who has maintained his or her minimum unit progress requirement for UCD, is considered a student in good standing.

Grade-point average (GPA) The GPA is computed in the following manner. You receive a certain number of points for each grade received. An "A" grade is worth 4 points, a "B" worth 3, a "C" worth 2, "D" worth 1, and an "F" worth 0. The total number of points accumulated is then divided by the number of course credits taken for a letter grade. The result is the grade-point average. Passed, Satisfactory, Not Passed, Unsatisfactory, or Incomplete grades are not computed in the quarterly grade-point average. (Exception: Incompletes are counted as "F" at the end of a student's undergraduate studies when determining whether a bachelor's degree candidate has achieved the required 2.0 average.) Only grades received for courses completed at the University of California are computed.

Graduate student A student who is enrolled in the Graduate Division for an advanced degree. Graduate courses at UCD are numbered 200-299.

GSA (Graduate Student Association) The elected representative body for graduate students at UCD.

Independent studies Special courses involving independent work supervised by a faculty member. Such courses for undergraduates are numbered 98, 99, 198, and 199. Those for graduate and/or professional students are numbered 298, 299, 398, 399, 498, and 499. These courses are restricted to qualified students for a designated number of units.

International student A student enrolled in nonresident status who is a citizen or resident of another country.

Lower Division Freshman and sophomore standing at UCD (fewer than 84 units completed); also refers to UCD courses numbered from 1 through 99.

Major The area of academic concentration in which the degree is conferred.

Matriculate To enroll for a degree in a college or school.

Minimum progress Refers to the number of units a student must have completed and passed by the end of a specific number of quarters at UCD.

New student A student beginning work at any level at UCD is considered to be a new student. After one quarter's attendance at Davis, a student is considered to be a continuing student. Graduate students who were enrolled at UCD as undergraduates are considered to be new students for their first quarter of graduate work.

Part-time student A student enrolled in the Part-Time Degree Program.

Passed/Not Passed (P/NP) option A system used to encourage undergraduate students to experiment in fields outside of their major areas. The "P" grade is given for a grade of C- or better. P/NP grades are not included in a student's grade-point average, but the units are counted toward the 180-unit graduation requirement.

PELP Any student, new or continuing, can interrupt formal study in a given quarter (or for a maximum of one academic year) by enrolling in the Planned Education Leave Program before the tenth day of instruction. You will not be eligible for most University services, but student employment and counseling services and faculty advising are available. PELP ensures your space in registration for the quarter following your leave.

Petition A request, usually written on a standard form, to adjust a study list or curriculum to fit an individual situation. Also, a request for an exception to a policy or regulation.

Prerequisite A necessary condition for enrollment in a course or a major. Prerequisites for courses usually consist of a previous course or courses in a related subject and/or the instructor's permission. Prerequisites are indicated in the course descriptions.

Professional school student A student enrolled in the School of Administration, Law, Medicine, or Veterinary Medicine.
Probation  An indication that performance is below standard because of academic deficiencies; a trial period in which a student is permitted to redeem failing grades or deficient units.

Quarter  A subdivision of the academic year at UCD, consisting of three 10-week terms (Fall, Winter, and Spring Quarters). The two 6-week Summer Sessions provide a quarter’s work in a more concentrated format, but are not considered regular quarters. (Attendance at both Summer Sessions, however, may count as one quarter in residence.)

Quarter units  Academic work at the University is measured by quarter units of credit which determine the amount of time a student has formally devoted to a given subject. To convert these units to semester units multiply by 2/3; from semester to quarter units multiply by 3/2.

Registration  The process by which a student informs the University that he or she plans to begin attendance or continue attendance. Registration typically involves paying fees and enrolling in classes.

Registration card  (sometimes called a “reg card”) Given to a student who is registered and has paid all fees for the current quarter. You will need your registration card to secure grades, gain student admittance to campus events, and to identify yourself as a UCD student. If you lose your registration card there is a $3 replacement fee.

Regular session  Refers to Fall, Winter, and Spring Quarters. Students in the School of Medicine also attend a Summer Quarter.

Repeated Courses  Courses in which a grade of D or F for undergraduate students and C, D, or F for graduate students can be repeated for a letter grade only. Courses taken on a P/NP or SU grading basis can be repeated on the same basis or for a letter grade. There are limitations on the number of repeated units that count toward a degree.

Residence  This word is used in a number of senses in this catalog; care must be taken to determine the meaning of the word each time it is used: (1) to denote registration in a regular session (i.e., when a student is “in residence” during Fall, Winter, or Spring Quarters); (2) to denote the period of time that a student must be registered at UCD in order to be eligible for graduation (i.e., academic residence); (3) to denote a student’s state of residence (e.g., California) to determine if non-resident tuition must be paid (i.e., legal residence); (4) to indicate the student’s place of residence (i.e., living quarters).

Sabbatical  A leave of absence granted to a University professor for travel, research, etc. May be for one quarter to a full year.

Satisfactory/Unsatisfactory  The equivalent of Passed/Not Passed for graduate students. The “S” grade is given for a grade of B- or better in graduate courses and C- or better in undergraduate courses.

Semester  A subdivision of the academic year into two sessions, usually Fall and Spring, each lasting approximately 18 weeks. Only the School of Law uses the semester system at UCD. To convert semester units to quarter units, multiply by 3/2.

Study List  The official program of courses for which a student registers. Your course enrollment form is submitted to the Registrar at the time of registration each quarter. In the College of Agricultural and Environmental Sciences, the Study List also refers to a student’s long-term academic study plan.

Subject A  The University’s requirement in English composition which must be completed to receive the bachelor’s degree.

Summer Sessions  Two 6-week summer sessions are offered between the close of Spring Quarter and the opening of Fall Quarter. Regular instruction, both undergraduate and graduate, is offered for full credit.

TA (Teaching Assistant)  TA’s are graduate students, usually on the doctoral level, who teach on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in each department.

TB  Stands for “temporary building,” usually a trailer or prefabricated building not intended as a permanent facility.

TBA  Stands for “to be announced.” In the Class Schedule and Room Directory course listings, TBA may refer to class meeting time, instructor’s name, or room number for class meeting.

Tenure  Denotes security of employment until retirement; may be granted to a faculty member after a specified number of years at the University.

Term  A regular quarter (Fall, Winter, or Spring).

Transcript  An official copy of your academic record (grades) at an educational institution such as the University of California.

Undergraduate  A college student who is pursuing a bachelor’s degree.

Unit  Courses are assigned a unit value based on one unit of credit for every three hours of work (in-class and preparation time) per week by the student. A student’s progress in the University and class level are determined in part by the number of units completed.

