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
752-0653

College of Letters and Science
150 Mrak Hall
752-0382

Graduate Division
252 Mrak Hall
752-0650

Graduate School of Administration
308 Voorhies Hall
752-7302

School of Law
1011 King Hall
752-0243

School of Medicine
Medical Sciences 1C
752-0331

School of Veterinary Medicine
1024 Harriing Hall
752-1360

Office of Summer Sessions
376 Mrak Hall
752-1647

University Extension
4485 Chemistry Annex
752-0680

Admissions
Undergraduate: Office of Admissions
175 Mrak Hall
752-2971
EOP Office of Admissions
752-2992

Graduate: Graduate Division Admissions
252 Mrak Hall
752-0655

Administration: Graduate School of Administration
308 Voorhies Hall
752-7302

Law: School of Law Admissions
1011 King Hall
752-0243

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

Veterinary Medicine: School of Veterinary Medicine Admissions
1044 Harriing 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
752-2483
Residence Halls: Housing Office
752-2033
Student Family
Orchard Park
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

Relate with Schools/EOP Outreach Services
128 Mrak Hall
752-1099

Legal Analyst, Residency Matters
580 University Hall
University of California
Berkeley, CA 94720

Student Health Service
54A Cowell Hospital and Student Health Center
752-2300

Information Services Office
129 Mrak Hall
752-0539
(campus tours, maps, and information)

Cover painting by artist Jan Conroy.

The quotes interspersed throughout the text have been collected over the years from students, faculty, staff, and alumni at UCD.
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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.

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.

Non-discrimination. 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-TTYY.

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.
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CALENDAR

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/NC 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/A 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.**
  - Thurs.-Fri., Nov. 25-26
  - Thurs.-Fri., Dec. 23-24
  - Thurs.-Fri., Dec. 30-31

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.

**FALL 1982**
June 7-Aug. 6
(1982)

**WINTER 1983**
Nov. 8-10
Feb. 9-11
(1982)

**SPRING 1983**
Feb. 14-15
Mar. 11-12
Apr. 1
May 4

**FALL 1983**
June 7-Aug. 13
Nov. 17
Mar. 4

- Mon., Sept. 20 Mon., Jan. 3 Thurs., Mar. 31
- Sept. 20-22 Jan. 3-4 Mar. 31-Apr. 1
- Sept. 20-21 Jan. 3-4 Mar. 31-Apr. 1
- Sept. 22 Jan. 4 Apr. 1
- Wed., Oct. 6 Tues., Jan. 18 Fri., Apr. 15
- Oct. 6 Jan. 18 Apr. 15
- Oct. 6 Jan. 18 Apr. 15
- Oct. 6 Jan. 18 Apr. 15
- Oct. 27 Tues., Feb. 8 Fri., May 6

**Fri., Dec. 3**
Dec. 6-11
Dec. 11
Mon., Feb. 21
Mon., Mar. 28
Mon., May 30
Mon., July 4
(1982)
(1982)
(1982)

**Tues., Mar. 15**
Mar. 17-23
June 11-17

**Thurs., June 9**
June 17
Mid-June

**Mon., July 4**
(1982)

**Mon., Sept. 5**
(1982)

*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.
- Final date for candidates for master's degrees to file theses with the committee in charge.
- Final date for candidates for master's degrees to file theses with the Dean of the Graduate Division.

FALL 1982
Mon., Oct. 4
Mon., Nov. 1
Fri., Dec. 10
Mon., Aug. 16
Fri., Oct. 1
Wed., Dec. 1

WINTER 1983
Mon., Jan. 10
Mon., Feb. 14
Wed., Mar. 23
Mon., Nov. 15
Mon., Jan. 3
Tues., Mar. 1

SPRING 1983
Mon., Mar. 7
Mon., May 16
Fri., June 17
Mon., Mar. 15
Fri., Apr. 1
Wed., June 1

FALL 1983
Wed., June 1
Mon., Aug. 1
Fri., July 1
Mon., May 23
Fri., Aug. 26

(for Sept. '83)
(for Sept. '83)
(for Sept. '83)
(for Sept. '83)
(for Sept. '83)

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.
- Applications for admission to graduate standing, with complete credentials, must be filed with the Dean of the Graduate Division on or before this date.
- Applications for admission to the Graduate School of Administration for 1983-84 must be filed with the School on or before this date.
- Applications for admission to the School of Law for 1983-84 must be filed with the School on or before this date.
- Applications for admission to the School of Medicine for 1983-84 must be filed with the School on or before this date.
- Applications for admission to the School of Veterinary Medicine for 1983-84 must be filed with the School on or before this date.
- Applications for readmission to undergraduate status must be filed with the Registrar on or before this date.
- Applications for readmission to graduate status must be filed with the Graduate Division on or before this date.

Nov. 30
June 1
April 1
Feb. 1
Nov. 1
Nov. 1
Fri., Aug. 20
Mon., Aug. 2

July 31
Oct. 1
Jan. 1
June 1
July 31
Oct. 1
Jan. 1
June 1

Financial Aid Deadlines

- Applications for grants, loans, work-study, and California Student Aid Commission awards for 1983-84 must be filed with the Financial Aid Office on or before this date.
- Applications for UCD undergraduate scholarships for 1983-84 must be filed with the Scholarship Office on or before this date.
- Applications for President's Undergraduate Fellowships for 1983-84 must be filed with the Scholarship Office on or before this date.
- Applications for fellowships and graduate scholarships for 1983-84 must be filed with the Graduate Division on or before this date.

Thurs., Feb. 10
Sat., Jan. 15
Fri., Nov. 12
Sat., Jan. 15
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 333 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, 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 334. 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).
Introduction

Balloons proclaim this as the annual Student Activities Faire on the Quad, when students can meet representatives from many of the more than 270 campus organizations.
THE UNIVERSITY OF CALIFORNIA

When the first transcontinental railroad cars steamed into the western terminal in Sacramento, only 40 students—taught by 10 professors—were enrolled in the University of California. A year earlier, in 1868, Governor Henry H. Haight signed the Organic Act which provided that a "complete University" be created for the State of California. Classes began in 1869 on the campus of the College of California in Oakland. The first few buildings on the Berkeley campus were completed in 1873, and that year the University took up residence in its new home. The following June, 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 138,700 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 UC campuses, including UC 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 16 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 1981, 27 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 S. Saxon is President and head of the Systemwide Administration. Authority for the administration of each campus has been delegated to a Chancellor.
THE DAVIS CAMPUS

James H. Meyer, Chancellor of UC Davis, administers this campus of 18,700 students, 1,250 teaching faculty and 6,000 staff.

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 5,500 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, Accreditation Board for Engineering and Technology, American Chemical Society, and the Commission for Teaching Preparation and Licensing.

UCD's History

In 1906 the University of California acquired 768 acres surrounding the town of Davisville for a University farm. The Farm (as UCD was originally known) was established to serve the rural population of California, offering three years of instruction in the principles and practices of managing soils, crops, and animals. The need for such training was recognized and plans for the farm encouraged by Sacramento Superior Court Judge Peter J. Shields, the "Father of the Davis Campus."

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 to 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 50’s. 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.

“I’d like to see Davis remain a progressive, environmentally concerned place. It’s a good way to live.”—Senior, Environmental Toxicology

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 Regional Transit System linking Davis with the nearby cities of Woodland and Sacramento is supplemented by Unitrans, 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 18,700 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 Rail Road line from Vallejo to a junction located on the former Jerome C. Davis farm and the founding of the city of “Davisville.”

The community is closely tied to the University (more than half of the people in Davis are University students, faculty members, or staff) yet the city has developed its own recreational, cultural, and community outlets to supplement the University’s offerings. The Davis Art Center, adult education programs, 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 37,000.

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 1966 regulates such things as new home insulation and window area and requires all new housing developments to have bicycle paths.

The Davis Campus Today

Looking around the campus you can see modern concrete and glass buildings 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, 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 1,755,000 volumes and receives more than 45,000 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 in the Peter J. Shields Library, there are 1,814,000 items on microcopy, 95,000 maps, 570,900 pamphlets, 20,300 rare books, 14,100 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. Audiotape walking tours and lectures on the uses and resources of the library are part of the Educational Services Program. A 3-credit course, "Introduction to Library Research and Bibliography" (English 28), is given most quarters. A non-credit class called "Library Survival" is also offered.

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 6,100—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 180,700 volumes support programs in both human and veterinary medicine. The Physical Sciences Library contains 166,700 volumes and also houses a collection of more than 782,000 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 162,000 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 Arboretum

Arboretum Headquarters
Temporary Building 32
752-2488

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. Elliott Weier Redwood Grove. Other collections of great horticultural and botanical
interest include plantings of acacia, ceanothus, eucalyptus, hakea, and exotic conifers, as well as various groups in the Heath family (Ericaceae), Legume family (Leguminosae), and Myrtle family (Myrtaceae).

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.

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 46 core and affiliate faculty members, over 41 collaborating scientists, more than 89 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
- 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
"Sometimes people think they can be taught writing the same way that they were taught how to drive a car. But writing doesn't work that way. You're never done with learning how to write."

—English professor

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**

50-1 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 computing 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 B7800; four Digital Equipment Corporation (DEC) PDP 11/70 systems; and a DEC VAX 11/780 and a VAX 11/750. These systems support over 130 terminals located in five classrooms plus over 100 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 Datasync. This switching computer allows the user to identify from an individual terminal the computer system required for the work which is to be accomplished. 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 Education Center**

Temporary Building 117
752-2888

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

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 explore the profession of early childhood education. Selected graduate students and faculty members also conduct research at the Center. Enrollment information may be obtained by calling or writing the Center.

**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**

(temporary address)
3981 South K Street
Tulare, California 93274
(209) 688-1728

The Center initiated its program in 1981 and construction of permanent facilities, now underway, is expected to be complete by late 1982. 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 Office of Water Research and Technology, 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 resources 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
752-3284

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
752-3028

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 an active publication program; the preparation and administration of grant proposals for extramural funding of social science research; a specialized library of published and fugitive materials which is open to faculty, students, and other users; the Social Science Data Service; the training of graduate and undergraduate students in research methods through participation in faculty-led projects; and the conduct of 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
221 Physics/Geology Building
752-1760

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 Reserve System. Its mile-long ocean frontage is protected as a California Marine Life Refuge.
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)**

The Laboratory of 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, a diagnostic radiograph facility, and in central laboratories for cell biology research and inhalation toxicology.

**Serology Laboratory**

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.

"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."—UCD Admissions Counselor

**Stebbins Cold Canyon Reserve**

Professor Peter B. Moyle
Department of Wildlife and Fisheries Biology
67 Briggs Hall
UC Davis
752-2739

Information:
Natural Land and Water Reserves System
Room 544
2111 Bancroft Way
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 Section 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 fitness 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
Temporary Building 160
752-0210

The world-renowned embryological collection founded in Baltimore in 1914 by Franklin P. Mall, and the later collections of Hertig, Rock, Hartman, and Bluntschli, are now housed at UCD. 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 available to qualified investigators studying normal and abnormal primate development, on application to the Director.

UC Appropriate Technology Program
Headquarters:
2043 Bainer Hall
(916) 752-7166

The UC Appropriate Technology Program (UCATP) operates to develop and support appropriate technology research and demonstration projects by UC faculty and students throughout the nine campuses.

The following definition of appropriate technology guides the Program: "Technologies that are more careful of people and the environment than some of our present technologies, that reduce dependence on non-renewable or non-local resources, that are economically and ecologically sound, and that offer small-scale, practical alternatives to our current level and pattern of resource consumption."

Small grant proposals (up to $4,000, although a few exceeding this amount are also funded) are invited from faculty and from students with faculty support. Students are encouraged to submit proposals for mini-grants (up to $1,000); faculty sponsorship is required. Requests for proposals are issued in spring, with additional requests in fall if funding is available. Areas of research emphasized are as follows: energy production from renewable resources, efficient end uses of energy, climatically responsive architecture, resource conservation and recycling, organic agriculture, and institutional factors affecting appropriate technologies.

The Program's quarterly newsletter, UCAT News and Views, is available free on request. The newsletter contains project summaries and updates on works in progress as well as information regarding recent publications and activities in appropriate technology. Research leaflets, which are condensations of UCATP final reports, are also available on request.

The UCATP library, located in Room 30 of the Physical Sciences Library, contains books and current magazines in the areas of energy, agriculture, shelter, economics, environment, and community development.
ADDITIONAL ACADEMIC RESOURCES

UNIVERSITY EXTENSION

Information and catalogs:
4485 Chemistry Annex
752-0680

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, toxins and hazardous waste, social services, engineering, labor relations, liberal arts, education, 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)

Information:
104 Freeborn Hall
752-2523

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

In 1982-83 CAL will be presenting music and dance concerts, films, plays, poetry readings, lectures, solo recitals, orchestral performances, and free noontime entertainment on the Quad.

Student tickets are available at reduced prices for events for which there is a charge.

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 two locations, the Memorial Union Desk located in the first floor lounge and in Room 129, Mrak Hall. 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
752-1947

Summertime means vacation time for some students, but gives others 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 and in Washington, D.C. 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 1983 there will be two six-week summer sessions at UC Davis: June 20 through July 29, and August 1 through September 9. 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, when 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.

EDUCATION ABROAD

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

Academic Advice:
H.J. Ketelapper, Campus Coordinator
Dean's Office, College of Letters and Science
752-3392

The United Kingdom, Japan, Sweden, Norway, Mexico, Brazil, Hong Kong, Ireland, Egypt, France, Austria, China, Germany, Italy, Israel, Spain, Kenya, 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).

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.

"Whatever you do, get an internship or two or three while you're here. It's the only way to get an idea if you really like doing what you like studying." —Senior, Child Development
Eligibility requirements include:

- At least 84 quarter units completed by the time of participation
- At least a 3.0 GPA for coursework completed in the University of California at the time of application and departure
- 2 years (6 quarters) of University-level foreign language, or the equivalent, with a 3.0 GPA (not applicable where classes are in English)
- 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 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 minimum costs for the nine-month program range from $5,200 to $8,600.

For study abroad during the 1983-84 academic year, the application deadlines are early November 1982 for the United Kingdom and Ireland and mid-to-late January 1983 for all other study centers, except Australia, which has a May 1983 deadline for a year of study beginning in February of 1984. 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 65.) Consult with your major adviser, the Dean’s Office of your college, and the Campus EAP Coordinator. See page 180 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 Intercampus 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 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
  Associate Director Lawrence Berkeley Laboratory
  UC Berkeley
- University Professor Neil J. Smelser
  Department of Sociology
  UC Berkeley
- University Professor Edward Teller
  Lawrence Livermore 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
Student Life
LIVING ACCOMMODATIONS

Residence Halls

Information:
Student Housing Office
752-2033

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 1982-83 is $2,440 for a double-occupancy room and $2,640 for a single room (of which there are very few available to new residents). Nineteen meals per week are provided.

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 1982-83 (including all utilities except telephone) are about:

- 1-bedroom unfurnished, $181/month
- 2-bedroom unfurnished, $206/month
- 2-bedroom furnished, $242/month
  (air conditioned)

Community Housing

Information:
Student Housing Office
752-2489

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 A Delicate Balance — Your Rights and Responsibilities, leasing information, and the Davis Model Lease, 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, however, prepared lists are not furnished by mail.

RECREATIONAL FACILITIES AND PROGRAMS

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

How about intramural sports? The Intramural Recreation Program is one of the most popular programs on the Davis campus, a great way to relax and have fun. More than 50 different activities, from coed inner-tube water polo (created on the Davis campus in 1989) to lacrosse, are available year-round. Whether the action takes place in one of several gymnasiums, the Rec Hall,
the track at Toomey Field, Memorial Union Games Area, the tennis courts, or the swimming pool, participation is always lively and informal.

Memorial Union
Information:
Coordinator, MU Business Services and Facilities
463 Memorial Union
752-2924
Coordinator, MU Programs and Campus Recreation
469 Memorial Union
752-1730

The Memorial Union (MU), at the north end of the Quad, is the hub of campus activities. Bring yourself up to date on local events by stopping at the Information Desk in the main lounge, or by calling 752-2222. In the MU you’ll find the Games Area (with 16 bowling lanes, a billiards room, a card and TV room, and game machines), the Campus Box Office, and Freeborn Hall. Freeborn is a 1,800-seat assembly hall used for dances, banquets, dramatic and musical events, lectures, and conferences. Located in Lower Freeborn is KDVS radio, the California Aggie newspaper, Rabbit Reproductions, Experimental College, Zapple Records, Classical Notes, and the University Haircutters. Also housed in the MU complex are the Committee for Arts and Lectures, the Campus Events and Information Office, Women’s Resources and Research Center, the UCD Bookstore and Corral, the Coffee House, MU Dining Commons, The Last Resort Restaurant and Pub, MU Art Gallery and Listening Lounge, music practice rooms, lounges, outdoor plazas, Associated Students offices (including the travel service), the Graduate Student Assembly (GSA) Office, Student Activities, MU Recreation offices, and meeting rooms. In addition to these programs and services, the MU staff coordinates the following facilities and programs outside the MU complex:

The Putah Creek Recreation Area and the Arboretum feature picnic areas, bicycle and walking paths, bridle paths, and a small lake. Surrounded by a grassy area suitable for group recreation, the Putah Creek Lodge has outdoor barbecue pits and tables as well as an indoor fireplace, kitchen, and multi-purpose room. The Arboretum along Putah Creek is planted with trees and shrubs from California and many other parts of the world for teaching and research activities, as well as for general enjoyment.

Memorial Union and Recreation Services maintains the tennis courts on La Rue Road, just north of the Recreation 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.

The Recreational Swimming Pool Complex includes a large free-form pool with separate wading pool, bath house, snack bar, and shuffleboard courts. The adjacent lodge is equipped with a kitchen, meeting rooms, and a lounge with a large fireplace. The Hickey Gymnasium is also available for recreational lap swimming.
The Silo Barn Student Center, built in 1908, was once billed "The World's Most Modern Dairy Barn." The barn was renovated in 1970 and now features a snack bar, games facilities, a large multi-purpose room, and offices for Student Special Services. The Craft Center is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, and workshops and classes are offered each quarter in such varied crafts as woodworking, weaving, spinning, jewelry making, batik, ceramics, photography, silkscreening, leatherworking, upholstery, and more.