Upper Division  Junior and senior standing at UCD, based upon completion of at least 64 units; also refers to UCD courses numbered 100-199.

Work-Learn  An internship program providing on-the-job experience in a student’s field of interest. Participation may be full time (during the summer or academic year) or part time, and may be paid or volunteer. Academic credit may also be earned.

Work-Study  A financial aid program which provides eligible students with part-time jobs on campus or with off-campus nonprofit organizations.
APPENDIX

STATEMENT ON LEGAL RESIDENCE AT THE UNIVERSITY OF CALIFORNIA

Each new student entering the University of California (and each former student returning after an absence of one or more quarters) is required to submit a Statement of Legal residence to the Office of the Registrar. This Statement is used by the Residence Deputy in determining the legal residence of each student for fee assessment purposes.

Students who have not been legal residents of California for more than one year immediately prior to the residence determination date for each quarter in which they propose to attend the University are charged, along with other fees, a nonresident tuition fee (see page 35).

The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

Establishing Legal Residence for Tuition Purposes

In order to be classified as a resident for tuition purposes at the University of California upon admission, an adult student must have established his or her residence in California at least one year immediately preceding the residence determination date for the term during which he or she proposes to attend the University and must have relinquished any prior residence. An adult student must couple his or her physical presence within this State for one year with objective evidence that such presence is consistent with his or her intent in making California his or her permanent home and, if these steps are delayed, the one-year durational period will be extended until BOTH presence and intent have been demonstrated for one full year. Physical presence within the State solely for educational purposes does not constitute the establishment of California residence under State law regardless of the length of his or her stay in California.

Relevant indicia which can be relied upon to demonstrate one's intent to make California his or her permanent residence include, but are not limited to, the following: registering and voting in California elections; designating California as his or her permanent address on all school and employment records, including military records if one is in the military service; obtaining a California driver's license or California Identification Card, if a non-driver; obtaining California vehicle registration; paying California income taxes as a resident, including income earned outside this state from the date residence is established; establishing an abode where one's permanent belongings are kept within California; licensing for professional practice in California; and the absence of these indicia in other states during any period for which residence in California is asserted. Documentary evidence may be required. No single factor is controlling or decisive. All relevant indicia will be considered in the classification determination.

The residence of the parent with whom an unmarried minor (under age 18) child maintains his or her place of abode is the residence of the unmarried minor child. When the minor lives with neither parent his or her residence is that of the parent with whom he or she maintained his or her last place of abode. The minor may establish his or her residence when both parents are deceased and a legal guardian has not been appointed. The residence of an unmarried minor who has a parent living cannot be changed by his or her own act, by the appointment of a legal guardian, or by relinquishment of a parent's right of control (see Exceptions below). Where the residence of the minor is derived, the California residence of the parent from whom it is derived must satisfy the one-year durational requirement.

A man or a woman establishes his or her own residence. A woman's residence shall not be derivative from that of her husband, or vice versa.

Reclassification

Students seeking reclassification whose parents have not been residents of California for at least one year immediately preceding the term, must establish that they are financially independent of their parents. This factor is in addition to the other requirements necessary for a resident classification. (Graduate students who are teaching assistants, research assistants or teaching associates employed on a 0.49 or more time basis are exempt from the financial independence requirement.)

A student must petition to have his or her status changed at the Office of the Registrar and documentation of residence (driver's license, voter registration receipt, etc.) may be requested at that time. All changes of status must be initiated two weeks prior to the in-person registration period for the quarter or semester for which the student intends to be reclassified.

Detailed information concerning reclassification can be obtained by contacting the Residence Deputy at the Registrar's Office.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note that the rate of nonresident tuition and the residence requirements are subject to change. Regulations have been adopted by The Regents, a copy of which is available for inspection in the Registrar's Office of the campus.

Incorrect Classification

Those classified incorrectly as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts (by the student), the student also is subject to University discipline. Resident students who become nonresidents must immediately notify the Residence Deputy at the Registrar's Office.
Inquiries and Appeals

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Residence Deputy at the Office of the Registrar. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Legal Analyst—Residence Matters, 590 University Hall, 2200 University Avenue, Berkeley, California 94720, within 120 days after notification of the final decision by the Residence Deputy.

Exceptions

1. A minor student who remains in this state after his or her parent, who was a resident of California for at least one year immediately prior to leaving but has established residence elsewhere shall be entitled to retain resident classification if the student enters the University within one year after the parent moves, so long as continuous attendance is maintained at the University.

2. Nonresident students who are minors or 18 years of age who can show that they have been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and have demonstrated the intent to make California their permanent home may be eligible for resident status.

3. A student shall be entitled to resident classification if immediately prior to the residence determination date he or she has lived with and been under the continuous direct care and control of any adult other than a parent for not less than two years, provided that the adult having such control has been a California resident during the year immediately prior to the residence determination date. This exception continues until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident student, so long as continuous attendance is maintained at an institution.

4. Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild or spouse who is a dependent of a member of the United States military stationed in California on active duty. Such resident classification may be maintained until the student has resided in California the minimum time necessary to become a resident. If a student is enrolled in an institution and (1) the member of the military is transferred on military orders to a place outside this state where he continues to serve in the armed forces or (2) the member of the military retires from active duty immediately after having been on active duty in California, the student is entitled to retain resident classification under conditions set forth above.

5. If a student who is a member of the United States military stationed in California on active duty, except a member of the military assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification until he or she has resided in the state the minimum time necessary to become a resident.

6. A student who is an adult alien is entitled to resident classification upon admission if the student has been lawfully admitted to the United States for permanent residence in accordance with all applicable laws of the United States and has thereafter established and maintained residence in California for more than one year immediately prior to the residence determination date. Nonresident aliens present in the United States under the terms of visa classifications A, E, G, I, or K who can demonstrate California residence for more than one year immediately prior to the residence determination date while holding such visa may be entitled to resident classification. Inquiries should be directed to the Residence Deputy.

A student who is a minor alien shall be entitled to resident classification upon admission if the student and the parent have been lawfully admitted to the United States for permanent residence in accordance with all applicable laws of the United States, provided the parent has had residence in California for more than one year after admission to permanent residence prior to the residence determination date for the applicable term. Minor students holding A, E, G, I, or K visas should contact the Residence Deputy for information about eligibility for resident status.

7. Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, may be entitled to resident status.

Waivers Of Nonresident Tuition

To the extent funds are available, nonresident tuition waivers may be granted to spouses and dependent, unmarried children under age 21 of University faculty members who are qualified for membership in the Academic Senate, to unmarried, dependent children under age 21 of a full-time University employee whose permanent assignment is outside California and who has been employed by the University for more than one year immediately prior to the opening of the term. Inquiries regarding these waivers should be directed to the Residence Deputy.