The Equestrian Center, southwest of the Veterinary Medical Teaching Hospital, is active all year round. Trail rides and instruction in both English and Western riding are available for beginning through advanced riders.

The Outdoor Adventures program is located in Temporary Building 24 (across from Chemistry 194). Outdoor Adventures operates a rental outlet and resource center, and provides classes, trips, and clinics in backpacking, rock climbing techniques, white water rafting, boardsailing, mountaineering, cross-country skiing, and equipment construction... to name just a few.

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, and squash courts; a weight room; I.C.A. training and team rooms; an arena area for volleyball, basketball, and badminton; and areas for wrestling and martial arts, table tennis, gymnastics, and dance.

Students can use Rec Hall facilities by showing their current Registration Card. Nonstudents may purchase privilege cards to use Rec Hall lockers, equipment, and facilities. Faculty and staff may also purchase a one-day pass at the door.

Recreation Hall is also available to campus affiliated organizations for special events.

"When you have a choice between four movies, a jazz concert, a recital by the Early Music Ensemble, a lecture on breakthroughs in cancer treatment, a trip to the mountains, San Francisco, Lake Tahoe, or a picnic along Putah Creek, how can you go wrong?"
—Junior, Animal Science
THE ARTS AT DAVIS

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

The Department of Music sponsors the University Symphony, Chorus, 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 Music 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 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, writing, 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 dramatic schedule includes the University Theatre Season (five major productions of established plays); one major production of an experimental piece; the 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 (725-2886) features a series of changing contemporary and historical art exhibits during the school year. The Gallery shows are organized by part-time student managers and include works by professional artists in one-person and group shows.

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 (752-6667), 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 has a permanent collection as well as exhibits that change throughout the year. The Design Galleries on the first floor of Walker Hall, and exhibit spaces in the College of Agricultural and Environmental Sciences Office (228 Mrak Hall), the Faculty Club, and AOB-IV, feature the work of students and faculty members in the Design program. Exhibits in the Anthropology Museum (138 Young Hall), are oriented toward areas of graduate and faculty research interest. Various collections include artifacts from North America, the South Pacific, and Africa. Exhibits are mainly Department collections, with some works on loan from other galleries.

The Committee for Arts and Lectures (CAL) brings a wide variety of performing groups to campus, in addition to sponsoring lectures, film series, 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.

On the lighter side, the Cal Aggie Marching Band entertains spectators at UCD football and basketball games, and sometimes even shows up at tennis matches. A special group which defies all categorization, the Band is noted for its colorful performances and is one of the last remaining student-funded and student-run marching bands in the country.

ASSOCIATED STUDENTS (ASUCD)

Information:
ASUCD Office
3rd floor, Memorial Union
752-1980

The Associated Students of the University of California, Davis (or ASUCD) is the student organization to which every registered undergraduate belongs. Out of the $385 undergraduates pay each quarter $13.50 goes to ASUCD. Graduate and professional students may become members by paying the $13.50 fee although certain ASUCD services are available to these students from their membership in the Graduate Student Association or Law Student Association. The money is spent on activities and services that will make life as a student a little easier, less expensive, or just more fun — such as the Coffee House, the campus newspaper, radio station, record store, Unitrans bus service, note-taking service, the Experimental College, the Academic Grievance Center, and more.

The student government, which controls how and where the money goes, is run by the ASUCD Executive Council. The Executive Council is based on the city council form of government and consists of six elected council members and the Council President. It is the policy-making body for ASUCD and oversees every
aspect 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 keeps the student body in contact with other universities, the University systemwide administration, The Regents, and the Davis city government.

Four commissions deal with making recommendations to the Executive Council. Members of the commissions are appointed by a subcommittee of the Executive Council. The four commissions are as follows:

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 Committee, 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 which combines the ASUCD Catalog of Services and Organizations and the Student Directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the ASUCD services include the Unitrans bus system, California Aggie newspaper, Student Viewpoint evaluation of professors and classes, the Bike Barn repair services, free legal services, 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, Zapple Records, 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

Information:
Student Activities
4th Floor, Memorial Union
752-2007

At UC Davis there are over 300 registered student organizations with a total of 18,000 members. These organizations represent cultural, social, religious, political, ethnic, academic, recreational, international, and service interests. Student Activities is a resource office staffed by professionals in student development and higher education. The office provides advising on activities and campus policies, support services, and leadership training to help campus organizations increase their effectiveness. In addition, Student Activities is responsible for administering the following campus programs: The Cal Aggie Marching Band, the UCD Spirit Squad, the Ballet Folklorico del Alma, five annual cultural events, Club Finance Council, an annual Activities Faire, and the campus Film Co-Op.

Student Activities staff can assist individual students who want to become involved in new activities or to start new organizations. All students are encouraged to drop by the office at the above location.
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 tutoring and referral service for use by all students. If you have a problem, remember—start with the First Resort (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.

“...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.”
—Senior, Rhetoric
procedures, and opportunities, and to offer programs relevant to students' changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome. The Coordinator's office is located in 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 and management. 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 considering a career in the health sciences. The professional staff and student advisers 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.

"I think if you get into this university somebody is telling you that you've got the potential. And you should think of it that way. You can make it. I did." — UCD Grad, former EOP student

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 advisors 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: 752-5665

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 transfers) 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 course work and developing academic skills. It helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

Learning Skills Center (LSC)
Information:
The Basement, South Hall
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 Office'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

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.

International Student Services

Information:
Services for International Students and Scholars
3rd floor, South Hall
752-0664

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 (SIS).

The functions of the SIS Office are to assist incoming international persons in obtaining proper visas, 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 $10,500 per year for a single student is recommended to cover nonresident tuition and fees, and living expenses (see page 38). 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.

Additional funding will be required for books, laboratory equipment, dental and eye care, summer health insurance, health care of dependents, and Summer Session fees, as needed.

The international student should be cautioned that there will be numerous additional 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 Stilo Student Center
752-3184 (voice)
752-6TTY (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 Center for Services to Handicapped Students 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.

Most architectural barriers to participation in campus activities have been removed. Accessible on-campus housing is available, as well as a campus map showing special facilities. The campus is almost completely flat and has a good curb ramp system. This ease of mobility, plus special class 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.

"The campus is really accessible. It helps ... you wouldn't believe how it helps." —UCD Sophomore

Advising is available to assist with such problems as living options, attendant recruitment and management, and adaptations for maximum independent living. 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.

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, interpreters, and clerical or research assistants. Other resources include:

- Priority registration and enrollment in classes
- Educational support equipment: reading machine; reading, taping, 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

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 Stilo
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 Silo 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 Silo
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:
Lower Freeborn
752-3372

The Women's Resources and Research Center is a supportive place for women in all roles, with all kinds of needs and interests. WRRC's services are wide-ranging and include:

- Workshops, lecture series, and conferences on subjects related to the status of women and the effects of changing sex roles on both women and men
- Academic advising and assistance in locating faculty supervision for 198, 199, 298, and 299 courses
- Internships in legislative work, publicity, program planning, and graphic arts
- Career advising
- Resource files and referrals for birth control, marital problems, legal rights, legislation, child care, sexuality, mental health, health care, employment
- Consultation with other units
- Research on issues of concern to women
- Problem-solving groups

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 324 of this catalog or telephone 752-3307.

The Center is staffed by professionals, student interns, and volunteers. People are encouraged to drop by and talk with the staff, and volunteers are needed to work with the Women's Center on programs, resource updating, legislative research, publicity, and on the newsletter.

**Student Employment**

Information:
Student Employment Center
1st floor, South Hall
(916) 752-0620

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, interviewng, and job-seeking skills
- Seminars to explore career fields and employment trends
- A Career Resources Library
- 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 graduates 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.

**CAL AGGIE ALUMNI ASSOCIATION**

Information:
The Alumni Center
University House
732-0286

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.

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**Internships, work experience, and special projects have been some of the most enjoyable parts of my years at Davis.”—Senior, Applied Behavioral Sciences**
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 $1,050 per quarter. (See page 329 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</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 fee</td>
<td>$3.50</td>
</tr>
<tr>
<td>Associated Students</td>
<td>$3.50</td>
</tr>
<tr>
<td>Membership fee</td>
<td>$13.50</td>
</tr>
<tr>
<td>Graduate Student</td>
<td>$3.00</td>
</tr>
<tr>
<td>Association fee†</td>
<td>$209.00</td>
</tr>
<tr>
<td>Education fee‡</td>
<td>$229.00</td>
</tr>
<tr>
<td>Fall (quarter)</td>
<td>$208.00</td>
</tr>
<tr>
<td>Winter (quarter)</td>
<td>$228.00</td>
</tr>
<tr>
<td>Total for California residents</td>
<td>$396.00</td>
</tr>
<tr>
<td>Winter and Spring (each quarter)</td>
<td>$405.50</td>
</tr>
<tr>
<td>Tuition for nonresidents‡</td>
<td>$395.00</td>
</tr>
<tr>
<td>Total for nonresidents‡</td>
<td>$404.50</td>
</tr>
<tr>
<td>Fall (quarter)</td>
<td>$1,050.00</td>
</tr>
<tr>
<td>Winter and Spring (each quarter)</td>
<td>$1,050.00</td>
</tr>
<tr>
<td>Total for California residents</td>
<td>$1,446.00</td>
</tr>
<tr>
<td>Winter and Spring (each quarter)</td>
<td>$1,455.50</td>
</tr>
<tr>
<td>Total for nonresidents‡</td>
<td>$1,445.00</td>
</tr>
<tr>
<td>Winter and Spring (each quarter)</td>
<td>$1,454.50</td>
</tr>
</tbody>
</table>

These fees are for the 1982-83 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 1982-83 Student Fees and Deposits, available from the Registrar’s Office. Current fees are also published in the Class Schedule and Room Directory.

(Fees are subject to change without notice.)

Explanation of Fees and Expenses

University Registration Fee: $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: $209 Fall Quarter and $208 Winter and Spring Quarter for undergraduates; $229 Fall Quarter and $228 Winter and Spring Quarter for graduate students; $342.50 per semester for law students. Revenue from this fee is used to support a portion of the cost of the educational program.

Nonresident Tuition: $1,050 per quarter; $1,575 per semester for law students. Paid by all full-time and part-time students.

Associated Students Membership Fee: $13.50 per quarter. All full-time and part-time undergraduate students are members of the Associated Students, University of California, Davis (ASUCD). Graduate and professional students may become members by paying the fee (see also Graduate Student Association fee following).

Graduate Student Association Fee: $3 per quarter. Paid by all graduate students but not mandatory for professional students in the Schools of Law, Medicine, and Veterinary Medicine. Professional students may become members by paying the fee.

Law Student Association Fee: $2.50 per semester.
Costs for a Year at UCD

The Financial Aid Office estimates that the average 1982-83 expenses of a UCD undergraduate who is single will total $5,725, including $1,186 for fees, $393 for books and supplies, $1,525 for housing, $1,420 for food, $986 for personal expenses, and $215 for transportation. Estimated expenses for other single students are: graduate students, $6,225; law, $6,325; veterinary medicine, $6,525; first-year medicine, $6,825; second-year medicine, $8,175; third- and fourth-year medicine, $7,875. For married students, these categories range from an undergraduate low of $8,750 to a high of $11,500 for students in their second year of medical school.

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 9 and 37 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 days</td>
<td>80%</td>
</tr>
<tr>
<td>15-21 days</td>
<td>60%</td>
</tr>
<tr>
<td>22-28 days</td>
<td>40%</td>
</tr>
<tr>
<td>29-35 days</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 1983-84 academic year no later than February 10, 1983. 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 1982.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. Scholarship applications for the 1983-84 academic year are available in October and must be filed by January 15, 1983 (See the Scholarship section beginning on page 41.)

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 103).

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 on 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 on 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

Educational Fee Grants provide qualified California residents with a grant to pay their Educational Fee for the first three quarters of attendance at a UC campus.

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. 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 should be made with a Financial Aid Counselor on campus for assistance in completing the application.

- Amount 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 costs 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.

Educational Fee Deferment Loans enable California residents to delay payment of all or some of the Educational Fee. Repayment may be deferred until completion or termination of studies. (Cosigner is required for annual amounts above $1,000.)

- 4 percent interest
- Repayment begins 6 months after graduation or withdrawal

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. (Cosigner 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
- Interest may vary depending on governmental regulations
- 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
- Interest may vary depending on governmental regulations
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.

- $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
- Repayment begins 12 months after receipt of the degree or withdrawal

"I think setting goals is a key. Not just future goals like a career, but deciding what it is you want to get out of each class—your goals for learning."—Freshman, Environmental Policy Analysis and Planning

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

- $15,000 maximum per academic year
- $60,000 total maximum
- Interest may vary depending on Treasury bill rates
- Repayment begins 9 months after completion of formal training, including accredited internship and residency programs, or withdrawal

Guaranteed Student Loans (GSLs) are available through banks and other lending institutions. These loans may be need-based, depending on federal regulations. Interest accrued while in school is paid by the federal government. This program requires a separate application, which is available in the Financial Aid Office. (The GSL program is subject to frequent changes.)

- $2,500 maximum per year for undergraduate students
- $5,000 maximum per year for graduate students
- 9 percent interest (may change on short notice)
- Repayment begins 6 months after graduation or withdrawal

California Loans to Assist Students (CLAS) are government-insured loans that are made to parents of dependent students and to independent undergraduate students, and graduate or professional students by participating banks and other lenders.

- Parents of dependent students may borrow $3,000 per year up to a maximum aggregate of $15,000 for each dependent student
- Independent 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
- 14 percent interest
- 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 — more 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 34.
SCHOLARSHIPS AND AWARDS

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 15. 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 103.)

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.

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

Other Scholarships are made possible by individual donors, private corporations, and various agencies. Many organizations and groups conduct their own scholarship programs. In most cases, you apply directly to these sponsoring groups.

- Generally $200 to $500

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

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

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 $100 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs (see page 37). The Regents Scholarship Administrative Committee conducts personal interviews during the final selection process. These scholarships are renewable as long as you maintain a 3.0 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
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 48 and "How to Use this Catalog," page 6.) The second step is to determine the admission category to which you belong. (Admission categories are defined on page 47.) This is a very important step because entrance requirements and filing dates may vary depending on your category of admission. The third step is to obtain and complete the Undergraduate Application 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 45. A summary of the steps in the application procedure appears on page 54. 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 33) for further information concerning admission or assistance if needed.

Office of Relations with Schools/EOP Outreach Services

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; and the MESA program which introduces students to the field of engineering. 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

The Information Services Office

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 ahead and make an appointment with the Undergraduate Admissions Office. 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 48. 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.

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.

"How do you learn to write? Read. Read often. Read a lot. Read everything."—English professor
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 campus has closed, any additional applications which are received will be forwarded to the next open campus preferred by the applicant. Therefore, it is important to give careful consideration to alternative campus preferences when completing the application.

Opening dates of the initial filing periods for new applicants are as follows:

<table>
<thead>
<tr>
<th>Quarter to be Admitted</th>
<th>Opening Date of Filing Period</th>
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<tr>
<td>*Spring 1983</td>
<td>October 1, 1982</td>
</tr>
<tr>
<td>Fall 1983</td>
<td>November 1, 1982</td>
</tr>
<tr>
<td>†Winter 1984</td>
<td>July 1, 1983</td>
</tr>
<tr>
<td>*Spring 1984</td>
<td>October 1, 1983</td>
</tr>
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</table>

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.

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

*An applicant seeking admission to the Spring Quarter may not enroll in any semester-system school for the Spring Semester immediately preceding the UC Davis 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 UC Davis.
for admission to more than one campus, admissions processing will be suspended until you notify the Student Academic Services (570 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. 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 54). 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 49).

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.

"Just because you major in history doesn't mean you'll be a historian for the next 40 years of your life. There are music majors in med school and Art History majors working for IBM. A major is something you enjoy and feel is valuable."—Senior, Mathematics

**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 48) 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 50) is a student who has been registered in a regular or extension session of a college or university other than the University of California since high school graduation.

An **intercampus transfer** applicant (page 52) 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 Program/Student Affirmative Action** applicant (page 51) 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 57) 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 52 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 52).

A **limited status** applicant (page 52) 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 52) 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 53 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 53 for details.

A second baccalaureate applicant (page 52) 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 52) is a student who is not a U.S. citizen, immigrant, or refugee.

A **concurrent enrollment** applicant (page 53) 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 97 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.

Students in a Dramatic Art class create face masks.
"A university education should help students re-evaluate their notions about life, and should provide them with the capacity to develop ideas and evaluate situations critically."—Zoology professor

UNDERGRADUATE STUDIES

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

The College of Agricultural and Environmental Sciences focuses on seven areas of concentration: animal science; plant sciences and pest and disease management; food, nutrition, textile, and consumer sciences; applied economic and behavioral sciences; resource sciences and engineering; environmental studies; and biological sciences (majors are listed on pages 70-72). The College of Engineering focuses its curricula on the engineering sciences (majors are listed on page 78). 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 87).

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 Admissions 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.

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

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

Scholarship Requirement

If you attain a grade-point average of 3.30 (where the letter grade A = 4, B = 3, and C = 2) in the required "A to F" subjects taken after the ninth grade, you will be eligible to enter the University regardless of your scores on standardized tests. If your grade-point average falls below 3.30 but higher than 2.77, you will be eligible for the University by achieving the specified scores on the standardized tests (see the Eligibility Index on page 50). If you are a nonresident applicant, your grade-point average in the required subjects must be 3.40 or higher.

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

To meet the Subject and Scholarship Requirements you may repeat up to a total of two semester courses in which you received a grade of D or lower. The grades you earn in repeated courses, however, will not be counted higher than a C in determining your scholarship average. If the courses you repeat were taken before the tenth grade, they will be treated as if you were taking them for the first time.

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.

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
### Eligibility Index

<table>
<thead>
<tr>
<th>Grade-Point Averages</th>
<th>ACT Composite Scores</th>
<th>SAT Total Scores</th>
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*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to 36 maximum.

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

A 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 Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, Iowa 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 4894 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 other than the University of California 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 52.

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 50), you may be admitted 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 49).

- 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.

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"I’m a very curious person. All my life I’ve been asking questions and driving everyone crazy. It was really great to come to the University and find out that people not only tolerated my questions, but they expected me to ask questions.”—UCD Grad, former EOP student

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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 non-refundable $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 38). EOP/SAE also provides special assistance in areas pertinent to academic and student life (see page 30).