In addition, certain student Teaching Assistants and Teaching Fellows, and certain graduate students designated as University Fellows and Distinguished Scholars may be eligible for nonresident tuition waivers or fellowships. Such students should contact the Graduate Division at their campus for further information.

DISCLOSURES FROM STUDENT RECORDS

In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the Davis campus of the University have the right:

- To inspect and review records pertaining to themselves in their capacity as students;
Appendix

• To have withheld from disclosure, absent their prior consent for release, personally identifiable information from their student records, with exceptions as noted in Section 10.70 of the University's policies;
• To inspect records maintained by the campus of disclosure of personally identifiable information from their student records;
• To seek correction of their student records through a request to amend the records or a request for a hearing; and
• To file complaints with the Department of Education regarding alleged violations of the rights accorded them by the Federal Act.

These rights are implemented on the Davis campus by UCD Policy and Procedure Manual, Section 320-21, "Disclosure of Information from Student Records."

Questions about these rights should be referred to Bob Franks, Office of Student Activities and Judicial Affairs, telephone 752-1128. Copies of the Federal Act, the full text of the UC Policies and the UCD Policy and Procedure Manual, Section 320-21, may be consulted at the Reference Desk of the Shields Library. Copies of the above may be obtained at the Office of Student Activities and Judicial Affairs.

Categories of personally identifiable information designated by the campus as public information are: name, address, telephone listing, date and place of birth, major field of study, dates of attendance, degrees and honors received, the most recent educational institution attended, participation in intercollegiate athletics and the name, weight, and height of the participants on intercollegiate University athletic teams; provided, however, that address and telephone numbers are not public information with respect to interns, residents, and fellows, and that with respect to these students, public information also includes primary hospital assignment, field of residency training, and name of medical school awarding the M.D. degree.

Students may request, in writing, by the last day of registration, that any or all personally identifiable information from their records not be regarded as public information. Students who desire to withhold their addresses and telephone listings may so indicate on the Student Data Card included in the registration materials. Students who desire to withhold any other item of information in the list from the category of public information must file a form in the Registrar's Office indicating which items they wish withheld.

Students availing themselves of this right should understand what the consequences of this action may be. For example, if a request is made to withhold from disclosure a student’s name and degrees and honors received, the campus cannot make public any honors received by the student, e.g., the award of a Regents Scholarship or election to Phi Beta Kappa, and cannot include the student's name and degree earned in the campus commencement program without the written consent of the student. Similarly, if a request is made to withhold from disclosure a student’s name and dates of attendance, a student’s status as a student cannot be verified for potential employers without written consent of the student. Furthermore, if a student’s last instruction to the campus was to withhold from disclosure the degree granted to that student and the date on which the degree was conferred, that information cannot be confirmed for a third party in connection with the appointment of that graduate to a new position or published in connection with an honor that individual subsequently receives. Students may reverse the decision of a previous quarter at registration for a new quarter on the student data form, or at any time by filing a form with the Registrar's Office indicating which items they now wish released.

PROPORTION OF UCD GRADUATES FINDING WORK IN THEIR FIELD OF CHOICE

The percent of UCD alumni whose full-time job is in the field of their choice is shown by field of study and number of years since receiving the bachelor's degree. Figures do not include the 12 percent of 1979 graduates and the 6 percent of 1973 graduates who had not decided on a career field at the time of the survey.

<table>
<thead>
<tr>
<th>Years Since Graduation</th>
<th>Animal Science</th>
<th>Applied Economics</th>
<th>Food Science</th>
<th>Plant Science</th>
<th>Bio-science</th>
<th>Resource Science</th>
<th>Engineering</th>
<th>Humanities</th>
<th>Physical Science</th>
<th>Social Science</th>
<th>Total Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>56</td>
<td>72</td>
<td>79</td>
<td>79</td>
<td>53</td>
<td>76</td>
<td>93</td>
<td>51</td>
<td>71</td>
<td>55</td>
<td>67</td>
</tr>
<tr>
<td>7 years</td>
<td>85</td>
<td>100</td>
<td>82</td>
<td>67</td>
<td>81</td>
<td>79</td>
<td>95</td>
<td>67</td>
<td>94</td>
<td>75</td>
<td>79</td>
</tr>
</tbody>
</table>

1 Source: A 1980 survey of 1979 and 1973 UCD graduates conducted by Student Affairs Research and Information, University of California, Davis.
2 Fields of study are a group of related undergraduate majors: for example, "Animal Science" would include such majors at UCD as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.
RETENTION DATA AND GRADUATION RATES AT UCD

Freshmen

(Retention and graduation rates for regularly admissible undergraduates entering UCD as freshmen.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled in 4th Quarter</th>
<th>4 Years</th>
<th>5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>1,803</td>
<td>85%</td>
<td>40%</td>
<td>59%</td>
</tr>
<tr>
<td>1972</td>
<td>1,963</td>
<td>85%</td>
<td>39%</td>
<td>60%</td>
</tr>
<tr>
<td>1973</td>
<td>1,941</td>
<td>86%</td>
<td>36%</td>
<td>60%</td>
</tr>
<tr>
<td>1974</td>
<td>2,005</td>
<td>84%</td>
<td>34%</td>
<td>58%</td>
</tr>
<tr>
<td>1975</td>
<td>2,174</td>
<td>85%</td>
<td>31%</td>
<td>54%</td>
</tr>
<tr>
<td>1976</td>
<td>1,915</td>
<td>86%</td>
<td>29%</td>
<td></td>
</tr>
</tbody>
</table>

Transfer Students

(Retention and graduation rates for regularly admissible undergraduates transferring to UCD as juniors.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled in 4th Quarter</th>
<th>2 years</th>
<th>3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>1,151</td>
<td>79%</td>
<td>44%</td>
<td>70%</td>
</tr>
<tr>
<td>1973</td>
<td>1,249</td>
<td>79%</td>
<td>43%</td>
<td>69%</td>
</tr>
<tr>
<td>1974</td>
<td>1,190</td>
<td>74%</td>
<td>39%</td>
<td>65%</td>
</tr>
<tr>
<td>1975</td>
<td>1,250</td>
<td>75%</td>
<td>39%</td>
<td>66%</td>
</tr>
<tr>
<td>1976</td>
<td>999</td>
<td>76%</td>
<td>31%</td>
<td>62%</td>
</tr>
<tr>
<td>1977</td>
<td>812</td>
<td>74%</td>
<td>32%</td>
<td>58%</td>
</tr>
<tr>
<td>1978</td>
<td>760</td>
<td>79%</td>
<td>36%</td>
<td></td>
</tr>
</tbody>
</table>

* These are not necessarily years of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies.

1 Source: Student Affairs Research and Information, University of California, Davis (February 1982).

AVERAGE MONTHLY SALARY OFFERS TO GRADUATES WITH BACHELOR'S, MASTER'S, AND DOCTORATE DEGREES

<table>
<thead>
<tr>
<th>Field of Study:</th>
<th>Average Monthly Salary Bachelor's</th>
<th>Average Monthly Salary Master's</th>
<th>Average Monthly Salary Doctorate</th>
<th>Probable or Definite Job Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$1,793-$2,375</td>
<td>$2,088-$2,665</td>
<td>$2,675-$3,583</td>
<td>85.9%</td>
</tr>
<tr>
<td>Humanities</td>
<td>833-1,667</td>
<td>1,125-2,100</td>
<td>—</td>
<td>75.6%</td>
</tr>
<tr>
<td>Life Science</td>
<td>1,000-2,000</td>
<td>1,083-1,916</td>
<td>—</td>
<td>73.1%</td>
</tr>
<tr>
<td>Management</td>
<td>1,148-2,458</td>
<td>1,917-2,708</td>
<td>1,292-3,325</td>
<td>89.8%</td>
</tr>
<tr>
<td>Physical Science</td>
<td>820-1,667</td>
<td>1,087-2,291</td>
<td>1,423</td>
<td>81.1%</td>
</tr>
<tr>
<td>Social Science</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>75.3%</td>
</tr>
<tr>
<td>Medicine</td>
<td>—</td>
<td>1,423</td>
<td>2,433</td>
<td>100.0%</td>
</tr>
<tr>
<td>Dentistry</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>81.3%</td>
</tr>
</tbody>
</table>

1 Source (except for Medicine and Dentistry—see footnote): A national survey of a representative group of colleges conducted by the College Placement Council, representing the 80 percent range of offers for 1981-82 throughout the country. It should be noted that a wide variation in starting salaries exists within each discipline based on job location, type of employer, personal qualifications of the individual, and employment conditions at the time of job entry.

2 Source: The Job Market for UCLA's 1982 Graduates. Percentages are based only upon those students who planned to work immediately after graduation.

3 Source: The Job Market for UCLA's 1981 Graduates. Percentages are based only upon those students who planned to work immediately after graduation. Medical and dental salaries are shown as means rather than ranges. The medical mean is derived from a range of resident salaries.
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

Regents Ex Officio
George Deukmejian
Governor of California and President of The Regents
Leo T. McCarthy
Lieutenant Governor of California
Willie L. Brown, Jr.
Speaker of the Assembly
Bill Honig
State Superintendent of Public Instruction
James N. Thayer
President of the Alumni Association of the University of California
Douglas E. Schmidt
Vice President of the Alumni Association of the University of California
David Pierpont Gardner
President of the University

---

Regents-Designate (non-voting)

Appointed Regents*
Edward W. Carter
Glenn Campbell
William French Smith
Robert O. Reynolds
Dean A. Watkins
Joseph A. Moore
John H. Lawrence, M.D.
William A. Wilson
Yvonne Braithwaite Burke
Robert N. Noyce
Vilma S. Martinez
John F. Henning
Stanley K. Sheinbaum
Yori Wada
Frank W. Clark, Jr.
David Geffen
Willis W. Harmon
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INDEX

Absence
planned leave of (PELP), 55
readmission after, 55
Academic Reentry Program, 28, 45, 49
Administration
Graduate School of, 107, 125
admission to, 107
courses in, 125
degrees and fields of specialization, 95, 107
University, 9
Administrative Officers, 7, 9, 346
Admission
application
deadlines, 5, 43
redirection, 52
to graduate status, 5, 96
to professional school, 107
(Administration), 109 (Law), 113
(Medicine), 117 (Veterinary Medicine)
to undergraduate standing, 42
by examination, 48
categories (student), 44
checklist, 52
choice of college, 45
Educational Opportunity Program, 41, 49
eligibility, notification of, 44
failure to register, 44
handicapped student, 41
intention to Register, Statement of, 44, 52, 85
of applicants from other countries (see International students)
of nonresidents (see Nonresident student)
preparation for, 41
readmission (see Readmission)
reappraisal, 43
reentry (see Academic Reentry Program)
Relations with Schools/EOP Outreach Services, 41
requirements at entrance
credit toward, 45-49, 52
examinations, 47-48, 49, 51
for graduate study, 96
for preprofessional study, 101-105
for undergraduate study, 45-49
Student Affirmative Action, 41, 49
visit to campus before, 41, 65
Adult Fitness Program, 16
Advising
academic, 66-66 (Agricultural and Environmental Sciences), 76 (Engineering), 84 (Letters and Science)
and counseling, 25-28
Educational Opportunity Program/Student Affirmative Action, 27
handicapped student, 30
international student, 29
orientation and summer, 25, 29, 31, 44, 54, 85
peer, 25, 26, 31, 66, 77, 85
preprofessional, 26, 69, 85, 101
reentry, 28
(see also specific major programs)
Aeronautical engineering (see Engineering)

Afro-American Studies Program, 126
courses in, 127
major in, 126
Agrarian Studies
courses in, 127
major in, 68, 127
Agricultural
Alternative Development Program, 16
and Environmental Chemistry, graduate
grade, 128, 129
and Environmental Sciences, College of, 65-73
advising, 65-66
degree requirements, 70
expanded course descriptions, 66
honors and prizes, 73
major certification, 71
majors and special programs, 67-69
minor programs, 70
orientation class, 66
passed/Not passed option, 72
program planning, 65
scholarship, 71
scholarships, 73
student services, 66
study list/study-plan requirements, 71
teaching credentials, 70, 128, 131
transfer students, 72
unit limitations, 70-73
withdrawal from, 73
work-learn, 66, 127, 133, 334
and Home Economics Education, courses in, 128
and Managerial Economics, major in, 67, 128
business management (see Management)
Chemistry, courses in, 128
Economics, Department of, 129
courses in, 129
option, 128
related majors, 67
Education
graduate program, 96, 132
major in, 68, 131, (see also Agricultural and Home Economics Education)
Engineering
courses in (see Agricultural Engineering Technology; Consumer Technology; Engineering; Agricultural Technology; Department of, 132, 190
major in (see Engineering; Agricultural Technology), courses in, 132
geology (see Geosciences)
History Center, 11
Practices, courses in, 133
Science and Management
courses in, 134
major in, 67, 133
Agronomy
and Range Science, Department of, 135
courses in, 134, (see also Range Science)
related majors, 68, 296, 306
(see also Plant Science)
Allergy (see Allergy-Allergy)
Alumni Association, 33
American
History and Institutions requirement, 62
Studies Program, 135
courses in, 136
major and minor programs, 135
Anatomy
courses in, 136, (see also Human Anatomy)