Academic Reentry Program

The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories who are reentering the University after life and work experience. Preadmission and reentry advising provides assistance in combining past study with current academic and career goals. A reentry student who has not met the entrance requirements but has demonstrated recent academic potential, has special talents, or a disadvantaged educational history may be considered for admission by special action. (See page 31 for more information.)

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 84 quarter units (56 semester units) of transferable work with a grade-point average of 2.8 or higher. Upon successful completion of that work, you may have the requirement for two units of the required high school subjects waived.

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 to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, California.
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 $10,500 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 45). 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 899, 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 32.

Part-Time Status

If you are employed, 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 dean's offices, must be approved by the Dean of your college (certain verifications are required), and then filed with the Registrar's Office no later than the tenth day of instruction in the quarter of enrollment. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Service, as full-time students. For information on fee reductions applicable to part-time students, see page 37.

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 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 100.

For admission to the Graduate School of Administration, see page 111.

For admission to the School of Law, see page 113.

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

For admission to the School of Veterinary Medicine, see page 121.

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 61)

For admitted and non-admitted UCD students:
- University Extension courses (see page 128)
- Summer Sessions courses (see page 127)

For students who have not been admitted to UCD:
- Concurrent courses (see page 128)

Preadmission advising is available to nontraditional students through the Academic Reentry Program (see page 52).
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 64 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 62 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.

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 77.)

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, file, see, 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.

REDIRECTION

If at the end of the first month of the application filing period (see page 45) 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.
WILL 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 329).
• 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 53) enroll for ten units or fewer per quarter; and graduate students with part-time status enroll for one-half course load (see page 102). Employee-students (page 53) may enroll for up to nine units or three courses, whichever is greater, per quarter.

Students should familiarize themselves with the quarterly Minimal-Progress requirements on page 63. Undergraduate students should refer to College sections for quarterly maximum-unit allowances.

Students should also refer to the Advanced Placement chart on page 62 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 adviser’s approval in order to drop courses. 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 (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 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 38. (See below for a planned temporary leave.)

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

Readmission after an Absence

If you are a former UCD 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 1982</td>
<td>August 20, 1982</td>
</tr>
<tr>
<td>Winter 1983</td>
<td>December 10, 1982</td>
</tr>
<tr>
<td>Spring 1983</td>
<td>March 11, 1983</td>
</tr>
<tr>
<td>Fall 1983</td>
<td>August 19, 1983</td>
</tr>
</tbody>
</table>

Graduate students applying for readmission should refer to page 5 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.

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 20).
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 course)
- 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:

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

Grade-Point Average (GPA)

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

A student at Davis is expected to maintain a C (2.0 GPA) or better in all work undertaken in the University. If you fall below a C average, you are considered "schoastically deficient" (see page 63).

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 1/6 of the units completed in residence on the Davis campus. Consequently, at least 6/5 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.

"It's true there's an 'open door' policy here—you just have to be brave enough to knock."

—Sophomore, English

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 adviser. (See page 126 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 page 126 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 but is incomplete for a good cause. 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 P or S grade) before the end of the third succeeding term of the student's academic residence, or the grade will revert to an F (or NP or U). If a student's degree is conferred before the expiration of the time limit for an I-grade conversion, and the 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 63). 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 a 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 grade of C, D, or F 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 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, 4485 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. 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 completed in or part a take-home examination. The writing time of a take-home and an in-class final examination together should not exceed three hours. In each undergraduate 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 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 his or her college by the end of the next regular term for appropriate action.

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 passing 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.
### 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 C 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, Mrk 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>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGLISH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>5, 4, 3</td>
<td>English 1 and 3</td>
<td></td>
<td>English/Humanities Credit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>College of Agricultural &amp; Environmental Sciences:</td>
</tr>
<tr>
<td></td>
<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></td>
<td>College of Engineering:</td>
</tr>
<tr>
<td></td>
<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></td>
<td>College of Letters &amp; Science:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 units Humanities credit. Partially satisfies English Composition requirement (course route option).</td>
</tr>
<tr>
<td><strong>FOREIGN LANGUAGES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>5, 4, 3</td>
<td>French 6</td>
<td>French 30A or any upper-division literature course.</td>
<td>Humanities Credit/Unrestricted Electives: 4 units For each foreign language examination passed.</td>
</tr>
<tr>
<td>German</td>
<td>5, 4, 3</td>
<td>German 4, 6A or 6B</td>
<td>Any upper-division course; German 101 strongly recommended.</td>
<td></td>
</tr>
<tr>
<td>Latin (Vergil)</td>
<td>5, 4, 3</td>
<td>Latin 103</td>
<td>Determined by consultation with Classics adviser.</td>
<td></td>
</tr>
<tr>
<td>(Lyric)</td>
<td>5, 4, 3</td>
<td>Latin 105</td>
<td>Determined by consultation with Classics adviser.</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>5, 4, 3</td>
<td>Spanish 5</td>
<td>Spanish 28.</td>
<td></td>
</tr>
<tr>
<td><strong>HUMANITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art Studio</td>
<td>5</td>
<td>Art 2, 5</td>
<td>Art 3.</td>
<td>Humanities Credit/Unrestricted Electives: 8 units</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Art 2</td>
<td>Art 3 or 4.</td>
<td></td>
</tr>
<tr>
<td>Art History</td>
<td>5, 4</td>
<td>Art 1A, 1B, 1C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Art 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American History</td>
<td>5, 4, 3</td>
<td>History 17A, 17B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>European History</td>
<td>5, 4, 3</td>
<td>History 4B, 4C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>5, 4, 3</td>
<td>Music 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NATURAL SCIENCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>5, 4</td>
<td>Biological Sciences 1 and Botany 2 or Zoology 2-2L</td>
<td>Any appropriate upper-division course in the biological sciences. Bacteriology 2, Botany 2 or Zoology 2-2L.</td>
<td>Natural Sciences Credit/Preparatory Courses for Science Majors: 10 units Student has option of taking Botany 2 or Zoology 2-2L for full credit. In the College of Engineering, 5 units apply toward the &quot;Basic Science and Mathematics&quot; or &quot;Technical electives.&quot;</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Biological Sciences 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>5, 4, 3</td>
<td>Chemistry 1A, 1B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics AB</td>
<td>5, 4, 3</td>
<td>Mathematics 11, 21A</td>
<td>Mathematics 21B.</td>
<td></td>
</tr>
<tr>
<td>BC</td>
<td>5</td>
<td>Mathematics 11, 21A, 21B</td>
<td>Mathematics 21C.</td>
<td></td>
</tr>
<tr>
<td>Physics B</td>
<td>5, 4, 3</td>
<td>Physics 1A, 1B, 10, 2A, 2B, 2C, 2B</td>
<td>Determined by consultation with adviser.</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>Physics 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>5</td>
<td>Physics 1A, 2A or 8A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI</td>
<td>4</td>
<td>Physics 1A or 2A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>5</td>
<td>Physics 1B, 2B, or 8B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>4</td>
<td>Physics 1B or 2B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Note: In the College of Engineering only a score of 5 on the CEEB (CI and CII) Examinations applies toward the physics requirement.</td>
</tr>
</tbody>
</table>

8 units Students who achieve a score of 5 or 4 may, with the instructor’s consent, enroll in Mathematics 21C.

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

10 units No credit for laboratory parts of Physics 4 or 3.

4 units Course equivalents may be used as prerequisites for succeeding courses of same 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.
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 within the University and for the work undertaken in any one term.

A student will be placed on **probation for qualitative reasons** if, at the end of any term, the student's grade-point average (GPA):
- is less than 2.0, but not less than 1.5, for the term
- is less than 2.0 for all courses taken within the University of California.

A student will be subject to **disqualification for qualitative reasons** if, at the end of any term,
- the student's grade-point average (GPA) is less than 1.5 for the term
- the student has attempted more than 16 units graded "I" (Incomplete)
- the student has spent two consecutive 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 125)
- 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 "P" (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 own 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 language is not English can meet the Subject A requirement by passing a special examination in English composition and, if necessary, completing English 25 (English for Foreign Students) with a minimum grade of C.

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 coun-
try’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 20, 116, 130A, 130B, 130C, 155
  - Political Science 1, 5, 5D, 10D, 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 15 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.

“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.” —UCD Alumnus
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 in 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 41).

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 Quarter 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 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 Omega Alpha (Medicine)
- Alpha Zeta (Agriculture)
- Omicron Nu (Home Economics)
- Order of the Coll (Law)
- Phi Beta Kappa (Liberal Arts)
- Phi Kappa Phi
- Phi Zeta (Veterinary Medicine)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Prytanian Society (Women)
- Sigma Xi (Research)
- Tau Beta Pi (Engineering)
College of Agricultural and Environmental Sciences

A student learns to use gel permeation chromatography to separate a substance’s components by molecular weight.
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 farms to the cities. The best uses of land and forest areas, as well as the control 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 Mrak Hall. Teaching excellence depends on constructive help from all students. As full participants in the educational process, students are expected to provide faculty advisors, departmental chairpersons, and the deans with candid appraisals of College programs. The College also uses questionnaires to evaluate the success of its programs and to determine immediate reactions to courses and instructors. You are encouraged to communicate with the College Office at any time, in person or by letter, concerning the impact of College programs on your education or ways in which these programs may be improved. Such information is very important in planning to meet the educational needs of future students.

**PROGRAM PLANNING**

**Your Role**

Although many services are provided to assist in program planning, in the last analysis you are the one who determines which program to pursue. The most crucial decision you make in this process is selecting your educational objectives. These may or may not require enrollment in a university. As part of making this decision, you should investigate the educational opportunities in the College by visiting the campus before applying for admission and talking with the deans, faculty members, and students. If the University is to be a means of reaching a career decision, you should examine its potential for meeting your goals.

Once you decide to enroll in the College and have chosen an educational objective, be it specific or exploratory, the College's advising services can be of assistance. Our advisors know the resources of the College and can help you use them to accomplish specific goals. The advisors can, in fact, be called upon long before you arrive on campus. High school students desiring information about college preparatory programs and college students contemplating transfer are encouraged to seek guidance from our deans and faculty advisors as early as one or two years before coming to the Davis campus. This is best done in person, although information can be provided by letter or phone.

It has been the experience of advisers that much of the inflexibility attributed to College programs exists only in the mind of the student. Recommendations mean to serve as guides are sometimes misunderstood to be hard and fast rules. The phrase "courses normally taken by students" often leads students to believe the courses are specifically required when they are not.

The concept of prerequisite knowledge is particularly misunderstood. Education is a building process. It is difficult or impossible to learn advanced principles without first understanding elementary ones. As a matter of convenience, most students acquire preparatory knowledge through prerequisite courses, but that is not the only route available. If you have acquired the prerequisite knowledge by other means, you need not take the specified prerequisite. Instructors will often indicate
on the basis of informal discussions that you are prepared for advanced study without the need for courses. Courses may also be challenged by examination (see page 61).

Flexibility in planning has also been constrained by the belief that students in one college may not take courses in other colleges. This is not true. Within the boundaries of enrollment limitations and Academic Senate policy — and your ability to acquire useful knowledge as a result of taking a particular course — you may enroll in almost any course listed in this catalog.

College 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 an 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 an adviser with the training and experience required to facilitate your program planning.

The function of 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 an adviser-student relationship can have has long been recognized within the College, and you are strongly urged to consult with your 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 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 Hoagland 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

“This may be the last chance you’ll ever have to experiment where mistakes won’t count against you too much. So take advantage of everything you’ve always wanted to do.” — Junior

Economics

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This student, an Animal Science major, chose a Work-Learn Internship at the University’s Sierra Foothill Range Field Station in Yuba County.
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 276) to introduce students to the University, to aid them in formulating educational objectives, and to help them identify the many educational opportunities at UCD. Although not required, this course is recommended as a useful means for discovering what the Davis campus and the College of Agricultural and Environmental Sciences are all about.

**Expanded Course Descriptions**

Most of the majors available in the College of Agricultural and Environmental Sciences allow for considerable freedom in selecting courses. You may find, however, 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, detailing of 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 resident's 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 work and may offer academic credit or salaries. 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. Students must complete at least 84 units in order to enroll in a 192 course. (See page 127 for details.) A maximum of 12 units of internship courses and a total of 20 units of variable-unit courses (see College requirement on page 74) 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:**

181 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:**

181 Animal Science Building, 752-6118
APPLIED ECONOMIC AND
BEHAVIORAL SCIENCES
Glenn R. Hawkes, 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

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:
119 AOB-4, 752-2244
140 Walker Hall, 752-1165 (Design only)
Temporary Building 99, 752-3625 (Asian American Studies only)
Temporary Building 105, 752-6326 (Environmental Planning and Management only)

Interdisciplinary Major
International Agricultural Development
Advising Center:
139 AOB-4, 752-1804

FOOD, NUTRITION, TEXTILE AND CONSUMER SCIENCES
John R. Whitaker, 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)
3001 Wickson Hall, 752-1909 (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 Center:
109 Everson Hall, 752-2512

Exploratory Program
Exploratory (non-degree program)
Advising Center:
122 Hoagland Hall, 752-0610

INDIVIDUAL MAJOR
College Academic Advising Center:
122 Hoagland Hall, 752-0610, or
College Office, 228 Mrak Hall, 752-0107

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

Majors and Programs in Plant Sciences
Plant Science
Preliminary Science
Range and Wildlife Science
Advising Centers:
132 Hunt Hall, 752-1703
273 Hoagland Hall (Preliminary Science), 752-1511

Major in Pest and Disease Management
Entomology
Advising Center:
265B Briggs Hall, 752-0489

BIOLOGICAL SCIENCES (an Intercollege Division)
Donald L. McLean, Ph.D., Divisional Dean
Division Office, 150 Mrak Hall, 752-0391

Majors in Biological Sciences
Bacteriology
Biochemistry
Biological Sciences
Botany
Genetics
Physiology
Zoology
Advising Centers:
150 Mrak Hall, 752-0410
192 Briggs Hall, 752-0203 (Animal Physiology only)
162 Robbins Annex, 752-1093 (Botany only)
2320 Storer Hall, 752-7468 (Zoology only)

ENVIRONMENTAL STUDIES (an Intercollege Division)
Associate Dean
2126 Wickson Hall, 752-3026
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
212 Environmental Toxicology Building (Environmental Toxicology only)

Major in Agricultural Engineering
(See College of Engineering, page 76.)

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 on page 73.

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 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, Community Health, 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.

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 105.)

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 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 74). 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.

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 within the College, requests for multiple majors are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major (page 72), 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 planned 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 consult 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 103.

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, 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 90 for minors approved by the College of Letters and Science.

Agricultural Entomology (Entomology)
Apiculture (Entomology)
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)
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 minor or more 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 onto 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 64.

**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, or 199
- 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 65).

**Major Requirements:** See requirements under specific majors in the Majors 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 two programs, the Agricultural and Managerial Economics major and the Animal Physiology major, require that certain courses of the major be completed with a C average. You should contact the advisers of these major programs for details.

**Natural Sciences, Social Sciences, and Humanities Requirements (Breadth Requirements):** Since the broadening effect of any particular course is depen-

dent 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 63).

In conjunction with an 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 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 63 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 59 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 adviser before electing to take a course Passed/Not Passed.

Credit by Advanced Placement Examinations

(See page 52.)

Credit in Extension Courses

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

Transfer Students

If you transfer to UCD from another institution, the Admissions Office will determine the unit credit you will be awarded for previous work. The College evaluates the credit awarded by the Admissions Office and determines how many units will be counted as upper-division work. 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 70-72) 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 57 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 Agricultura

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 66.

College Medal

Each year the outstanding graduating senior in the College is awarded a silver medal, known as the “Agricultural and Environmental Sciences Medal.” Scholastic excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient.

Scholarships

To encourage capable young men and women to pursue careers in the agricultural and environmental sciences, many companies and private individuals have established scholarships restricted to students in this college. You are encouraged to apply for these scholarships if you have a high scholastic standing and demonstrate exceptional performance. Certain scholarships also require proof of financial need. Information is available from the Scholarship Office, or from the College Office, 228 Mrak Hall. (See also the Scholarship section, beginning on page 41.)
College of Engineering
Engineering is the profession in which the physical, biological, and social sciences are applied in a practical way for the benefit of mankind. As an engineering student, you will learn to observe and describe problems that deal with human needs and seek useful solutions to these problems. Your skills upon graduation will be useful to you not only as an engineer, but also as a professional in management, sales, operations, manufacturing, and other fields.

Eighteen undergraduate engineering curricula, including five forms of double-major programs, are offered at Davis. These are all four-year programs that lead to the degree of Bachelor of Science in Engineering. Within each curriculum, areas of specialization are available through the selection of suitable technical elective courses. If your specific career objectives are not compatible with the established curricula, an individual engineering major can be proposed.

With the exception of the individual major, the four-year undergraduate program is divided into two parts. The first part (the Lower Division Program) is made up of mathematics, physics, chemistry, humanities and social science courses, and certain introductory engineering courses. The Lower Division Program is essentially the same for all engineering curricula, with the exception of Chemical Engineering and the double major in Chemical Engineering/Materials Science and Engineering. The second part (the Upper Division Program) is made up of elective courses and a group of required technical courses pertinent to your intended major. Most of your senior year is elective, to be divided between technical and non-technical courses. The major programs are outlined on pages 183 through 190.

It takes more than four years of schooling to learn all you need to know about any profession. The objective of the undergraduate programs in engineering, therefore, is to form an appropriate foundation for a lifetime of learning. Extended learning after graduation—on-the-job experience, individual study, extension courses, or formal graduate study—is an essential part of an engineering education. And since practical experience during your undergraduate years is also useful, you are encouraged to participate in engineering internship programs.

For information on graduate programs leading to the Master of Engineering, Doctor of Engineering, Master of Science and Doctor of Philosophy degrees, or Graduate Certificate Programs, see page 83.

A.B.E.T. Accreditation

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

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 48. It is recommended, however, that you take the following subjects (or integrated courses covering substantially equivalent material) during high school:

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Plane geometry</td>
<td>1</td>
</tr>
<tr>
<td>Trigonometry</td>
<td>½</td>
</tr>
<tr>
<td>Analytic geometry</td>
<td>½</td>
</tr>
<tr>
<td>Chemistry and/or physics</td>
<td>1</td>
</tr>
</tbody>
</table>

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.