Department of (Veterinary Medicine), 136
graduate group, 96, 137
Anesthesiology, courses in, 258
Animal
Behavior
courses in, 137
graduate group, 96, 137
biochemistry (see Biochemistry)
Genetics, courses in, 137
husbandry (see Animal Science, Nutrition)
Physics, courses in (see Physiology)
Department of, 138
Science
courses in, 139
Department of, 138
major in, 67, 138
specialization in, 133
Anthropology, Department of, 140
courses in, 141
major and minor programs, 140-41
(see also Oriental Languages and Civilizations)
Applied
Behavioral Sciences, Department of, 143
courses in, 144
Early Childhood Laboratory, 13
major in, 68, 143
minor programs, 143
teaching credentials, 99, 131
Economic and Behavioral Sciences, 67
Physics (see Physics)
Science (see Engineering)
Aquaculture (see Animal Science)
Arboretum, University, 10
Archaeology (see Anthropology)
Architecture (see Art, Landscape Architecture)
Art, Department of, 145
History
courses in, 147
faculty in, 146
major and minor programs, 146
museum training, 146, 148
Studio, courses in, 145, (see also Design)
faculty in, 145
major and minor programs, 145
Arts
and Lectures, Committee for, 17, 22
at Devils, 21
Asian American Studies
courses in, 148
minor program, 144
related major, 143
Assistantships, teaching and research, 36, 99
Associated Students (ASUCD), 24
Astronomy, courses in, 290
Athletics, 22, 24, (see also Physical Education)
Atmospheric Science
courses in, 149
faculty (Land, Air and Water Resources), 244
graduate group, 96, 150
major in, 68, 149
related major, 211
Avian
Medicine (see Epidemiology and Preventive Medicine)
Sciences
courses in, 151
Department of, 150
graduate group, 96, 151
major in, 67, 150

348
Bachelor's degree (see Degree Requirements)
Bacteriology, Department of, 152
courses in, 152
majors in, 68, 86, 152
Bee biology (see Entomology)
Behavioral Biology, courses in, 258
Biochemistry
and Biophysics
courses in, 154
Department of, 154
courses in, 154
Food, major in, 68, 217
graduate group, 96, 154
major in, 68, 86, 153
Biological Chemistry, courses in, 259
control (see Entomology)
Sciences (Intercollege Division), 155
courses in, 156
major in, 68, 86, 155-56
minor program, 156
Biology (see Biological Sciences)
Biomedical Engineering
courses in, 157
graduate group, 96, 157
Biophysics
graduate group, 96, 157
(see also Biochemistry and Biophysics)
Black studies (see Afro-American Studies)
Botany
courses in, 158
Department of, 157
graduate group, 96, 160
majors in, 68, 86, 157-58
minor program, 158
Brewing technology (see Fermentation Science; Food Science)
Business administration, preprofessional requirements, 102
management (see Management)
(see also Agricultural and Managerial Economics; Economics)
Calendar, 4-5, 111 (Law School), 115
(Medicine School)
Campuses, University, 9
Campus
Events and Information, 18
75th anniversary, 7
Tours and Services, 18, 31, 41, 54
Writing Center, 11, 203
Candidacy for degrees, filing announcement:
graduate students, 5, 97-98
undergraduates, 4, 62
Cantonese, courses in, 148
Cardiology, courses in, 264
Change of campus before registration, 44
college, school, or major, 54, 76, 87
grade, 56, 57, 58
name, 55
Chemical Engineering (see Engineering)
Chemistry
applied, specialization in, 185
Biological, courses in, 259
courses in, 161
Department of, 160
majors in, 160
(see also Agricultural and Environmental Chemistry)
Chicano Studies, courses in, 276
Child
Care Programs, 33
Development
graduate group, 96, 162
(see also Human Development)
Chinese, courses in, 283, (see also Asian American Studies; Oriental Languages and Civilizations)
City planning (see Environmental Planning and Management; Environmental Policy Analysis and Planning)
Civil Engineering (see Engineering)
Class level, 58
Classical Civilization, major in, 162
Classics, Department of (Spanish and Classics), 162
courses in, 163
major and minor programs, 162-63
Clinical Pathology
courses in, 164
Department of, 164
Psychology, courses in, 259
Community Development
graduate group, 96, 164
(see also Applied Behavioral Sciences; Home Economics)
Health, courses in, 260
Nutrition, major in, 68, 165
Comparative biochemistry (see Biochemistry Graduate Group)
Literature
courses in, 166
graduate group, 96, 167
major and minor programs, 165-66
Program, 165
Pathology, graduate group, 96, 167
Computer Center, 12
Science and Engineering, major in, 187
and Mathematics, major in, 252
courses in, 188 (see also Engineering; Electrical and Computer Science; Mathematics; Statistics)
Computing Science, graduate group, 96, 167
Concurrent student (see Enrollment)
Conduct and discipline, 60
Conservation, 16, 306, 309, 317, 332
Consumer
Economics
courses in, 168
(see also Development, Resource, and Consumer Economics)
Food Science, major in, 68, 168
Research, Center for, 13
Science
courses in, 168
related majors, 168, 237
Technology, courses in, 169
Counseling Center, 26
Courses
adding and dropping, 54
classification and numbering, 121-24
enrollment in (see Enrollment)
expanded descriptions of, 66, 78, 121
prerequisites, 121
repetition of, 67, 69, 91
(Letters and Science)
(see also Credit; Units of Credit)
Credentials (see Teacher Education)
Credit
advanced (credit) allowed, 59
and scholarship, 56, 62
by examination, 68, 59
for repetition of course, 57, 58, 60, 91
for work taken in other institutions, 51, 52, 60
in extension courses, 72, 78, 90, 124
in internship courses, 66, 91, 123
in professional courses, 71, 90, 122
in Summer Session courses, 60, 62, 97, 123
minimums, 60
(see also Units of Credit)
value of courses, defined, 121
Criminal Justice, Center on Administration of, 11
Crocker Nuclear Laboratory, 15
Davis, campus and community, 7, 8
Deficiencies
disciplinary action, 58, 60
of transfer students, 50, 58
removal of grade, 57
Degree requirements
advanced, 97
for Bachelor of Arts, 89
of Science, 70, 78, 89, 118
(see also specific major programs)
Part-Time Program, 51, 98
University, 61, 96
Dermatology, courses in, 261
Design
courses in, 169
Environmental, Department of, 209
major in, 68, 169
(see also Art; Landscape Architecture)
specializations in, 189, 244
Development, Resource and Consumer Economics, major in, 67, 170
Dietetics
major in, 68, 171
related fields, 68
Disqualification for scholastic deficiency, 60, 72
Directory for correspondence, 339
Dramatic Art, Department of, 171
Artists in Residence Program, 171
courses in, 172
major and minor programs, 171
University theatre, 21, 171
Early Childhood Laboratory, 13
Earth Sciences and Resources
courses in, 173
graduate group, 96, 173
East Asian Studies Program, 173
courses in, 174
major and minor programs, 173-74
Ecology
courses in, 174
graduate group, 96, 174
Institute of, 14
Economics
courses in, 175
Department of, 175
major in, 175
(see also Agricultural Economics; Consumer Economics; Home Economics)
Education
Abroad Program, 18, 180
Handicapped Students, Services to, 30, 41
Health
evaluation, 29, 54
insurance plan, 29
Sciences, 102-105
Service, Student, 29
Hebrew, courses in, 308
Hematology-Oncology, courses in, 265
History
and government of the University, 9
courses in, 233
Department of, 232
major and minor programs, 232-33
of art (see Art)
of the Davis campus, 7
requirement for admission, 46
Home
Economics
Education (see Agricultural and Home Economics Education)
manual in, 68, 237
Management (see Consumer Science)
Honors
at graduation, 63, 73, 81, 93
courses, defined, 122
dean’s list, 62, 73, 81, 93
prizes and awards, 62-63, 73, 81-82, 93
Horticulture
graduate group, 96, 237
(see Environmental Horticulture)
Housing
on-campus and off-campus, 21
room and board, 21, 35
student family, 21
Human
Anatomy, courses in, 262
Development
courses in, 238
major in, 68, 237
Physiology, courses in, 263
Humanities
advanced credit allowed, 59
and fine arts, list of courses, 89
list of courses, 71, 79-80, 89
(college) requirements, 71, 79, 89
Immunology
graduate group, 96, 239
(see also Veterinary Microbiology and Immunology)
Independent Study Program, 4, 122
Individual major (see Majors)
Infectious Diseases, courses in, 265
Integrated Studies Program and courses in, 240
Intercampus
exchange program, 98
Institute for Research at Particle Accelerators, 15
transfer, 50
Intercollegiate athletics, 24
Interior decoration (see Design)
Intemal sports, 22, 24
Internal Medicine, courses in, 263-66
International
Agricultural Development
courses in, 241
graduate group, 96, 241
major in, 69, 240
Relations Program, 242
courses in, 242
major in, 242
students
admission, 45, 50, 97
advising and services, 29
American History and Institutions
requirement, 62
courses in English for, 51, 61, 204
examination in English for, 51, 61, 97
financial certifications, 50
rules governing residence, 342
scholarship, 50
Internship Program, 123, (see also Work-learn internships)
Irrigation (see Engineering: Civil; Soil and Water Science)
Italian (French and Italian, Department of), 242
courses in, 243
major and minor programs, 242-43
Japanese, courses in, 283
Laboratory
science requirement for admission, 46
technician (see various natural science majors)
Land, Air and Water Resources,
Department of, 244
Landscape
Architecture
courses in, 245
major in, 68, 244
horticulture, option in, 296
management, 210
Late registration and filing, 4, 35, 54
Latin
courses in, 163
major and minor programs, 163
Law
and Society option, 314
School of, 109-111, 245-48
admission and application, 109
calendar (semester), 111
courses in, 245
degree, 95, 110
preprofessional requirements, 109
student advising program, 26, 102, 109
Learning Skills Center, 28
Leave of absence, 55
Letters and Science, College of, 84-93
advanced placement examinations, 59, 89, 91
advising, 84-85
change of major, 87
credit in special courses, 89, 91
declaration of major, 86
honors and awards, 93
individual major, 86, 239
major programs, 86-87
minor programs, 88
passed/not passed option, 92
preprofessional advising, 85
requirements
advising checkpoints, 85
breath, 89
College, 88
English composition, 61, 84, 89, 91
for graduation, 84, 88
major (see specific majors)
residence, 89
scholarship, 88, 99
unit limitations, 91, 93
senior degree check, 85, 92
<table>
<thead>
<tr>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>student services, 84</td>
</tr>
<tr>
<td>teaching departments, 86</td>
</tr>
<tr>
<td>undeclared status, 85</td>
</tr>
<tr>
<td>Library, University, 10</td>
</tr>
<tr>
<td>Limited status, 50</td>
</tr>
<tr>
<td>Linguistics</td>
</tr>
<tr>
<td>courses in, 250</td>