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 62. 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 (66 semester units), you are classified in lower-division standing, and must complete one of the two 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.

Subject Areas Minimum Quarter Units
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) 27
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) 8
Unspecified subjects (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year) 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 prerequisites to upper-division courses in your curriculum.

The minimum number of required units in the Lower and Upper-Division Programs varies from 180 to 195.

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. Students who enter in advanced standing may be limited in their freedom to change majors within the College after admission.

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 57 for details on filing petitions.

Enrollment in Engineering 17 and 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 enrollment, and new advanced standing transfers are required to do so for the first quarter.

Faculty advising is complemented by a well-developed peer advising system. Student advisers are available at the Student Center in Bainer Hall and at other locations listed in the index under Advising.

CHOOSING A MAJOR

The majors (curricula) in the College of Engineering are:

- Aeronautical Engineering
- Agricultural Engineering
- Agricultural Engineering (Forest Engineering option)
- Chemical Engineering
- Civil Engineering
- Computer Science and Engineering
- Electrical and Computer Engineering (General)
- Electrical and Computer Engineering (Computers)
- Electrical and Computer Engineering (Electronics, Circuits and Signal Processing)
- Electrical and Computer 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 and Computer 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 Baine Hall. (See also page 239.)

Many students who enter the College of Engineering have well-defined career objectives. Others do not. Until you have completed 84 quarter units of college work, you are formally classified as Engineering Lower Division. Your official designation of an engineering curriculum does not take place until the end of your sophomore year. If you are planning to graduate under either the Chemical Engineering or the Chemical Engineering/Materials Science and Engineering curricula, however, you should make that decision during your freshman year and plan your entire program accordingly.

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 183.

The minimum number of required units ranges from 180 to 195, 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 63).

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, Chemistry 1A or 4A, Rhetoric 1 or 3, or humanities-social sciences electives)

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 126.)

Work-Learn Programs: Internship courses numbered 92 and 192 are designed to provide internship experience through the Internship Program (see page 20). 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 beginning of your senior 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 64.

**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 183.

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**

The English Composition requirement may be satisfied in one of two ways:

1. By passing the English Composition Examination administered by the College of Letters and Science. (This examination is taken after completion of 84 quarter units of college work. It should be taken early in the junior year and must be taken prior to the last quarter before graduation.)
2. By completing any section of English 103 with a grade of C – or higher, taken after completion of 84 units of college work.

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 1981-82 academic year, the English Composition Examination will be offered on October 24, January 30, and April 24. Sign-up rosters will be available in 2132 Bainer Hall, Monday through Thursday of the week prior to each examination.

**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:** When a wise decision-maker examines an engineering problem, both scientific and humanistic components need to be considered. The humanities-social sciences electives are emphasized within the engineering disciplines to better prepare you for such decision making. Each engineering program must include at least 24 quarter units from subjects in the areas of humanities and social sciences (23 units required in Chemical Engineering and Chemical Engineering/Materials Science and Engineering majors). A wide latitude is allowed in selecting these units. Subjects that are vocationally oriented, however, such as management and accounting, or which contain a preponderance of scientific or mathematical content, are not considered to be humanities — even though they are offered by a department ordinarily classified as a humanities or social science department.

All undergraduate courses in the following categories, except courses 92, 97T, 98, 99, 192, 197T, 198, 199 and additional exceptions noted in parentheses below, are suitable as humanities-social sciences electives. If you repeat a course which may be repeated for credit, not more than 4 units of that course may be counted toward your humanities-social sciences requirement.

- Afro-American Studies
- Agrarian Studies
- American Studies
- Anthropology
- Applied Behavioral Sciences (except 160B)
- Art (except 2, 3, 4, 5, 11, 16, 101-146)
- Asian American Studies
- Chicano Studies
- Classics
- Comparative Literature
- Dramatic Art (except 25, 30, 124A, 124B, 124C, 124D, 180)
- Economics (except 11A, 11B, 12)
- Education (except 100, 114)
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.

"The most important thing to remember about studying is that to do it well you have to practice. It's a skill, like anything else, and it takes some time to get good at it. NOBODY was born knowing how to do calculus."—Senior, Mathematics

All upper-division courses in engineering, physics, chemistry, statistics (except Statistics 102), and mathematics (except Mathematics 101) are suitable as technical electives. Many upper- and lower-division courses in the agricultural, earth, and life sciences — as well as a few in the humanities — qualify as technical electives.

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.

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 59.)

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 66 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 are available on the campus television network at receiving sites in Livermore, Sacramento, Marysville-Yuba City, and the Diablo Valley. Those interested in TV classes should contact the 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 Room 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 (probation 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.

"An education which emphasizes job skills may prepare you for the quarter of your waking life spent at work, but a liberal arts education prepares you for all of life.”—Dean, Letters and Science

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
- Sends you a Status Card outlining transfer credit information
- Prepares a statement of remaining College requirements, on request, for seniors (Senior Degree Check, page 94)
- 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.

"Nobody can guarantee you a career. But you can make one disastrous mistake right now—you can decide to spend your entire university time getting ready for just your first job. Can you afford to be that sure?"
—Rhetoric professor

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 87).

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 94) 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 94) in order to achieve your goals and to 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.

Major Programs Offered by the College of Letters and Science

Following is a list of the major programs offered by the College of Letters and Science. All but three of the majors lead to a Bachelor of Arts degree. Those which lead to a Bachelor of Science degree are indicated by a footnote symbol (see below). Courses listed in this catalog under American Studies, Astronomy, Chinese, Classics, Education, Integrated Studies, Japanese, Military Science, Oriental Languages and Civilizations, 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
Anthropology
Applied Physics
Art History
Art Studio
Bacteriology
Biochemistry
Biological Sciences
Botany
Chemistry
Classical Civilization
Comparative Literature
Computer Science and Mathematics
Dramatic Art
East Asian Studies
Economics
English
French
Genetics
Geography
Geology
German
Greek
History
International Relations

Italian
Latin
Linguistics
Mathematics
Medieval Studies
Mexican-American (Chicano) Studies
Music
Philosophy
Physical Education
Physics
Physiology
Political Science
Political Science: Public Service
Psychology
Religious Studies
Rhetoric
Russian
Sociology
Spanish
Statistics
Women's Studies
Zoology

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.

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; 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 Mrak 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 Graduate Division. See page 103 for more complete information.

THE MAJOR
There are three types of programs which satisfy requirements for the major: departmental majors, interdepartmental majors, and individual majors.

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.

2. At the time of request, a substantial part of the preparatory subject matter for both majors must have been successfully completed.

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 87), and the same conditions apply.

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.

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 criteria:

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 minors 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 departments and programs that offer a minor list course requirements in the Majors and Courses section of this cata-
log. Following is a list of teaching departments and programs which offer minor programs:

American Studies
Anthropology (Biological Anthropology, General Anthropology, Social-Cultural Anthropology)
Art (Art History, Art Studio)
Biological Sciences
Botany
Classics (Greek, Latin)
Comparative Literature
Dramatic Art
East Asian Studies
Education
English
French
Geography
Geology (Geology, Economic Geology, Engineering Geology, Environmental Geology, Geochemistry, Geomorphology, Geophysics, Oceanography, Paleobiology)
German (German Language, German Literature)
History
Italian
Linguistics
Mathematics (Computer Science and Mathematics, Mathematics)
Mexican-American (Chicano) Studies
Music
Oriental Languages and Civilizations (by arrangement)
Philosophy
Physical Education
Physics (Classical Physics, Quantum Physics, General Physics)
Political Science
Psychology
Religious Studies (Religious Studies, Oriental Religions, Judaism, Christian Studies)
Rhetoric (Communication Skills, Contemporary Communication Studies, Rhetoric, Theory and Criticism)
Russian (Russian Language, Russian Literature)
Sociology (Sociology, Sociology-Social Welfare, Sociology-Law and Society)
Spanish
Statistics

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 73.

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 64.

College Requirements

Unit Requirements. A minimum of 180 units is required for the degree (see page 92 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. A minimum of 12 of the 48 units of upper-division Letters and Science courses must be from outside the major department or program.

English Composition Requirement. The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination (see page 93) 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 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 93 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 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 below.)

**Major Program Requirements.** Requirements for major programs are described in the Majors 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 curriculum committee in the College of Letters and Science (see page 87 for a list of majors) or an individual major program approved by the College's Committee on Individual Majors (see page 88).

**Scholarship Requirements.** For all UCD courses and all UCD upper-division courses required for the major program, the minimum grade-point average is 2.00. See page 65 for University requirements.

**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 65. (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. 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 either 1, 2, 3, 5F, or 5P (or

"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."

—English professor

Comparative Literature 1, 2, or 3). All subsequent courses in English may be counted toward humanities/fine arts.

Foreign language. A.B. degree: all courses in foreign language departments, including literature courses, except the first 6 units of course work (course 1 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.

Philosophy.
Religious Studies.

Rhetoric.
**Social Sciences**

- Afro-American Studies 100, 101B, 107, 110, 120, 121.
- American Studies. (See "Humanities/Fine Arts" above.)
- Anthropology. All courses except 1, 5, 150, 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, 111, 112, 115, 117.
- Linguistics. All courses except 1, 106, 107, 196.
- Political Science.
- Sociology. All courses except 46A, 46B, 106.
- Women's Studies 50.

**Natural Sciences and Mathematics**

- Anthropology 1, 5, 15, 150, 151, 152, 153, 154A, 154B, 155, 156, 157.
- Astronomy.
- Bacteriology. All courses except 101.
- Biochemistry and Biophysics.
- Biological Sciences. All courses except 12, 19.
- Botany.
- Chemistry.
- Entomology 10, 100.
- Genetics.
- Geology.
- Human Anatomy 101.
- Mathematics.
- Physical Education 101, 102, 103, 113.
- Physics.
- Physiology.
- Statistics.
- Zoology.

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**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 56.

**Credit for Courses**

**Advanced Placement Examinations.** For credit allowed on units earned through Advanced Placement Examinations, see page 62.

**Education Abroad Program.** Full University credit may be awarded for courses taken through the Education Abroad Program. See page 20 for further information.

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**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)

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"The system is not inflexible. It's people who make rules and people who change rules, but you've got to question things!"—Junior, Psychology
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. (See under Nonstandard courses below.)
- **Nonstandard courses** (92, 97T, 97TC, 99, 190C, 192, 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 ¼ of UCD units graded “P” taken at student’s option. (Note University limitation page 59.)
- **Physical Education**: 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, French 1, 2, 3, 4, 6) and you have already passed a subsequent course in the sequence (e.g., you want to repeat French 2, but you have already passed French 3), 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 60.)

**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.

## 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 23, 1982
- January 29, 1983
- April 23, 1983

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 of the week prior to each examination date.

The English Composition Examination Form, available at the UCD Bookstore, is required.

## 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.

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.

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 59).

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.

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 63.) 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.

SENIOR DEGREE CHECK
Before the beginning of your senior year, you should take some time out 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.

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 the same class level and college.

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 66.

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.

I think it’s worth it to go out of your way to talk to professors in their offices. They seem to appreciate knowing students as individuals as much as students like to know professors as individuals."—Senior, Economics
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 Health Services, 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.)
- Agricultural Education (M.Ed.)
- 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.)
- Clinical Psychology (Ph.D.)
- 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.)
- 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.)
Graduate Groups

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, write to the chairperson for more information.

Agricultural Education
   Mary C. Regan, Ph.D.
   Applied Behavioral Sciences

Agricultural and Environmental Chemistry
   James N. Seiber, Ph.D.
   Environmental Toxicology

Anatomy
   Ralph L. Kitchell, D.V.M., Ph.D.
   School of Veterinary Medicine

Animal Behavior
   Peter S. Rodman, Ph.D.
   Anthropology

Atmospheric Science
   Roger H. Shaw, Ph.D.
   Land, Air and Water Resources
   Veihmeyer Hall

Avian Sciences
   Ursula K. Abbott, Ph.D.
   Avian Sciences

Biochemistry
   Merna R. Villarejo, Ph.D.
   Biochemistry and Biophysics

Biomedical Engineering
   Stanley A. Brown, D.Eng.
   Orthopaedics Research Laboratory
   School of Medicine

Biophysics
   Ronald J. Baskin, Ph.D.
   Zoology

Botany
   David E. Bayer, Ph.D.
   Veihmeyer Hall

Child Development
   Keith Barton, Ph.D.
   Applied Behavioral Sciences

Clinical Psychology
   Stephen I. Abramowitz, Ph.D.
   UC Davis Medical Center
   4430 V Street
   Sacramento, CA 95817

Community Development
   Refugio I. Rochin, Ph.D.
   Agricultural Economics

Comparative Literature
   Robert M. Torrance, Ph.D.
   French and Italian

Comparative Pathology
   Richard Yamamoto, Ph.D.
   Epidemiology and Preventive Medicine
   School of Veterinary Medicine

Computing Science
   Richard F. Walters, Ph.D.
   Community Health
   School of Medicine

Earth Sciences and Resources
   Kenneth L. Verosub, Ph.D.
   Geology

Ecology
   R. Merton Love, Ph.D.
   Graduate Group in Ecology
   Wickson Hall

Endocrinology
   George H. Stabenfeldt, D.V.M., Ph.D.
   Reproduction
   School of Veterinary Medicine

Engineering
   Zuhair A. Munir, Ph.D.
   Dean's Office
   College of Engineering

Food Science
   Dieter W. Gruenwedel, Ph.D.
   Food Science and Technology

Genetics
   S. Richard Snow, Ph.D.
   Genetics

Horticulture
   George C. Martin, Ph.D.
   Viticulture and Enology
   Environmental Horticulture

Immunology
   Eli Benjamini, Ph.D.
   Medical Microbiology
   School of Medicine

International Agricultural Development
   Donald R. Nielsen, Ph.D.
   Land, Air and Water Resources
   Veihmeyer Hall
Linguistics
   Lenora Timm, Ph.D.
   Linguistics

Microbiology
   David Pratt, Ph.D.
   Bacteriology

Nutrition
   Hubert Heitman, Jr., Ph.D.
   Animal Science

Pharmacology and Toxicology
   Keith F. Killam, Jr., Ph.D.
   Pharmacology
   School of Medicine

Physiology
   Ray E. Burger, Ph.D.
   Animal Physiology

Plant Physiology
   Victor V. Rendig, Ph.D.
   Land, Air and Water Resources
   Hoagland Hall

Plant Protection and Pest Management
   David E. Bayer, Ph.D.
   Botany

Preventive Veterinary Medicine
   Walter W. Sadler, D.V.M., M.P.H.
   Epidemiology and Preventive Medicine

Primary Health Care
   Ferd Mitchell
   Family Practice
   UC Davis Medical Center
   Sacramento, CA 95817

Range Management
   R. Merton Love, Ph.D.
   Agronomy and Range Science

Soil Science
   Lynn D. Whittig, Ph.D.
   Land, Air and Water Resources
   Hoagland Hall

Statistics
   P.K. Bhattacharya, Ph.D.
   Division of Statistics

Textiles
   S. Haig Zeronian, Ph.D.
   Division of Textiles and Clothing

Water Science
   Verne H. Scott, Ph.D.
   Land, Air and Water Resources
   Velhmeier Hall

"Once people learn how hard writing is, it gets easier for them. They stop looking for shortcuts and start revising."—English professor
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 upper-division course work in the applicant's final two years of 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 SHOULD 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 delayed, 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 reinstatement 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; and the minimum score acceptable 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 studying at UC Davis (see page 32 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 UC Davis. 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 scholastic 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 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 to some degree on the student's undergraduate training, and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Announcements 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, 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 37 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 fees and enroll for up to nine units 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 Employee Relations and Development Office. Petitions can be obtained through the employee’s unit.

FELLOWSHIPS, ASSISTANTSHIPS, AND LOANS

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants who plan to enter in a Fall Quarter and wish to be considered for a fellowship or graduate scholarship must file the combined Application for Admission and Fellowship no later than January 15 preceding the Fall Quarter to be attended. These applications are considered only once a year. If you are continuing in graduate status at Davis you must file an application for fellowship and graduate scholarship for continuing students with the chairperson of your graduate program on or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mrak Hall.

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 38).

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 to 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;
- 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 1983-84 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 AOB-IV.

Recent legislation makes the teacher education program also available to upper-division students. With careful planning it is possible for some students to complete requirements for a preliminary credential as undergraduates. This credential allows you to teach for five years while finishing the fifth year of academic work required 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
(C) University of California, Davis 95616
(I) University of California, Irvine 92717
(LA) University of California, Los Angeles 90024
(R) University of California, Riverside 92502
(SD) University of California, San Diego, La Jolla 92093
(SF) University of California, San Francisco 94143
(SB) University of California, Santa Barbara 93106
(SC) University of California, Santa Cruz 95064

Direct inquiries about schools and curricula in San Francisco (except Hastings College of the Law) in care of: Office of Student Admission.

Professional schools and curricula requiring 2 to 3 years of undergraduate preparation:

School of Business Administration (B)
School of Criminology (B)
Curriculum in Cytotechnology (SF)
Curriculum in Dental Hygiene (SF)
Schools of Dentistry (LA, SF)
Curricula in Education (B, D, I, LA, R, SB, SC)
School of Engineering (I)
School of Engineering and Applied Science (LA)
School of Forestry and Conservation (B)
School of Journalism (B)
Curriculum in Medical Illustration (SF)
Curriculum in Medical Technology (SF)
Schools of Medicine (D, I, LA, SD, SF)
Schools of Nursing (LA, SF)
School of Optometry (B)
School of Pharmacy (SF)
Curriculum in Physical Therapy (SF)
Schools of Public Health (LA, B)
School of Veterinary Medicine (D)

Graduate School of Business Administration (B)
Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)

Preparation for education credentials is available as follows:

Kindergarten — Primary (LA, SB)
Elementary Teaching (B, D, I, LA, R, SB, SC)
Bilingual (Spanish) Emphasis — Elementary (D)
Secondary Teaching (B, D, I, LA, R, SB, SC)
Special Education (R)
Junior College Teaching (B, LA, R, SB)
Pupil Personnel Services: Basic (B, SB)
Agricultural Specialist (D)
Bilingual (Spanish) Specialist (D)
Reading Specialist (D)
School Librarianship (B, LA)
School Psychology (B, D, SB)
Special Services (LA, SB)
Supervision (B, LA)
Administration (B, D, 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 second class in the fall of 1982, offers a two-year program of study in management and policy analysis leading to the Master of Administration degree. (See page 111 for details.)

"Make your own decision on what kind of education you want. Don't feel you have to do what everyone else is doing."—Senior, Mathematics

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 72, 185, 295) 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 legal careers should consult the Pre-Law Adviser, Pre-Law Advising Office, 109 South Hall, 752-3009. Information is available about law school admission procedures, academic program planning (see also page 30), and career possibilities.

School of Law, UC Davis: Consult this catalog (page 113), the Announcement of the School of Law, or the Law School Admissions Office, 115 King Hall, 752-6477.

HEALTH SCIENCES
At the Davis campus preparatory work only 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, work experience in health care, and 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 projected date of admission. Check individual catalogs for exact prerequisites.

Biological sciences (at least one year with laboratory), Biological Sciences 1; Zoology 2-2L; Physiology 110-110L; Zoology 100-100L; Biochemistry 101A-101B.

Chemistry 1A-1B-1C, and 8 to 12 units of organic chemistry with laboratory (e.g., courses 8A-8B, 128A-129A, or for some schools, courses 128A-128B-128C and 129A-129B-129C may be required). 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, 3A-3B-3C.

Psychology: two courses. Recommended: Psychology 1, 16, 112, 145, or 168.

Suggested electives: Statistics 13 or Agricultural Economics 112; Mathematics 16A-16B-16C; Genetics 100A-100B or 116; sculpture course, art practice (Art 11).

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 18, 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 171C, 174A-174B, 165B).
Statistics 3 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 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-128A-129A 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).
Recommended: one year of calculus (e.g., Mathematics 16A-16B-16C).

**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 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 3; 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 (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, 115, 125, 131; Behavioral Biology 451, 468; Family Practice 92A-H, 192K, 406A, 406B, 406C; 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, biochemistry, 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. USC requires its own examination. 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.
- Economics: one macroeconomics course (Economics 1B). A few schools require Economics 1A-1B.
- English, one year: one each of composition, literature and one other.
- 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, 3.
- Human Anatomy 101, 101L.
- Physics 2A, 3A. Many schools require also Physics 2B, 2C, 3B, 3C.
- Physiology 2-2L or 110-110L (110-110L strongly recommended).
- Psychology 1 and 168.
- 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 127; 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 117 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 121, 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.
- 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, with 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 non-profit enterprise. The School combines the principal components of leading graduate programs of management and 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 graduate program seeks to provide both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made.

The program has a first-year core which emphasizes concepts and techniques appropriate to management in either the public or private sector so that students, no matter what their special career interests, are prepared to function in either sphere. Courses in the core cover economic analysis, policy analysis, quantitative methods, accounting, budget and control, marketing and finance, organizational theory, and behavior and law. During the second year, students specialize in one of several concentrations including General Management, Management Science, Agricultural Management, Finance and Accounting, and Environmental and Natural Resources Management, each with an emphasis in either the public or private sector. A joint degree in Engineering Management is also offered.

An internship during the summer after the first year and a problem-oriented second-year seminar give the student contact with real management problems in which concepts and methods learned in the first year can be applied.
The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. The fall of 1982 will see the School enroll its seventeenth 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, and 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 30 and 106).

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 Council, 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 pro-
gram 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 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 115), 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 admitted to advanced standing with credit for not more than one year of such work. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

Application procedures for advanced standing are the same as described above with the addition of (1) a letter of good standing including class rank from the dean of any law school previously attended; (2) at least one letter of recommendation from a law professor; (3) transcripts of all law school work; (4) LSAT score (no need to register with LSDAS — a copy of the report previously submitted to the school you are presently attending will suffice); and (5) an official transcript from the school where you earned your undergraduate degree, stating the date the degree was conferred. The deadline for transfer applications is June 30 of the year for which transfer is sought. Committee decisions on advanced standing are normally made in late July or early August of the year in which admission is sought.

Students who have been disqualified at another law school will not be admitted to this school.

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, Chicoano, 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 16th Street N.W., Suite 940, Washington, D.C. 20006.

Applications for the special summer program for Native American students may be obtained from the School of Law, University of New Mexico, 1117 Stanford Drive N.E., Albuquerque, N.M. 87106.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Chicano students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 28 Geary Street, 6th Floor, San Francisco, CA 94108.
PROFESSIONAL CURRICULUM AND DEGREE

The course of study in the professional curriculum requires six semesters for completion and extends over a period of three years. It is designed for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the Fall Semester.

When you satisfactorily complete the professional curriculum of 84 semester units, and the required period of resident 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 8 semester-hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than it would take to earn the two degrees separately. The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the law school and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with the UC Berkeley School of Business for the M.B.A. degree, and with UCD departments for the M.A. degree in economics and sociology. 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 1982-83

<table>
<thead>
<tr>
<th></th>
<th>Fall 1982</th>
<th>Spring 1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Introductory Program begins</td>
<td>Sun, Aug 15</td>
<td></td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 23</td>
<td>Mon, Jan 10</td>
</tr>
<tr>
<td>Labor Day holiday*</td>
<td>Mon, Sept 6</td>
<td></td>
</tr>
<tr>
<td>Thanksgiving holiday period*</td>
<td>Thurs-Fri, Nov 25-26</td>
<td></td>
</tr>
<tr>
<td>President's holiday*</td>
<td>Mon, Feb 21</td>
<td></td>
</tr>
<tr>
<td>Spring vacation period</td>
<td>Mon-Fri, Mar 21-25</td>
<td>Fri, Apr 29</td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, Dec 3</td>
<td>Fri, Apr 29</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Wed, Dec 4-8</td>
<td>Sat-Wed, Apr 30-May 4</td>
</tr>
<tr>
<td>Law school examination period</td>
<td>Thurs-Thurs, Dec 9-23</td>
<td>Thrus-Fri, May 5-20</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Thurs, Dec 23</td>
<td>Fri, May 20</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td></td>
<td>Sat, May 21</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-1 (MS-1) 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 1982 will be limited to 100 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 with an eye to meeting the needs of society, 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 underrepre-
sented 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 and a nonrefundable 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-December and as late as September.

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- 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, one year or the equivalent

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). In calculating grade-point averages, such courses as physical education, military science, and courses taken for graduate degrees will be excluded. 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 UC Davis 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 1982-83

The School of Medicine operates on a different schedule from the remainder of the campus.

#### Summer Quarter 1982
- **Medical School instruction begins** for 3rd- and 4th-year students
  - Mon, June 28
- Independence Day (academic and administrative holiday)
  - Mon, July 5
- **Medical School instruction begins** for 2nd-year students
  - Mon, Aug 2
- Labor Day (academic and administrative holiday)
  - Mon, Sept 6
- **Quarter ends** for 3rd- and 4th-year students
  - Fri, Sept 17
- **Quarter ends** for 2nd-year students
  - Thurs, Sept 16

#### Winter Quarter 1983
- **Medical School instruction begins**
  - Mon, Jan 3
- President's holiday (academic and administrative)
  - Mon, Feb 21
- **Quarter ends** for 1st- and 2nd-year students
  - Mon, Mar 21
- **Quarter ends** for 3rd-year students
  - Fri, Mar 25
- Spring holiday (academic and administrative)
  - Mon, Mar 28

#### Fall Quarter 1982
- Orientation for incoming class
  - Wed-Fri, Sept 22-24
- **Medical School instruction begins**
  - Mon, Sept 27
- Thanksgiving holiday (academic and administrative)
  - Thurs-Fri, Nov 25-26
- **Quarter ends** for 1st- and 2nd-year students
  - Tues, Dec 14
- **Quarter ends** for 3rd- and 4th-year students
  - Fri, Dec 17
- Christmas holiday (academic and administrative)
  - Thurs-Fri, Dec 23-24
- New Year's holiday (academic and administrative)
  - Thurs-Fri, Dec 30-31

#### Winter Quarter 1983
- **Quarter ends** for 2nd-year students
  - Fri, May 27
- Memorial Day holiday (academic and administrative)
  - Mon, May 30
- **Quarter ends** for 4th-year students
  - Fri, June 3
- Commencement
  - Fri, June 3
- **Quarter ends** for 1st-year students
  - Tues, June 14
- **Quarter ends** for 3rd-year students
  - Fri, June 24

#### Spring Quarter 1983
School of Veterinary Medicine
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 curricu- lum. 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.

### Subject Requirements

<table>
<thead>
<tr>
<th>Subject</th>
<th>Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science courses</td>
<td>58</td>
</tr>
<tr>
<td>Chemistry (general, qualitative, organic, and biochemistry)</td>
<td>24</td>
</tr>
<tr>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>Physics (general)</td>
<td>9</td>
</tr>
<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>
</tr>
<tr>
<td>Statistics</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>70</strong></td>
</tr>
</tbody>
</table>

Following is a list of courses taught on the UC Davis campus which fulfill the preceding subject requirements.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1</td>
<td>(5)</td>
</tr>
<tr>
<td>Physiological Sciences 101A or Physical Chemistry 101A</td>
<td>(4, 3)</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C, 8A, 8B</td>
<td>(5, 5, 5, 3, 3)</td>
</tr>
<tr>
<td>English 1 and additional English or rhetoric</td>
<td>(4, 8)</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 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.
In view of the demand from California residents for admission to the School of Veterinary Medicine — each year there are 5 to 6 applications from Californians for each of the 128 first-year openings — and since it is virtually impossible for a California resident to gain admission to a veterinary school elsewhere, it is the stated policy of the University that with only rare exceptions admission to the School is limited to California residents. The criteria for determining residency are explained on page 320. Specific questions should be addressed to the Legal Analyst — Residence Matters, 590 University Hall, University of California, Berkeley, CA 94720. No other persons are qualified to give rulings on residency. In cases where exceptions are made, first preference is given to residents of states participating in the Western Interstate Commission for Higher Education (WICHE). For this reason, an application form will be available only to California residents and individuals from WICHE states. Students residing in WICHE states that do not have a school of veterinary medicine and who wish to participate in this program 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 64), 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 must hold the Doctor of Veterinary Medicine degree or equivalent degree from an accredited school of veterinary medicine, and be recommended for admission by the faculty committee in charge of the program. Candidates for the degree must satisfactorily complete in residence a minimum of 50 quarter units of approved course work plus an epidemiological research problem for which an additional 10 units are credited. The program, consisting of a group of required core courses and electives, may be completed in a 12-month period beginning in August. Some students, however, prefer the more flexible program possibilities allowing for in-depth elective course-work sequences afforded by extending the requirements over a two-year period. In either case a cycle of August-to-June sequence of courses must be completed.

Specific fields of emphasis are epidemiology, medical statistics, and disease control and eradication. Program options are available for specialization in food hygiene, avian medical practice, and in other areas of preventive veterinary medicine. The program commences with five weeks of instruction in Elementary Statistics prior to the beginning of the Fall Quarter, and is completed after a 10-week period of research and field studies subsequent to the completion of the Spring Quarter.

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.
Majors 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 1982 would be an even-numbered year and Winter and Spring Quarters 1983 would be odd-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.

Top line:  
course number;  
title;  
units;  
quarters offered;  
instructor(s) ........  
1. Physical Education for Men and Women (1) I, II, III. The Staff (Chairperson in charge)

Paragraph following:  
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 a) intercollegiate athletics. May be repeated for a total of 6 units. (PINP grading only.)

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.

"You have to be creative and willing to experiment to succeed."—Freshman, Biochemistry
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.

- **99 (Special Study for Undergraduates)** is a course arranged for an individual student who shares with an instructor an academic interest which cannot be accommodated within the formal course structure.

Autotutorial Courses are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 1ATA-1ATB-1ATC, 31ATA, 31ATB.

"It's not easy to sit back from the grind of daily assignments and classes and reflect on what you're learning. But if you don’t, nothing ever fits together and you have bits and pieces of ideas and nothing meaningful."—Senior, History

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 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.

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.

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

Information:
752-2231

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 undertake during an independent study quarter. Regularly offered formal courses will therefore only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is definitely not to be considered as merely a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:
1. Develop, in general terms, a plan of study;
2. Locate a faculty sponsor or panel of sponsors, and with their help and approval develop a detailed plan;
3. Complete a project proposal form (obtained from the dean of your college) and submit it to your dean's office where it will be forwarded to the Committee on Courses of Instruction.

Deadlines will be about two weeks prior to the final enrollment date in the quarter preceding the proposed independent study quarter (see the Calendar on page 4).

You must report the completion or termination of the project to the Committee on Courses of Instruction, which may request additional materials if they were provided for in the project proposal.

For further information contact the chairperson of the Committee on Courses of Instruction, c/o Academic Senate Office, in person or by phone.

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 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 92 and/or 192 courses 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.
Majors and 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 20 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 47 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. (See also page 19.)

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.

KEY TO FOOTNOTE SYMBOLS

The following symbols are used throughout the Majors and Courses section to indicate:

* Not to be given 1982-83
† Approved for graduate degree credit

1 Absent on leave, 1982-83
2 Absent on leave, Fall Quarter 1982 (Semester, for Law School)
3 Absent on leave, Winter Quarter 1983
4 Absent on leave, Spring Quarter 1983 (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
(752-7382/7363)

Faculty
Mitchel Y. Abolafia, Ph.D., Assistant Professor
Gordon S. Bektch, Ph.D., Visiting Professor
Nicole W. Biggart, Ph.D., Assistant Professor
Paul A. Griffin, Ph.D., Associate Professor
Chester Q. Corrigan, Jr., Ph.D., Professor
Richard C. Dorf, Ph.D., Professor
(Administration, Electrical and Computer Engineering)
George W. Downs, Jr., Ph.D., Associate Professor
Peter H. Farquhar, Ph.D., Associate Professor
(Victor P. Goldberg, Ph.D., Professor Economics)
Paul A. Griffin, Ph.D., Associate Professor
Chester O. Corrigan, Jr., Ph.D., Professor
Dale Rogers Marshall, Ph.D., Professor (Political Science)
David M. Rocke, Ph.D., Acting Associate Professor
Paul A. Sabatier, Ph.D., Associate Professor
Arthur M. Sullivan, Ph.D., Associate Professor
(Seymour I. Schwartz, Ph.D., Associate Professor (Environmental Studies)
Jerome J. Suran, B.S., Ph.D. (hor.)
(Administration, Electrical and Computer Engineering)

Courses in Administration
Graduate Courses

201. Accounting, Budgeting and Control (3.0) I, II, Griffin Lecture—3 hours. Prerequisite: graduate student standing in introduction to basic principles of accounting, budgeting and control. Basic accounting, financial reporting, cost accounting, planning and budget formulation, management accounting techniques, operational control and auditing strategies in financial reporting, and management information systems.

202. Organizational Decisionmaking (3.0) I Abbot Lecture—3 hours. Prerequisite: graduate student standing. Applicability of organizational theories and models to decision making in complex organizations, public and private. Organizational control structures and patterns of development and change are considered as are organizational responses to environments and market structures and role of the executive. Case studies.

203. Comparing Public and Private Management (3.0) I, II, Biggart Lecture—3 hours. Prerequisite: graduate student standing. Comparison of public and private management in terms of organizational environments, interaction and external control. Attention given to similarities and differences between different types of organizations and the interaction among them in a regulated market.


205A. Quantitative Analysis (3.0) I, III Rocke Lecture—3 hours. Prerequisite: introductory knowledge of statistics strongly recommended. Designed to give understanding of statistical techniques in decision making and develop skills sufficient to allow application of these tools to problems encountered in both public and private sectors. Emphasis on inter, programming and optimization, and simulation.

205C. Quantitative Analysis (3.0) III, IV Rocke, Dorf Lecture—3 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. Forecasting and management information systems.

206. Policy Analysis (3.0) III The Staff Lecture—3 hours. Prerequisite: graduate student standing. Comparison of techniques for planning, implementation, and evaluation in public and private sectors. Includes cost benefit analysis, project feasibility, and economic, social, and political policies. Product development issues include market planning, demand analysis, and production planning. Case studies.

207. Finance: Public and Private (3.0) III The Staff Lecture—3 hours. Prerequisite: graduate student standing. Comprehensive overview of financial issues in public and private management, sources and means of acquiring funds, implication of taxation for productivity, investment and income distribution, interactions in capital and securities markets, impact on interest rate and capital availability.

208. Marketing Management (3.0) I, II Rocke Lecture—3 hours. Competency in Administration core requirements or by petition with consent of instructor. Analysis of marketing strategies from the viewpoint of managers with emphasis on penetration, differentiation, and monopolistic applications. Includes consumer behavior, competitive strategy, market structure, government restraints, pricing strategy, production and distribution channels, advertising, promotion, planning.

209. Program Evaluation (3.0) III The Staff Lecture—3 hours. Prerequisite: graduate student standing. Focuses on questions of procedures for assessing efficiency and effectiveness of programs and policies. Statistic topics include experimental design, randomization, time series, regression modeling design. Advantages and limitations of various kinds of evaluation designs explored in depth.

210. Law and Legal Process (3.0) III The Staff Lecture—3 hours. Prerequisite: graduate student standing. Introduction to legal process in the United States: Sources of law, structure and operation of courts, federal-state relationships; functions of administrative law, fundamentals of business law.

217. Organizations, Environments, and Policy (3.0) Abbot Lecture—3 hours. Prerequisite: completion of Administration core requirements or consent of instructor. Focuses on the relationship between organizations and their environments — how organizations influence their environments and how interactions between organizations. Includes techniques for the analysis of interaction between markets, firms, and agencies; influence on business and government relationships.

220. Public Budgeting and Finance (4.0) Sullivan Lecture—3 hours: discussion—1 hour. Prerequisite: graduate student standing. Fiscal role of government in a mixed economy and democratic society; the politics and economics of taxation and resource allocation; Intergovernmental financial relations; planning and budget formulation, adoption, and execution; examination of models of budgeting; various budget uses; evaluation and audit.

224. Human Resources Management (3.0) Biggart Lecture—3 hours. Prerequisite: completion of Administration core requirements or consent of instructor. Problems of recruiting, training, motivating, compensating, and separating workers in contemporary organizations. Topics include recruitment, hiring, career management, professionalization, alienation, worker burnout, organizational deviance, and current issues such as affirmative action and public employments.

229. Labor Relations (3.0) I II, III, IV The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Course deals with labor organization, employment relations, employment contracts, and litigation. Worker and management rights, and collective bargaining in the public and private sectors will be explored.