</tr>
<tr>
<td>graduate group, 96, 250</td>
</tr>
<tr>
<td>major and minor programs, 249-50</td>
</tr>
<tr>
<td>Program in, 249</td>
</tr>
<tr>
<td>Literature in translation, 251</td>
</tr>
<tr>
<td>Living accommodations, 21</td>
</tr>
<tr>
<td>Loans, 35, 37-38, 99</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>change of, 54, 69, 76, 87</td>
</tr>
<tr>
<td>cross-college (or School), 70, 87, 111</td>
</tr>
<tr>
<td>declaration of, 69, 77, 86</td>
</tr>
<tr>
<td>double (see Engineering)</td>
</tr>
<tr>
<td>exploratory program, 68, 69</td>
</tr>
<tr>
<td>individual, 69, 77, 86, 189, 239</td>
</tr>
<tr>
<td>multiple, 70, 86</td>
</tr>
<tr>
<td>requirements (see specific major)</td>
</tr>
<tr>
<td>Management</td>
</tr>
<tr>
<td>Agricultural Science and, 67, 133</td>
</tr>
<tr>
<td>business, 128, 296</td>
</tr>
<tr>
<td>Food Service, 171, 220</td>
</tr>
<tr>
<td>food technology and, 171</td>
</tr>
<tr>
<td>home, 168-69, 237</td>
</tr>
<tr>
<td>landscape, 210, 244</td>
</tr>
<tr>
<td>Managerial Economics option, 128</td>
</tr>
<tr>
<td>(see also Administration; Applied Economic and Behavioral Sciences)</td>
</tr>
<tr>
<td>Marketing (see Administration; Agricultural and Managerial Economics; Agricultural Economics; Consumer Science; Food Science)</td>
</tr>
<tr>
<td>Marine</td>
</tr>
<tr>
<td>Laboratory (Bodega), 15</td>
</tr>
<tr>
<td>Resources, Institute of, 15</td>
</tr>
<tr>
<td>Materials Science and Engineering (see Engineering)</td>
</tr>
<tr>
<td>Mathematics</td>
</tr>
<tr>
<td>applied, 185, 252</td>
</tr>
<tr>
<td>courses in, 253</td>
</tr>
<tr>
<td>Department of, 251</td>
</tr>
<tr>
<td>major and minor programs, 251-52</td>
</tr>
<tr>
<td>requirement, 46, 75, 76, 89</td>
</tr>
<tr>
<td>Meat technology (see Food Science)</td>
</tr>
<tr>
<td>Mechanical Engineering (see Engineering)</td>
</tr>
<tr>
<td>Medical</td>
</tr>
<tr>
<td>evaluation and examination, 29, 54</td>
</tr>
<tr>
<td>health professions student assistance program, 26, 102</td>
</tr>
<tr>
<td>Microbiology, courses in, 266</td>
</tr>
<tr>
<td>Sciences, courses in, 266</td>
</tr>
<tr>
<td>Medicine</td>
</tr>
<tr>
<td>courses in (Veterinary Medicine), 274</td>
</tr>
<tr>
<td>Department of (Veterinary Medicine), 274</td>
</tr>
<tr>
<td>General, courses in, 264</td>
</tr>
<tr>
<td>preprofessional requirements, 103, 105, 114</td>
</tr>
<tr>
<td>School of, 113-15, 255-74</td>
</tr>
<tr>
<td>admission to, 113</td>
</tr>
<tr>
<td>calendar (quarter), 115</td>
</tr>
<tr>
<td>courses in, 268-74</td>
</tr>
<tr>
<td>transfer with advanced standing, 114</td>
</tr>
<tr>
<td>Medieval Studies Program, 275</td>
</tr>
<tr>
<td>courses in, 275</td>
</tr>
<tr>
<td>major in, 275</td>
</tr>
<tr>
<td>Memorial Union</td>
</tr>
<tr>
<td>Complex, 22</td>
</tr>
<tr>
<td>fee, 95</td>
</tr>
<tr>
<td>Merchandising, 128, 170, 324, 325</td>
</tr>
<tr>
<td>Meteorology, 149</td>
</tr>
<tr>
<td>Mexican-American (Chicano) Studies Program, 275</td>
</tr>
<tr>
<td>courses in (Chicano Studies), 276</td>
</tr>
<tr>
<td>major and minor programs, 275-76</td>
</tr>
<tr>
<td>Microbiology</td>
</tr>
<tr>
<td>courses in, 276</td>
</tr>
<tr>
<td>graduate group, 96, 276</td>
</tr>
<tr>
<td>(see also Medical Microbiology; Veterinary Microbiology and Immunology)</td>
</tr>
<tr>
<td>Microwaves, 188</td>
</tr>
<tr>
<td>Military Science, Department of, 276</td>
</tr>
<tr>
<td>courses in, 277</td>
</tr>
<tr>
<td>degree credit in, 277</td>
</tr>
<tr>
<td>programs in, 276</td>
</tr>
<tr>
<td>scholarships, 97, 276</td>
</tr>
<tr>
<td>Minor programs, 70, 88</td>
</tr>
<tr>
<td>application deadlines, 4</td>
</tr>
<tr>
<td>certification of, 70, 88</td>
</tr>
<tr>
<td>Molecular biology, 156, (see also Biochemistry; Genetics)</td>
</tr>
<tr>
<td>Music, Department of, 277</td>
</tr>
<tr>
<td>courses in, 278</td>
</tr>
<tr>
<td>major and minor programs, 277-78</td>
</tr>
<tr>
<td>musicians and quartet, 277</td>
</tr>
<tr>
<td>Name change, 55</td>
</tr>
<tr>
<td>Native American Studies courses in, 279</td>
</tr>
<tr>
<td>major in, 68, 279</td>
</tr>
<tr>
<td>minor program, 279</td>
</tr>
<tr>
<td>Natural Land and Water Reserves System (Steebkins Cold Canyon Reserve), 16</td>
</tr>
<tr>
<td>Natural sciences</td>
</tr>
<tr>
<td>advanced credit allowed, 59</td>
</tr>
<tr>
<td>(college) requirements, 71, 89, 90</td>
</tr>
<tr>
<td>Nematology</td>
</tr>
<tr>
<td>courses in, 280</td>
</tr>
<tr>
<td>Division of, 280</td>
</tr>
<tr>
<td>related fields (see Entomology; Environmental Toxicology; Plant Science)</td>
</tr>
<tr>
<td>Nephrology, courses in, 265</td>
</tr>
<tr>
<td>Neurology, courses in, 267</td>
</tr>
<tr>
<td>Neurosurgery, courses in, 268</td>
</tr>
<tr>
<td>Nonresident student</td>
</tr>
<tr>
<td>admission requirements, 50, 97</td>
</tr>
<tr>
<td>rules governing residence, 342</td>
</tr>
<tr>
<td>(see also International students)</td>
</tr>
<tr>
<td>tuition (see Fees)</td>
</tr>
<tr>
<td>Nontraditional student, 51</td>
</tr>
<tr>
<td>Nursery</td>
</tr>
<tr>
<td>production and management, 296</td>
</tr>
<tr>
<td>school education (see Human Development)</td>
</tr>
<tr>
<td>Nutrition</td>
</tr>
<tr>
<td>Community, major in, 68, 165</td>
</tr>
<tr>
<td>courses in, 265 (medicine), 281</td>
</tr>
<tr>
<td>Department of, 281</td>
</tr>
<tr>
<td>graduate group, 96, 282</td>
</tr>
<tr>
<td>minor programs, 281</td>
</tr>
<tr>
<td>related majors (see Animal Science; Dietetics; Nutrition Science)</td>
</tr>
<tr>
<td>Science, major in, 68, 282</td>
</tr>
<tr>
<td>Obstetrics and Gynecology, courses in, 268</td>
</tr>
<tr>
<td>Ophthalmology, courses in, 268</td>
</tr>
<tr>
<td>Oriental Languages and Civilizations courses in, 283</td>
</tr>
<tr>
<td>minor program, 88, 283</td>
</tr>
<tr>
<td>Orientation</td>
</tr>
<tr>
<td>course in, 66, 283</td>
</tr>
<tr>
<td>period (week), 4, 5, 25, 31, 54</td>
</tr>
<tr>
<td>summer, 25, 54</td>
</tr>
<tr>
<td>Ornamental Horticulture (see Landscape)</td>
</tr>
<tr>
<td>Orthopaedic Surgery, courses in, 268</td>
</tr>
<tr>
<td>Otorhinolaryngology, courses in, 269</td>
</tr>
<tr>
<td>Out-of-state applicants</td>
</tr>
<tr>
<td>(see Nonresident student)</td>
</tr>
<tr>
<td>Park and recreation administration</td>
</tr>
<tr>
<td>Part-time status, 51, 98</td>
</tr>
<tr>
<td>Pathology</td>
</tr>
<tr>
<td>Clinical (see Clinical Pathology)</td>
</tr>
<tr>
<td>courses in, 269 (Medicine), 284</td>
</tr>
<tr>
<td>(Veterinary Medicine)</td>
</tr>
<tr>
<td>Department of (Veterinary Medicine), 284</td>
</tr>
<tr>
<td>(see Plant Pathology)</td>
</tr>
<tr>
<td>Pediatrics, courses in, 270</td>
</tr>
<tr>
<td>Petitions, change, 57, 55, 56, 69, 76, 87</td>
</tr>
<tr>
<td>Pharmacology and Toxicology</td>
</tr>
<tr>
<td>courses in, 284</td>
</tr>
<tr>
<td>graduate group, 96, 284</td>
</tr>
<tr>
<td>Veterinary</td>
</tr>
<tr>
<td>courses in, 329</td>
</tr>
<tr>
<td>Department of, 329</td>
</tr>
<tr>
<td>courses in, 271 (medicine)</td>
</tr>
<tr>
<td>Philosophy, Department of, 284</td>
</tr>
<tr>
<td>courses in, 285</td>
</tr>
<tr>
<td>major and minor programs, 285</td>
</tr>
<tr>
<td>Physical Education, Department of, 286</td>
</tr>
<tr>
<td>Adult Fitness Program, 16</td>
</tr>
<tr>
<td>courses in, 287</td>
</tr>
<tr>
<td>intercollegiate athletics, 24</td>
</tr>
<tr>
<td>intramural sports, 22, 24</td>
</tr>
<tr>
<td>major and minor programs, 286-87</td>
</tr>
<tr>
<td>evaluation and examination, 29, 54</td>
</tr>
<tr>
<td>Medicine and Rehabilitation, courses in, 271</td>
</tr>
<tr>
<td>Physics, Department of, 289</td>
</tr>
<tr>
<td>Applied, major in, 289</td>
</tr>
<tr>
<td>courses in, 289</td>
</tr>
<tr>
<td>major and minor programs, 289-90</td>
</tr>
<tr>
<td>Physiological Sciences</td>
</tr>
<tr>
<td>courses in, 292</td>
</tr>
<tr>
<td>Department of, 292</td>
</tr>
<tr>
<td>Physiology</td>
</tr>
<tr>
<td>Animal, Department of, 136</td>
</tr>
<tr>
<td>courses in, 289, 295 (plant), 335</td>
</tr>
<tr>
<td>graduate group, 96, 294</td>
</tr>
<tr>
<td>major in, 68, 86, 292</td>
</tr>
<tr>
<td>plant (see Plant Physiology)</td>
</tr>
<tr>
<td>related field (see Animal Science)</td>
</tr>
<tr>
<td>Placement services (see Employment)</td>
</tr>
<tr>
<td>Planned Educational Leave Program, 55</td>
</tr>
<tr>
<td>Plant Pathology</td>
</tr>
<tr>
<td>courses in, 295</td>
</tr>
<tr>
<td>Department of, 294</td>
</tr>
<tr>
<td>related major (see Plant Science)</td>
</tr>
<tr>
<td>specialization in, 296</td>
</tr>
<tr>
<td>Physiology</td>
</tr>
<tr>
<td>courses in, 295</td>
</tr>
<tr>
<td>graduate group, 96, 295</td>
</tr>
<tr>
<td>protection (see Environmental Toxicology)</td>
</tr>
<tr>
<td>Protection and Pest Management</td>
</tr>
<tr>
<td>courses in, 296</td>
</tr>
<tr>
<td>graduate group, 96, 296</td>
</tr>
<tr>
<td>Science</td>
</tr>
<tr>
<td>courses in, 297</td>
</tr>
<tr>
<td>major in, 68, 296</td>
</tr>
</tbody>
</table>