228. Private and Public Sector Productivity Analysis (3.0) I, II The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Sources of productivity advance and the effects of productivity gains on prices or costs in different sectors, market settings, and organizations. Emphasis on improving productivity, methods of improving productivity, and implementing innovations in the private and public sectors are analyzed.

230. Regulation (3.0) I, II The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Role of urban administrator in policy formulation, implementation, and evaluation. Regulation of land use management at county and city level—interest groups, parties, elected officials, bureaucracies, other levels of government, and the delivery of services.

231. Intergovernmental Systems and Administration (3.0) III, Marshall Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Intergovernmental dimensions of public management, particularly how policies of the federal and state governments shape administrators' actions at other levels of government. Attention given to grants and contracts, regulations, fiscal decentralization, technical assistance, and to various substantive policy areas.

232. Urban Policy and Planning (3.0) Sullivan Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Analysis of public policy in an urban setting, focusing on the efficiency effects of such policies. Topics include urban spatial structure, growth-management policies, land use planning, transportation, environmental quality, local government finance, and urban planning.

233. Regulation and Policy in Agriculture (3.0) I, II The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Implications for management of regulation and public policy on agricultural production, production processing and marketing; influences on management strategy, organization, business practices, and resource productivity, trends in regulation and policy and their potential for management strategies are explored.

240. Management Policy (3.0) I, II, III, IV Suran Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. General management overview of the process of choosing and defining purposes and objectives, formulating and implementing management strategy, and management performance and results. Kinds of problems and issues that affect the success of the entire organization are highlighted.

241. Managerial Decision Making (3.0) I, II Farquhar Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Develops analytical skills for evaluating decisions and solving problems in various managerial and managerial decision making on problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

242. Competitive Analysis (3.0) I, II Farquhar Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Applies quantitative and behavioral analysis to decision problems involving competition: Problem areas include competitive analysis of pricing, bidding, and bargaining. Course considers aspects of negotiations in labor relations, arbitration, mergers, and regulation.

243. Risk Management (3.0) I, II, III, IV Farquhar Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Analyzes managerial problems in which uncertainty and risk are crucial elements in decision making. Problem areas include occupational safety, insurance, financial investments, hedging, and new ventures. Course develops a unified framework for analyzing risk in decision making.

244. New and Small Business Venture (3.0) I, III, IV Dorf Lecture—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, ongoing business during its formative stages. The small business team. Legal formation, management, and the management team. The entrepreneur. Students develop a detailed business plan.

245. Marketing Strategies (3.0) I, III The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor.
tor. Examines processes by which organizations develop strategies and plans and includes definition of new activities and products; marketing, marketing strategies, and marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning. Applications to problems in public and private sector marketing.

248. Marketing Research (3) III. Becthel Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.

250. Technology Management (3) I, II. Lec., Lab. Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Management of the engineering and technology activity. Focus is on planning, development, and production of new technology. Course covers economics, sales, and marketing, and the development of new technology products.


252. Production and Operations Management (3) II. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Explains methods of increasing operational efficiency in production and service organizations through planning, scheduling, and supervision. Materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as computer simulation, systems analysis, queuing, and network models.

253. Financial Management (3) II. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on planning, acquiring, and managing a company's financial resources. Includes allocation of financial assets to mergers and other forms of reorganization; analysis of investment, financial, and dividend policy. Theories of optimal capital structure.

254. Investment Analysis (3) II. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Examines modern asset pricing theory and the implications of that theory for the analysis and management of stock, bonds, and other financial securities. Factors influencing the value of stocks, bonds, options, warrants, and other securities are considered from the perspective of a portfolio fund manager.

255. Money and Security Markets (3) I. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Examines the factors affecting demand for money, influence of money on the price level, relationship between money and the price level, and money as a financial intermediary. Course covers the role of the Federal Reserve System and monetary and fiscal policy and their impact on the economy.

256. Options and Futures Markets (3) II. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Focuses on the operation of options and futures markets. Studies nature of various speculations (e.g., speculation involving risk, option, commodity, and futures contracts), price determination in options and futures markets, and futures trading.

257. Corporate Financial Reporting (3) I. Griffin Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Analysis of the impact of business taxation on investment decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.

258. Corporate Accounting (3) III. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Course analyzes contemporary issues in financial reporting. Applications to problems of business decision makers, investment managers, and accounting policy makers.

271. Accounting and Budgeting for Management Control (3) I. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Examination of concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

272. Evaluation of Financial Information (3) III. Griffin Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Studies how financial accounting and other information in making rational investment, lending, and purchasing decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed.

273. Auditing, Internal Control and Public Accounting (3) III. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Concentrates on role of the independent public accountant 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.

270. Information Systems and Management (3) I. Shanno Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Explains the information systems in managerial decision-making and the organizational issues in implementation and usage of management information systems. Computer technology for management information systems, information systems analysis and design, and management of information systems.

271. Decision Support Systems (3) III. Shanno Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Considers the design and use of computer systems in assisting managers in their decision making for unstructured tasks. Emphasizes general purpose time-sharing systems, graphics, telecommunication, data base management, applications of management decisions, support systems, and case studies.

272. Simulation and Systems Analysis (3) II. The Staff Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Applications of computer models for studying the simulated behavior of systems of interrelated elements. Covers deterministic and stochastic simulation methods, model design, output analysis, and related topics. Applications are made to management decision problems.

273. Optimization Theory and Applications (3) I. Shanno Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Introduces advanced optimization theory. Examines linear, nonlinear, discrete, and dynamic programming; optimality conditions; network models; and large-scale systems, and computer implementation. Applications are made to problems in private and public management.

274. Applied Linear Models for Management (3) I. Becthel Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Covers regression, analysis of variance, and multivariate analysis. Topics focus on applications to management and policy problems.

275. Time Series Analysis and Forecasting (3) III. Rocke Lecture—3 hours. Prerequisite: completion of Administration core requirements or by petition with consent of instructor. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control.

290A-290B. Seminar in Administration: Research and Practice (4-4) I, II. Seminar—4 hours. Prerequisite: completion or completion of fourteen courses toward degree in School of Administration. Prerequisite: completion of previous course with previous course work to the solution of a practical managerial problem. (Deferred grading, pending completion of course sequence.)

290C. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. Special topics in administration.

299A. Individual Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. Research projects in administration. (SU grading only.)
Agrarian Studies

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 activities, you may apply for admission to graduate study or a professional school.

Agrarian Studies

B.S. Major Requirements:

Social Sciences and Humanities (UNITS)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written and oral expression (College requirement</td>
<td>4</td>
</tr>
<tr>
<td>Natural science</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry (Chemistry 1A, 1B, 2A, 2B)</td>
<td>16</td>
</tr>
<tr>
<td>Biochemistry (Biochemistry 101A, 101B)</td>
<td>6</td>
</tr>
<tr>
<td>and upper division plant or animal physiology</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (Mathematics 16A plus either</td>
<td>7-10</td>
</tr>
<tr>
<td>Mathematics 16B, 19, Agricultural Science</td>
<td>4</td>
</tr>
<tr>
<td>and Management</td>
<td>6</td>
</tr>
<tr>
<td>Engineering 5, or Statistics (3)</td>
<td>6</td>
</tr>
<tr>
<td>Soil science (Soil Science 102)</td>
<td>4</td>
</tr>
<tr>
<td>Ecology (Plant Science 101 or Environmental</td>
<td>4</td>
</tr>
<tr>
<td>Studies 100)</td>
<td>4</td>
</tr>
<tr>
<td>Biological sciences (Biological Sciences 1</td>
<td>4</td>
</tr>
<tr>
<td>plus Botany 2 or Zoology 2)</td>
<td>9-10</td>
</tr>
<tr>
<td>Restricted electives</td>
<td>12-13</td>
</tr>
<tr>
<td>Advanced courses in consultation with advisement</td>
<td>6</td>
</tr>
<tr>
<td>as listed above for their major.</td>
<td></td>
</tr>
</tbody>
</table>

Additional requirements for this major include the following:

1. At least 24 units of upper-division coursework.
2. A minimum grade point average of 2.0 in all courses applied to the major.
3. Completion of a senior thesis or project described in the Ginsberg and Ziskin 100-101 course.
4. Participation in a community-based service Learning Community program.

Agrarian Studies Emphasis

Perspectives on agriculture (Agrarian Studies 210)

Functional Foods and Nutraceuticals (Agrarian Studies 216)

Agrarian Thematics in Literature (English 174)

Examples of typical programs in Agrarian Studies with suggested courses in the major may be obtained from the advisor through the College Office.

Proficiency in a foreign language is encouraged. Upon graduation a general education and specific skills are necessary for understanding of various aspects of agriculture. Students specializing in the agricultural sciences are encouraged to choose French, German, Japanese, or Russian; those interested in agricultural history could choose Greek or Latin; students preparing for international studies or "agrobusiness" would have obvious choices based on geographical interests.
Courses in Agrarian Studies Questions pertaining to the following courses should be directed to the instructor or to the Pomology Department, 1335 Wickersham Hall.

Lower Division Course

20. Perspective on Agriculture (S) II. Romani (Pomology)
Lecture—2 hours; discussion—1 hour, one 4-hour field trip; one 2-hour evening session. Introduction to agrarian studies. Presenting agriculture's vital role in past and current civilizations. A review of important relationships between agriculture and the natural and social sciences.

Upper Division Course

188. Special Topics in Agrarian Studies (1) II. Romani (Pomology)
Discussion—1 hour. Prerequisite: course 2 or consent of instructor. Open to lower division students. Group study of special topics on the relationships between agriculture and the arts and sciences. May be repeated for credit.

Agricultural and Home Economics Education (College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Applied Behavioral Sciences.

Major Programs and Graduate Study. See majors in Home Economics (page 237) and Agricultural Education (page 135); and page 97 for graduate study.

Teaching Credential Subject Representative. Secondary Teaching Credentials—J. G. Lester, 137 AOB-4 (Agriculture); B. G. Goldman, 149 AOB-4 (Home Economics). Community College Credentials—J. G. Lester, 137 AOB-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, 119 AOB-4.

Lower Division Course

92. Internship (1-12) II, III. The Staff (Leasing 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. (PnP grading only.)

Upper Division Courses

100. Concepts in Education (2) II, III. Goldman, Leasing Lecture—2 hours; field observations. Prerequisite: upper division students. Examination of educational institutions. Implications for those writing careers in teaching. (Sect. 1, Agriculture, Sect. 2, Home Economics.)

100. Vocational Education (3) II. Leasing Lecture—3 hours. Philosophy and organization of vocational education with particular reference to educational principles for agriculture, commerce, home economics and industry.


Agricultural and Environmental Chemistry (A Graduate Group)

James N. Seiber, Ph.D., Chairperson of the Group

Group Office, 111 Environmental Toxicology Building (752-1142)

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; Viticulture and Enology 219.

Courses in Agricultural Chemistry

Graduate Courses

200. Seminar (1) I, II, III. The Staff (Seiber in charge) Seminar—1 hour. Selected topics in Agricultural Chemistry, presented by students. (SU grading only.)

208. Group Study (1-5) I, II, III. The Staff (Seiber in charge) Prerequisite: consent of instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural chemistry.

209. Research (1-2) I, II, III, summer. The Staff (Seiber in charge) Arrangements should be made well in advance with a member of the Group in Agricultural and Environmental Chemistry. (SU grading only.)

171. Audio Visual Communications (2) II, III. The Staff Discussion—1 hour; laboratory—3 hours. Concepts and principles of audio-visual communications related to education. (PnP grading only.)

172. Multi-media Productions (3) III. Pernar 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) III. The Staff (Goldman in charge) Lecture—3 hours. Prerequisites: Consumer Economics 141 or 142 or Consumer Science 106. Examination of values, decision-making processes, lifestyle needs of individuals and communities as a basis for teaching of consumer education in various subject areas at all age levels. Offered in odd-numbered years.

182. Internship (1-12) I, II, III. The Staff (Leasing 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. (PnP grading only.)

186. Directed Group Study (1-5) I, II, III. The Staff (Thompson in charge) (PnP grading only.)

196. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Thompson in charge) (PnP grading only.)

Professional Courses

300. Directed Field Experience in Teaching (2) II, III. Goldman, Leasing Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. (Sect. 1, Agriculture, Sect. 2, Home Economics.) (PnP grading only.)

301. Planning for Instructional Programs (3) II, Goldman, III, Leasing 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. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

302. Teaching Methods in Education (2-3) III. Goldman, Leasing 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 aids. (Sect. 1, Agriculture—2 units. Sect. 2, Home Economics—2-3 units.)

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) II, III, Leasing Lecture-discussion—2 hours; field work—4 hours. Prerequisite: acceptance into the Teacher Education Program: course 306B (concurrently). Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

306B. Field Experience in Teaching Vocational Agriculture (5-18) I, II, III. Leasing Student teaching (corresponds with public school session). Prerequisite: acceptance into the Teacher Education Program: course 306A (concurrently); courses 100, 300, 301, 302. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges.

307. Teaching in Secondary Schools (5-18) I, II, III. Goldman Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program: courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. ( Deferred grading only; pending completion of course.)

323. Resource Development: Agricultural Education (3) II, Leasing Lecture—5 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.
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 professional, essentially prepared 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.

The Managerial Economics option, while considering the theoretical, deals more with the practical managerial problems. Emphasis is on the decision-making function of management, use of scientific management controls and organization, personnel policies, and procurement and marketing methods.

Both options prepare graduates for professional management positions in financial and research institutions not necessarily limited to agriculture.

Agricultural and Managerial Economics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Minimum Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>32</td>
</tr>
<tr>
<td>English (required, see College requirement, page 74)</td>
<td>8</td>
</tr>
<tr>
<td>American History and Institutions</td>
<td>8</td>
</tr>
<tr>
<td>Economics</td>
<td>18</td>
</tr>
<tr>
<td>Accounting (Economics 11A-11B)</td>
<td>10</td>
</tr>
<tr>
<td>Statistics (Statistics 102)</td>
<td>7</td>
</tr>
<tr>
<td>Mathematics, including calculus</td>
<td>6</td>
</tr>
</tbody>
</table>

Depth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro theory, Agricultural Economics 100B</td>
<td>10</td>
</tr>
<tr>
<td>Micro methods, Agricultural Economics 106</td>
<td>15</td>
</tr>
<tr>
<td>Macro theory, Economics 101 or 135</td>
<td>5</td>
</tr>
<tr>
<td>One of two options</td>
<td></td>
</tr>
<tr>
<td>(a) Agricultural economics (preprofessional)</td>
<td>28</td>
</tr>
<tr>
<td>Mathematics 168</td>
<td>16</td>
</tr>
<tr>
<td>Economics 198</td>
<td>16</td>
</tr>
<tr>
<td>Additional upper division agricultural economics and economics</td>
<td>2</td>
</tr>
<tr>
<td>(b) Managerial economics</td>
<td>32</td>
</tr>
<tr>
<td>Agricultural Economics 18</td>
<td>8</td>
</tr>
</tbody>
</table>

Breadth Subject Matter

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural and environmental sciences (excluding agricultural economics, consumer economics, and related behavioral sciences)</td>
<td>32</td>
</tr>
<tr>
<td>Natural sciences (including mathematics beyond preparatory subject matter)</td>
<td>12</td>
</tr>
<tr>
<td>Social sciences (excluding economics), history, and philosophy</td>
<td>10</td>
</tr>
</tbody>
</table>

Required: 8 units in one area and 12 units in each of the other two

Unrestricted Electives | 52-58

Total Units for the Major | 180

Recommended Courses

Students should consult department advisers for up-to-date lists of courses which are acceptable for the breadth subject major requirements.

Advising Center for the major is located in 105 Voorhies Hall.

Major Adviser: J. E. Kushman (Agricultural Economics).

Graduate Study. See page 97.

Agricultural Economics

(College of Agricultural and Environmental Sciences)

Warren E. Johnston, Ph.D., Chairperson of the Department

Department Office, 116 Voorhies Hall (752-1517)

Faculty

John M. Antle, Ph.D., Assistant Professor
Baylor D. Butler, Ph.D., Visiting Lecturer
Hoy F. Carman, Ph.D., Professor
Harold D. Carter, Ph.D., Professor
Robert A. Collins, Ph.D., Assistant Professor
James H. Cotham, Ph.D., Adjunct Lecturer
D. Barton DeLoach, Ph.D., Professor Emeritus
Peter H. Farquhar, Ph.D., Associate Professor (Agricultural Economics, Administration)
Jerry Foytky, Ph.D., Professor Emeritus
Benjamin C. French, Ph.D., Professor Emeritus
Varden Fuller, Ph.D., Professor Emeritus
B. Dwight Gardner, Ph.D., Professor

†Students graduating with this major are required to attain a minimum grade point average of 2.0. 

‡Students majoring in Agricultural Economics must complete a minor in Business Administration or in Business Management.

Major Program and Graduate Study. See the description in Agricultural and Managerial Economics (this page) and see page 97 for graduate study.

Major Advisers. See Class Schedule and Room Directory.

Related courses. See Environmental Planning and Management 110, Environmental Studies 160, 168A, 168B, 173; and courses in Consumer Economics and Economics.

Courses in Agricultural Economics

Lower Division Courses

*1. Economic Basis of the Agricultural Industry (4)
   Lecture—4 hours. Agriculture and men; the agricultural industry in U.S. and world economics; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California.
   18. Business Law (4)
   Lecture—4 hours. Prerequisite: sophomore standing. Introduction to business law in the field of contracts, business organization and termination, real property, employment and agency contracts; current applications by the courts and legislature. (P/N grade only.)
   40A, 40B, 40C. Field Practice (1, 1, 1) I, II, III, Staat.
   Discussion—1 hour; three field trips. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding of the organization and role of farmers, market demand, the production and supply of agricultural products, with particular reference to the individual firm; pricing of output; determinants of employment and
sources, general welfare issues, and market performance. Focus on the techniques of welfare analysis, its history, and alternative methodologies through specific empirical applications.

215A. Economic Development (4) (4) I. Kanaeda (Economics) Lecture—1 hour, seminar—3 hours. Prerequisite: course 215B or the equivalent. Institutions of economic development; various forms of development: demography, economics, development; distributional effects of economic development. (Same course as Economics 215A.)

215B. Macroeconomic Development (4) II. Kanaeda (Economics) Lecture—1 hour, seminar—3 hours. Prerequisite: course 215A or the equivalent. The macroeconomics of economic development: monetary policy problems; fiscal policies, international trade; specific country studies. (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 the development of the nation's role in economic development, agriculture and national planning; sectoral policies relating to prices, inputs, productivity, and marketing; international aspects of trade, aid, and technical assistance; country case studies. (Same course as Economics 215C.)

215D. Development Programming (4) III. Kanaeda (Economics) Lecture—1 hour; seminar—3 hours. Prerequisite: courses 215A and 215B or 215C, 200B, Economics 200E. Analysis of development plans, programs and policies. Application of programming, output, programming, and operations research techniques. Models. Techniques of project evaluation. (Same course as Economics 215D.)

221. Agricultural Policy in Developed Countries (3) III. McCalls Lecture—3 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, rural poverty, and resource utilization; international trade policies for temporary zones, marketing agreements.

240A. Econometric Methods (4) (4) I. Green Lecture—4 hours. Prerequisite: Statistics 130B and a course in linear algebra. Statistical models and their use in estimation of economic relationships; single and multiple equation systems. (Same course as Economics 240A.)

240B. Advanced Econometrics: Theory (4) I. Havener Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A; Statistics 131A, 131B, 131C recommended. Multivariate analysis, specification analysis, simultaneous equation models, identification, estimating methods, small sample properties. (Same course as Economics 240B.)

240C. Advanced Econometrics: Application (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Time series analysis and distributional techniques, logis of time series and cross section data. Bayesian econometrics, applications of regression and prediction. (Same course as Economics 240C.)


253. Optimization Techniques with Economic Applications (4) II. Paris Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Finance 200AM. Optimization techniques and methods including linear and nonlinear programming and dynamic models. Numerical applications to household decision problems, general equilibrium and economic growth problems.


255. Systems Analysis and Simulation (3) III. Logan Lecture—3 hours. Dynamic models formulation and computer simulation of economic systems.

256. Applied Econometrics (4) II. Havener Lecture—3 hours; discussion—1 hour. Application of statistical tools to economic and business analysis. Emphasis on regression analysis, problems of specification, and model development.

Agricultural Education

See Agricultural Education (this page); and Agricultural and Home Economics Education

Agricultural Education

(College of Agricultural and Environmental Sciences)

The Major Program

The Agricultural Education major serves those interested in teaching agricultural sciences in high schools or community colleges as well as those preparing for a service-type career in agriculture. It prepares graduates whose function will be to supervise youth and adult groups and to direct programs requiring preparation in both agricultural and human resources. State and federal requirements for instructors participating in federally funded vocational programs are also met. The need for scientists, technicians, and creative educators to assist in domestic and international agricultural programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation which is appropriate for work in banking, sales and service, rural recreation, and related agriculturally oriented industries. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility which this program provides.

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

42

Biological sciences (including genetics) 15
Chemistry (including organic) 15
Physics (choose from Physics 2A, 2B, or 2C, or 1A or 1B) 6

Depth Subject Matter

67

Agricultural economics 9
Agricultural and Home Economics Education 100, 180, 300

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) 8
Plant and soil sciences 16

Breadth Subject Matter

33

English (see College requirements page 74; plus 4 additional units of English or rhetoric) 12
Economics 1A or 1B 5
Social sciences and humanities electives 16

Restricted Electives

24

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 requirement.
Agricultural Engineering Technology (College of Agricultural and Environmental Sciences)

Faculty
See under Department of Agricultural Engineering.

Major Programs and Graduate Study. For the Bachelor of Science program see the major in Engineering: Agricultural and Specializations (page 184); and see page 97 for graduate study.

Courses in Agricultural Engineering Technology
These courses are intended primarily for students not majoring in Engineering. Majors in Engineering should refer to courses in Agricultural Engineering on page 191. Questions pertaining to the following courses should be directed to the instructor or to the Department Office, 2030 Bailer Hall.

Upper Division Courses

96. Directed Group Study (1-5). I, II, III. The Staff (Garrett in charge)
Prerequisite: consent of instructor. Group study of selected topics. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5) I, II, III.
The Staff (Garrett in charge).
(P/NP grading only.)

101. Farm Tractors (1) I, II.
Lecture—1 hour. Prerequisite: Physics 2A or high school physics recommended. Types of farm tractors; operating principles, including power transmission components, power-take-off driven, implement hitches and controls; traction and dispersion; operator's safety; comfort and convenience. (Engines are studied in Consumer Technology 101.)

102. Food Machinery (3).
Lecture—1 hour. Prerequisite: Physics 2A or high school physics recommended. Types of farm tractors; operating principles, including power transmission components, power-take-off driven, implement hitches and controls; traction and dispersion; operator's safety; comfort and convenience. (Engines are studied in Consumer Technology 101.)

103. Hydraulic Power and Controls (3).

104. Field Machinery (3).
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 lecture-discussions.

105. Machinery Management (1).
Lecture—1 hour. Prerequisite: upper division standing. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling machinery.

106. Agricultural Environment and Shelter (3).
Lecture—1 hour. Prerequisite: Animal Science 2 or consent of instructor. Animal energetics, heat and vapor transmission in buildings; psychrometrics; ventilation; heat and water protection. Environmental considerations affecting the choice of animal shelters.

Lecture—2 hours (first five weeks of quarter). Prerequisite: Plan Science 2B, 102 or 104, or consent of instructor. Factors in machinery management decisions; sources of management information; methods of analyzing and selecting machinery systems; management of machinery maintenance; the role of machinery management with respect to worker safety.

132. Management of Agricultural Wastes (3).
Lecture—1 hour. Prerequisite: upper division standing; Physics 2B and Chemistry 1B recommended. Current methods of disposing of animal, plant, pesticide, food processing, and forest products wastes. Waste problems in relation to soil, air, and water resources.

133. Laboratory Study in Management of Agricultural Wastes (3).
Laboratory—5 hours. Prerequisite: course 132 concurrently. Directed laboratory exercises, field trips and special projects to augment the study of course 132. (P/NP grading only.)

135. Aircraft and Ground Equipment for Crop Protection, Nutrition and Vector Control (3).
Lecture—2 hours. Prerequisite: Chemistry 1B; Physics 2B; upper division standing. Physical aspects of equipment and application techniques related to the effectiveness of agricultural chemicals and biological materials. Techniques for reducing hazards to people, crops, and wildlife.

136. Laboratory for Equipment for Crop Protection (3).
Laboratory—5 hours. Prerequisite: course 133 concurrently. Directed laboratory exercises and field trips to augment study in course 133. (P/NP grading only.)

141. Technology for Agriculture in Developing Regions (3).
Lecture—1 hour; laboratory-discussion—2 hours. Prerequisite: Physics 1A. Equipment used in tropical agriculture; man-made, animal, and engine-powered devices. Energy requirements, site-specific inputs, support infrastructure development, and productivity potentials. (Same course as International Agricultural Development 141.)

141AT. Equipment Technology for Developing Agriculture (3).
Lecture—1 hour; laboratory-discussion—2 hours. Equipment technology for developing agriculture. (Same course as 141.)

151. Energy Relations in Agricultural Production (3).
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, field machinery, pesticides, transportation, food preservation, distribution.

152. Alternative Energy Applications in Agriculture (2).
Lecture—1 hour. Prerequisite: Physics 2B. Alternate energy technology for solar radiation; energy production and use; animal husbandry; crop and animal digestion, fermentation and gasification; utilization of methane, ethanol, and producer gas from these processes. Practical systems for collection, converting, storing, and using the energy for agricultural purposes.

161A. Fundamentals of Aquacultural Engineering (3).
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 and Mathematics 168, or the equivalent. Application of engineering principles to aquacultures, physical-chemical aspects of aquatic environment, and processes in aquaculture, fluid flow.

161B. Fundamentals of Aquacultural Engineering (3).
Lecture—2 hours; discussion—1 hour. Prerequisite: course 161A. Aquaculture system planning; techniques of large-scale algal culture; introduction to mathematical modeling of aquatic systems.

198. Directed Group Study (1-5) I, II, III. The Staff (Garrett in charge).
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5).
The Staff (Garrett in charge).
(P/NP grading only.)

Graduate Courses

298. Group Study (1-5) I, II, III. The Staff (Garrett in charge).
(P/NP grading only.)

299. Research (1-12) I, II, III. The Staff (Garrett in charge).
(SU grading only.)
### Agricultural Practices; Agricultural Science and Management; Agronomy

#### 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. Courses in the major are acceptable; and a more comprehensive course treatment (e.g., Physics 1A, and 1B rather than 1A only) will be useful for some. Students should consider using some portion of their unrestricted elective units to go beyond the Minimum requirements shown for the Preparatory and Depth Subject Matter areas.

<table>
<thead>
<tr>
<th>UNITs</th>
<th>Preparatory Subject Matter</th>
<th>General biological sciences (Biological Sciences 1, plus for Animal Science option, Zoology 2-2; and Animal Science 2; for Food Science option, two courses from Bacteriology 2-3, Botany 2 or Zoology 2-2; for Plant Science option, Botany 2)</th>
<th>10-18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical sciences (Chemistry 1A, 1B, 1B, 8, 8B, plus for Animal and Plant Science options, Physics 1A for Food Science option, Physics 2A)</td>
<td>19</td>
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<td></td>
<td>Mathematics (Mathematics 16A and Agricultural Science and Management 160)</td>
<td>7</td>
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<td></td>
<td>Economics (Economics 1A, 1B, 11A, 11B)</td>
<td>17</td>
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<td></td>
<td>Breadth Subject Matter</td>
<td>18</td>
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<tr>
<td></td>
<td>English, written, English 1 or 2</td>
<td>4</td>
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<td></td>
<td>English, oral, Psych 1, 3, or Philosophy 5</td>
<td>10</td>
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<td></td>
<td>Social sciences and humanities</td>
<td>10</td>
<td></td>
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<td></td>
<td>Business Management</td>
<td>18-21</td>
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<td></td>
<td>Agricultural Economics 104A, 140</td>
<td>9</td>
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<td>Three courses covering various topics in economics and business management, such as: marketing (Agricultural Economics 113, 130, 136), finance (Agricultural Economics 117, 145, 171A, 171B); business methods (Agricultural Economics 155, 157); and business organization (Agricultural Economics 16, 112)</td>
<td>9-12</td>
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<tr>
<td></td>
<td>Depth Subject Matter</td>
<td>50</td>
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<td></td>
<td>Three options are offered, each with 50 units of courses. Students should consult with an advisor before beginning work in one of these options to insure that the course pattern and preparatory subject matter are chosen to best suit the student's objectives. Variations on these options can be developed with the approval of the faculty advisor.</td>
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<td></td>
<td>Animal Science option</td>
<td>9</td>
<td></td>
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<td></td>
<td>Genetics 120, Animal Genetics 106</td>
<td>9</td>
<td></td>
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<tr>
<td></td>
<td>Nutrition 103</td>
<td>4</td>
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<tr>
<td></td>
<td>Physiology 110</td>
<td>5</td>
<td></td>
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<tr>
<td></td>
<td>Animal science</td>
<td>20</td>
<td></td>
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<tr>
<td></td>
<td>Restricted electives</td>
<td>12</td>
<td></td>
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<tr>
<td></td>
<td>Courses to support student's objectives chosen with advisor's approval from the following or other areas: agricultural engineering technology, agronomy, plant science, range management, soil science and water science; Plant Science 2 or Agronomy 100 recommended.</td>
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<td></td>
<td>Food Science option</td>
<td>9</td>
<td></td>
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<tr>
<td></td>
<td>Biochemistry 10A, 10B</td>
<td>6</td>
<td></td>
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<td></td>
<td>Chemistry 1C, 5</td>
<td>9</td>
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<td></td>
<td>Mathematics 16B</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
<td>Physics 29, 2C</td>
<td>6</td>
<td></td>
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</tbody>
</table>

1 Units earned in the satisfactory of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

#### Courses in Agricultural Practices

Questions pertaining to the following courses should be directed to the instructor or to the Office of the Department of Agricultural Engineering, 2030 Bainer Hall.

##### Lower Division Courses

**49A. Field Equipment Operation** (1) I, III, Hanna (Agricultural Engineering)

Laboratory—3 hours. Prerequisite: consent of instructor. Theory and operation of the major types of field equipment, wheel and track-type tractors used in agriculture, forestry, and natural resource management. Essentials of safe equipment operation, the fundamentals of preventative maintenance, field adjustments and trouble shooting are presented. (P/NP grading only)

**49B. Field Equipment Maintenance** (1) II, Hanna (Agricultural Engineering)

Laboratory—3 hours. Prerequisite: consent of instructor. Theory and operation and maintenance principles for internal combustion engines, power trains, hydraulic and pneumatic controls, introduction to arc and acetylene welding, the care and use of basic hand and shop tools. (P/NP grading only)

#### Agricultural Science and Management

(College of Agricultural and Environmental Sciences)

##### The Major Program

The Agricultural Science and Management major is designed to prepare students for career opportunities on farms and ranches, in land management, and in agricultural service industries. The program provides a core of science and technology necessary for the understanding of how agricultural and food systems work, along with basic elements of economics, business, and management. Students may select from among several options allowing concentration of their agricultural science and technology courses in a chosen field. Experience in computing sciences (unrestricted electives) serves as an appropriate complement to this major.

##### Food science and technology

- Food Science and Technology 103, 104-104L, 110A, 110B, and 110 additional units in food science and technology chosen with advisor's approval.
- **Plant Science option**
  - Botany 111A, 111B, 120 or 121
  - Entomology 110 or 112
  - Genetics 120
  - Plant Pathology 120
  - Plant Science 2
  - Soil Science 100, 109
  - Water Science 110A
  - Restricted electives
  - Additional courses chosen with advisor's approval from agricultural engineering technology, Engineering 5, and upper division courses with concentration in agronomy, environmental horticulture, plant science, pomology, vegetable crops or viticulture.

#### 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.

##### Upper Division Courses

- **150. Applied Statistics in Agricultural Sciences** (4) I, Geng (Agricultural 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 interpretations.
- **190. Proseminar in Agricultural Science 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 Programs and Graduate Study

See majors in Plant Science (page 288) and Range and Wildlands Science (page 289), and page 97 for graduate study.

##### Related Courses

See Plant Science and Range Science.
Agronomy and Range Science

Courses in Agronomy

Questions pertaining to the following courses should be directed to the instructor or to the Teaching Services, 258 Hunt Hall.

Lower Division Courses

21. Agricultural Science and the Food Crisis (2) II. Raines. Lecture—2 hours; discussion—1 hour. Prerequisite: 105. An interdisciplinary approach to the food issue. Lectures will be drawn from several departments to discuss such areas as agronomy, nutrition, economics, water supply and ecology, political science, and anthropology. Both agricultural and non-agricultural majors are encouraged to enroll.

22. Agronomy Internship (1-12) II, III, summer. The student will be assigned as an intern at a farmer's residence. Prerequisite: 105. (PINF grading only.)

Upper Division Courses

100. Principles of Agronomy (4) I, Raines, III, Travis. Lecture—3 hours; discussion—1 hour. Prerequisite: 105 or consent of instructor. Fundamentals of field crop production and agronomic problem solving using ecological, physiological, and genetic principles.

100L. Principles of Agronomy Laboratory (1) I, III. Webster, III. Teaching Laboratory—3 hours. Prerequisite: 100 (may be taken concurrently.) Field-oriented introduction to principles of agronomic crop production.

111. Cereal Crops of the World (4) II. Foster. Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L. Botany 2. Cereal crops of man's development; adaptation, production, utilization, and factors determining yield of wheat, oats, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements.

112. Forage Crop Ecology (3) III. Ragusa. Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, and successful management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock.

115L. Forage Crop Ecology Laboratory (1) III. Regusa. Lecture—3 hours (includes four half-day field trips). Prerequisite: course 112. Greenhouse experiments and problem sets to supplement course 112. Field trips related to forage plant breeding, management, and utilization.

113. Fiber, Oil and Sugar Crops in a Changing World (4) I. Mikkelsen, Knowles, Hills. Lecture—3 hours; laboratory—3 hours. Prerequisite: existing courses 100, 100L. Botany 2. Industrial crops as world resources of food, feed, fiber, and consumer goods. The relationship of crops to their physical and biotic environment. Ecological and socio-economic and political forces that shape crop production, and utilization practices.

129. Morphology and Reproduction of Agronomic Crops (3) III. Webster. Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2 or the equivalent. Study of growth and development of crop plants with emphasis on reproductive structure and pollination, and techniques for morphological analysis.

192. Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Lecture—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience on or off campus in all subject areas pertaining to agronomy internships supervised by a member of the faculty. (PINF grading only.)

197T. Tutoring In Agronomy (1-5) 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 tutoring experience. Student will assist in classes under the direction of the faculty. May be repeated for credit up to a total of 5 units. Seminar—1 hour. (PINF grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: instructor. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-9) I, II, III. The Staff (Chairperson in charge). Prerequisite: 6 upper division units of agronomy. (PINF grading only.)

Graduate Courses

205A-205B. Design, Analysis and Interpretation of Experiments (3-3) I, II. Graduate Lecture—2 hours; discussion—1-2 hours. Prerequisite: graduate standing in Plant Science; Agricultural Science and Management 155a, knowledge of elementary FORTRAN or ALGOL recommended. The planning and analysis of field and laboratory experiments with emphasis on the biological interpretation of results.

210. Agricultural Research Planning and Management (3) II. The Staff. Lecture—2 hours; discussion—2 hours; two full-day field trips. Prerequisite: graduate standing in any agricultural field of study and consent of instructor. An analysis of the problems of planning, managing, and utilizing agricultural research to promote agricultural development.

221. Advanced Plant Breeding (4) III. Teuber. Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 113; Genetics 150 or 100B; courses 205A, Philosophy, methods and problems in developing improved plant species. Topics include: introgression, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for pest and stress resistance. Discussions focus on population improvement methods and crop ideotypes.

222. Quantitative Genetics and Plant Improvement (4) I. Allard. Lecture—4 hours: Prerequisite: Plant Science 113; Genetics 150 or 150B. Emphasis on stochastic genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even numbered years.

223. Selection Theory in Plant Breeding (3) II. Jain. Lecture—3 hours; discussion—1 hour. 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 their evolution at the molecular and structural level. Offered in odd numbered years.