352

Index

Toxicology
Center, Food Protection and, 13
(see Environmental Toxicology)
Transcript of record
for admission, 43, 51
from the University, 57
Transfer students
admission, 44, 48, 50
application to Davis campus, 43
credit advanced, 52, 59, 60, 72, 75, 114
intercampus, 50
regulations for students on probation, 58
Transportation, 8, 36
Truck crops (see Agricultural Science and Management; Plant Science)
Turf management (see Environmental Planning and Management; Soil and Water Science)
Tutorial courses, defined, 121, 122

Units of credit
class-level breakdown, 58
computation of grade-point average, 56
converting to quarter system, 56
deficiencies, 60
in colleges, 70-71, 79-81, 84, 88, 90-93
maximum and minimum limitations, 54, 58, 60, 73, 78, 88, 93, 122
non-credit courses, 60
requirements for graduation, 62
University
arboretum, 10
Extension, 17
courses, defined, 124
(see also Credit)
history and government, 9
Library, 10
medial, 63
professors, 19
requirements, 61-62
Theatre, 21, 171
Upper division courses, defined, 122
Urology, courses in, 274

Variable-unit courses, 121, 122
Vegetable Crops, Department of, 326
courses in, 326
related major, 296
Veterans affairs and benefits, 31
Veterinary
Medicine, School of, 117-19, 326
admission and application, 117
courses in (core), 326
degrees and requirements, 95, 118
Departments in (see Anatomy; Clinical Pathology; Epidemiology and Preventive Medicine; Medicine; Pathology; Physiological Sciences; Radiological Sciences; Reproduction; Surgery; Veterinary Microbiology and Immunology; Veterinary Pharmacology and Toxicology)
health professions student assistance program, 26, 102
preprofessional requirements, 69, 117
scholarship deficiencies, 58
Teaching and Research Center, 14
Microbiology and Immunology
courses in, 329
Department of, 329
Pharmacology and Toxicology
courses in, 329
Department of, 329
Viticulture and Enology, Department of,
courses in, 330
majors in (see Fermentation Science; Plant Science)
Vocation, agricultural, 127

Water Resources Center, 14
Water Science
courses in, 331
graduate group, 96, 332
related fields, 68, 211-12, 317
(see Land, Air and Water Resources)
Weed science (see Environmental Toxicology; Plant Science)
Wildlife and Fisheries Biology, Department of,
courses in, 332
major in, 67, 332
Wine making, 217, 330
Withdrawals, 55, 73
Woman's
Resources and Research Center, 31
Studies Program, 333
courses in, 334
major and minor programs, 334
Work-learn
courses in, 123, 127, 334
defined, 123
internships, 18, 66, 78, 91, 123, 334
Program, 334
Work-Study Program, 38

Zoology, Department of, 334
courses in, 335
majors in, 66, 86, 335
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ON THE COVER

Roland Petersen, Professor (b. 1926, Endelave, Denmark).
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