225. Manipulation of Plant Chromosomes (3) I. Dvorak. Lecture—2 hours; laboratory—3 hours. Prerequisite: Genetics 100A, 100B or Genetics 120. Application of chromosome manipulation in plant genetics and plant physiology. Development and utilization of genetic tools as gene mapping, analysis of genetic architecture of plant genomes, and interspecific gene transfer. Offered in even numbered years.

226. Advanced Population Biology (3) II. Jain. Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 130; recommended, a basic course in ecology (Botany 117, Zoology 122). The dynamics of growth and evolution of populations. Genetic and ecological aspects of population regulation and integration. Natural selection within and among species. Intraspecific and interspecific competition. Community structure and diversity. Offered in even numbered years.

227. Advanced Topics in the Ecology of Crop and Range Plant Communities (3) II. The Staff. Lecture—3 hours. Prerequisite: Plant Science 101. Analysis and qualitative description of the structure and dynamics of field crop and range communities in relation to interplant competition, population function, environmental stresses and adaptation.

228. Advanced Topics in the Physiology of Crop and Range Plants (3) III. 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.

230. Biological Nitrogen Fixation (3) II. Valentine. Lecture—3 hours; discussion—2 hours. Current concepts of the physiology, microbiology, biochemistry, genetics, and regulation of free-living and symbiotic N2-fixing organisms. Integration and development of basic research to develop new strategies for improving N2-fixing productivity of agronomic crops. Offered in odd numbered years.

230I. Seminar in Crop Growth, Production and Utilization (1-2) I, II. The Staff. Seminar—1-2 hours. Topics of current interest related to plant growth and production and management systems, and utilization of cultivated food, feed and fiber crops.

231. Seminar In Plant Breeding and Evolution of Cultivated Plants (1-2) I, Foster. Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins of evolution of cultivated plants.

277T. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: graduate standing, consent of instructor; courses 205A-205B 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. (SU grading only.)

286. Group Study (1-9) I, II, III. The Staff (Chairperson in charge). Directed 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.

299. Research (1-9) 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. (SU grading only.)

Agronomy and Range Science

(College of Agricultural and Environmental Sciences)

D. William Raines, Ph.D., Chairperson of the Department

Department Office, 133 Hunt Hall (752-1703)

Faculty

Robert W. Allaria, Ph.D., Professor (Agronomy and Range Science, Genetics) Benjamin H. Beard, Ph.D., Lecturer R. William Breidenbach, Ph.D., Lecturer Ivan W. Buddenhagen, Ph.D., Visiting Professor John P. Conradi, Ph.D., Professor Emeritus Beecher Crampton, M.S., Senior Lecturer Jan Dvorak, Ph.D., Associate Professor Ken W. Foster, Ph.D., Assistant Professor Shu Geng, Ph.D., Associate Professor Melvin R. George, Ph.D., Adjunct Lecturer James E. Hill, Ph.D., Adjunct Lecturer F. Jack Hills, Ph.D., Adjunct Lecturer Ray C. Hufnagel, Ph.D., Professor Subodh K. Jain, Ph.D., Professor Milton B. Jones, Ph.D., Lecturer Paulden F. Knowles, Ph.D., Professor Horton M. Laude, Ph.D., Professor Emeritus William M. Longhurst, Ph.D., Professor Emeritus Robert S. Loomis, Ph.D., Professor Roder M. Love, Ph.D., Professor Emeritus John W. Menke, Ph.D., Associate Professor Duane S. Mikaelson, Ph.D., Professor Maurice L. Peterson, Ph.D., Professor Emeritus Donald A. Phillips, Ph.D., Professor Calvin O. Quislet, Ph.D., Professor Charles A. Ragusa, Ph.D., Professor D. William Raines, Ph.D., Professor Paul L. Rowell, Ph.D., Adjunct Lecturer J. Neil Rutger, Ph.D., Adjunct Professor Charles W. Schaller, Ph.D., Professor Donald E. Stearns, Ph.D., Adjunct Lecturer Ernest H. Stanford, Ph.D., Professor Emeritus Larry R. Teuber, Ph.D., Assistant Professor Robert L. Travis, Ph.D., Adjunct Professor Carl L. Tucker, M.S., Resident Lecturer Raymond C. Valentine, Ph.D., Professor Barbara D. Webster, Ph.D., Professor William A. Williams, Ph.D., Professor Frederick P. Zacheline, Jr., Ph.D., Professor Emeritus

Courses. See course listings under Agronomy (this page) and Range Science (page 289).
American Studies
(College of Letters and Science)
Jay Mechling, Ph.D., Program Chairperson
Program Office, 816 Sprout Hall (752-3377)

Committee in Charge
• David A. Robertson, Ph.D. (English), Committee Chairperson
• Bruce Hackett, Ph.D. (Sociology)
• Jay Mechling, Ph.D. (American Studies)
• Larry J. Peterman, Ph.D. (Political Science)
• W. Jeffrey Weidner, Ph.D. (Animal Physiology)
• David Scofield Wilson, Ph.D. (American Studies)

Faculty
• Jay Mechling, Ph.D., Associate Professor
• Merline A. Williams, M.A., Lecturer
• David Scofield Wilson, Ph.D., Associate Professor

The Program of Study
Students who choose American Studies are usually those who feel too limited by a narrow, departmental approach to American experience. American Studies is a wide-ranging field that studies the development of the United States as a nation and the people who have contributed to its history. It includes the study of literature, history, politics, economics, and social institutions. The program is designed to provide a broad, general education for students who wish to pursue careers that demand an understanding of the United States and its role in the world. Students who wish to pursue careers in teaching, journalism, public relations, or other fields that require strong communication and analytical skills will find American Studies a valuable major.

American Studies Requirements:

**Courses in American Studies**

**Lower Division Courses**

**1A. Technology, Science and American Culture (4)**
- Lecture: 2 hours; discussion: 2 hours. Critical examination of the relationship between American science and technology as cultural systems that define the natural world and man's relation to it; mutual influence and interaction of these systems and other cultural systems (arts, politics, social thought, religion, etc.).

**1D. Religion and Revolution in American Culture (4)**
- The Staff

**1E. Nature and Culture in America (4)**
- Wilson

**1F. The Popular Image of Women in America (4)**
- Williams

**2A. American Wisdom (2)**
- Lecture: 1 hour; discussion: 1 hour. An exploration of the works of writers, thinkers, and artists who have contributed to the development of American culture.

**2B. Fieldwork in American Civilization (2)**
- The Staff

**4A. Introduction to American Studies (4)**
- Lecture: 2 hours; discussion: 2 hours; evaluation of written reports and conferences with individual students. Pre-requisite: consent of instructor. This course is required of all majors.

**Upper Division Courses**

**101A-H. Special Topics (4)**
- The Staff

**110. Introduction to Cross-Cultural Studies (4)**
- Lecture: 3 hours; short papers, tutorial conferences, archival researches, a written examination, and work on course projects. Similarities and differences between (1) American culture and foreign cultures; and (2) comparable elements in American culture and foreign cultures.

**111. Sacramento Valley Studies (4)**
- Lecture: 2 hours; discussion: 1 hour, fieldwork. Prerequisite: course 45 or Anthropology 2 recommended. This course may be taken for credit by a political science major, a sociology major, a history major, or a major in any discipline that requires an understanding of the political, economic, and social relations of the American Southwest.

**120. American Folklore and Folklife (4)**
- Lecture: 2 hours; fieldwork: 1 hour. The theory and methods of the study of American folklore, including oral tradition, music, dance, and drama. Emphasis is placed on the study of American folklore and folklife, and its relationship to the American culture.

**140A. Events and Institutions in American Culture (4)**
- Lecture: 2 hours; reports and tutorial conferences. Prerequisite: course 45. Study of selected events in American culture, focusing on the interplay of events and institutions in the development of American culture. Emphasis is on the development of American culture and the role of events and institutions in shaping it.

**140B. Value and Meaning in American Culture (4)**
- Lecture: 2 hours; reports and tutorial conferences. Prerequisite: course 45. Study of selected events in American culture, focusing on the role of values and meanings in shaping American culture.

**140C. Problems in American Culture (4)**
- Lecture: 2 hours; reports and tutorial conferences. Prerequisite: courses 45, 140A, 140B, and 140C. Study of selected events in American culture, focusing on the role of values and meanings in shaping American culture.

**121. Internship in American Institutions (1-12)**
- The Staff

**171. Tutoring in American Studies (1-5)**
- The Staff

**180A-190B. Senior Problem Seminar (4)**
- The Staff

**245. Direct Group Study (1-5)**
- The Staff

**295. Individual Study for Undergraduates (1-5)**
- The Staff

**Graduate Courses**

**284. Group Study (1-5)**
- The Staff

**299. Individual Study (1-12)**
- The Staff

**139**
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., Chair-
person of the Department

Department Office, 1321 Haring Hall (752-1174)

Faculty

George H. Cardinet III, D.V.M., Ph.D., Professor
Leslie J. Faulkin, Jr., Ph.D., Associate Professor
Dallas M. Hyde, 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. Mopper, Ph.D., Assistant Professor
Walter S. Tyler, D.V.M., Ph.D., Professor

Courses in Anatomy

Upper Division Courses

100. Systematic Anatomy (4) I, Julian
Lecture—2 hours; laboratory—6 hours. Prerequisite: Zool-
ogy 2, 2L. Lectures, dissections, and demonstrations
emphasizing the typical structure of the anatomical systems
of the dog, chicken, and subhuman primate.

198. Directed Group Study (1-5) I, II, III. The Staff (Chair-
person 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

201. Advanced Systematic Anatomy (5) II, Julian
Lecture—2 hours; laboratory—6 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.

202. Organology (2) I. The Staff (Julian in charge)
Lecture—2 hours. Prerequisite: course 100 or the equiva-
 lent and consent of instructor. Comparative development,
growth patterns, and composition of selected organs: liver,
kidney, lung, mammary gland, brain, and a skeletal muscle.
Offered in even-numbered years.

205. Ultramicroscopic Anatomy (3) I. The Staff (Tyler in charge)
Lecture—3 hours. Prerequisite: histology. The electron mi-
croscopic appearance of cells, tissues, and organs of ani-
mals. Using the structural basis for their physiological
functions. Offered in even-numbered years.

206. Morphology of Body Surfaces (2) III. The Staff (Tyler in charge)
Lecture—1 hour; discussion—1 hour. Emphasis on
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 replicates will be compared and correlated with that
derived from other techniques. Offered in even-numbered
years.

207. Perspectives in Morphological Research (3) III. The Staff
(Tyler in charge)
Lecture—2 hours; discussion—1 hour. Consideration of
the principles and applications of modern morphological
methods and their role in biomedical research. Examples
of specific methods include histology, computer analysis of
images, scanning and transmission electron microscopy,
histochemistry, autoradiography, rapid freezing, and
vascular injections. Offered in odd-numbered years.

210. Principles of Histology (3). I. The Staff (Tyler in charge)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Zool-
ogy 122, Biochemistry 101A. Principles of enzyme histo-
chemistry, animal tissues, light and electron microscopy.
Offered in odd-numbered years. (SU grading only.)

215. Veterinary Histology (6) II. The Staff (Faulkin in charge)
Lecture—3 hours; laboratory—6 hours. Prerequisite: Zool-
ogy 2, 2L. Principles of animal tissues and organs of mammalian and avian species of veterinary significance.

283. Tumor Biology (3) I, Faulkin, Cardin, Benjamini, Goldberg,
Kessel, Mand, Blasio, Tolu, Troy
Lecture—3 hours. Prerequisite: graduate standing and
consent of instructor. Growth, invasion and metastasis of
malignancies; mechanisms of carcinogenesis; intrinsic and extrin-
sic etiologic factors. Offered in odd-numbered years.

289. Seminar (1) I, The Staff
Seminar—1 hour. (SU grading only.)

287. Advanced Group Study in Surgical Anatomy (2-4) I, II,
III. Lohse
Laboratory—6 hours. Prerequisite: Veterinary Medicine
470 or consent of instructor. Selected topics in topographical,
radiologic, or regional anatomy as they apply to the
clinical sciences.

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-10 hours. Prerequisite: consent of instructor.

290. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-36 hours. Prerequisite: consent of instructor.
(SU grading only.)

Anesthesiology

See Medicine, School of

Animal Behavior (A Graduate Group)

Peter S. Podlack, Ph.D., Chairperson of the Group
Group Office, 328 Young Hall (Anthropology)
(752-0745/1581)

Faculty

The Group includes faculty from eight departments
in three schools and colleges.

Graduate Study. The Graduate Group in Animal Behavior
in the Ph.D. degree with a specialization in
one of three areas: (1) ethology and
the evolutionary basis of animal behavior; (2)
physiological basis of animal behavior; and (3)
behavior of domestic animals. All specializations will empha-
size the adaptive and evolutionary basis of animal
behavior.

Preparation. Appropriate preparation is a bach-
elor's or master's degree in one of the several disciplines
relevant to behavior such as psychology, zoology,
anthropology, physiology, wildlife biology,
ecology, veterinary science, genetics, or ani-
mal 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 the equivalent.
Statistics: Statistics 13, or the equivalent
Evolution: Genetics 103 or Zoology 148, or the equivalent
Animal behavior: Psychology 150 or Zoology 155, or the equivalent

Breadth Requirement. The following core courses are offered to all students.

Systemic physiology: Physiology 110-110L or Zoology 142-142L (7 units)
Statistical analysis: Psychology 207 or Agronomy 205A-205B (4-6 units)

Scientific approaches to animal behavior research: Animal Behavior 201 (3 units)

Seminar in animal behavior: Animal Behavior 290 (1-3 units)

Ecology: Entomology 104, Environmental Studies 100, or Zoology 125 (3-4 units)

College teaching: Biological Sciences 210 (2 units) Comparative psychology: Psychology 250 (4 units)

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: E. O. Price (Animal Science).

Courses in Animal Behavior

Graduate Courses

201. Scientific Approaches to Animal Behavior Research (3) I, II, III. Lott (Wildlife and Fisheries Biology)
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Philosophy, issues, goals, strategies, and tools in research.

Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. History of animal domestication, the role of natural and artificial selec-
tion in domestication, the influence of environment and ex-
perience on domestic animal behavior and human-animal interactions. Offered in even-numbered years.

289. Seminar in Animal Behavior (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (SU grading only.)

290. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. Advanced research in one of the specialty areas in animal behavior. (SU grading only.)

Animal Biochemistry

See Biochemistry; and
Biochemistry and Biophysics
Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Animal Science.

Major Program. See major in Genetics (page 223).

Related Courses. See Agronomy 221, 222, 223; Plant Pathology 215; Plant Science 113; Vegetable Crops 220.

Courses in Animal Genetics
Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 161 Animal Science Building.

Upper Division Courses

107. Genetics and Animal Breeding (5) L Thompson; III. Fall Lecture—5 hours. Prerequisite: Genetics 100 or 100A-100B. Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices. Foundation provided for further study in animal breeding.


109. Directed Group Study (1-5) L III. II. Fall The Staff (Bradford in charge) Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

110. Special Study for Advanced Undergraduates (1-5) I, II, III Fall The Staff (Bradford in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

204. Theory of Quantitative Genetics (3) L I. Fall Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 107 or the equivalent. Introduce 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) L I. Fall Lecture—5 hours. Prerequisite: course 107 and Animal Science 205; course 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices, statistical methods for evaluation of single and multiple traits. Methods of estimating genetic trends. Offered in odd-numbered years.

207. Quantitative Genetics and Animal Breeding Theory (3) I II. Abplanalp (Avin Sciences) Lecture—2 hours; laboratory—2 hours. Prerequisite: Mathematics 105A-105B or 130A-130B. Quantitative genetic theory relating to inbreeding and crossbreeding systems; selection for cross performance, major qualitative genes, control populations, is developed and applied to the planning of breeding programs.

208. Estimation of Genetic Parameters (3) 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 correlation are considered. Specific emphasis is given to procedures applicable to livestock populations under selection. Offered in even-numbered years.

250. Animal Improvement in an International Context (4) III. Bradford Lecture—3 hours; seminar—1 hour. Prerequisite: completion of at least one year of graduate study, including upper-division or graduate courses in livestock production and animal breeding. Evaluation, utilization, conservation and exchange of animal germ plasm resources; exploitation of heterosis; improvement schemes in the absence of central data processing; population structure and rate of improvement; roles of governments; group breeding schemes; research needs. (SU grading only.) Offered in odd-numbered years.

NOTE: For key to footnote symbols, see page 128.

Animal Nutrition

See Nutrition

Animal Physiology

(College of Agricultural and Environmental Sciences)

Dorothy E. Woolley, Ph.D., Chairperson of the Department Department Office, 182 Briggs Hall (752-0203)

Faculty
R. Leland Baldwin, Ph.D., Professor (Animal Science)
Maryllyn S. Berkley, Ph.D., Assistant Professor
James M. Boda, Ph.D., Professor
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

Animal Physiology
Jack M. Goldberg, Ph.D., Associate Professor
John M. Horowitz, Jr., Ph.D., Professor
Barbara A. Horwitz, Ph.D., Professor
Frederick W. Lorenz, Ph.D., Professor Emeritus
Verne E. Mendel, Ph.D., Professor (Animal Sciences)
Gary P. Moberg, Ph.D., Associate Professor
Frank X. Ogasawara, Ph.D., Professor (Avin Sciences)
Edward A. Rhode, Ph.D., Professor
Robert P. Scokey, Ph.D., Associate Professor (Neurology)
Arnold J. Silman, Ph.D., Associate Professor
Arthur H. Smith, Ph.D., Professor
W. Jeffrey Weinberg, Ph.D., Associate Professor
Barry W. Wilson, Ph.D., Professor (Avin Sciences)
Charles M. Winget, Ph.D., Visiting Lecturer
Dorothy E. Woolley, Ph.D., Professor

Courses: See course listing under Physiology (Animal), page 226.

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. Adams, Ph.D., Assistant Professor
Donald F. Amend, Ph.D., Associate Professor
Gary B. Anderson, Ph.D., Associate Professor
C. Robert Ashmore, Ph.D., Professor
R. Leland Baldwin, Jr., Ph.D., Professor
Donald L. Bath, Ph.D., Adjunct Lecturer
G. Eric Bradford, Ph.D., Professor
Anthony C. Bywater, Ph.D., Assistant Professor
C. Christopher Calvert, Ph.D., Assistant Professor
Floyd D. Carroll, Ph.D., Professor Emeritus
Ernest S. Chang, Ph.D., Assistant Professor
Wallis H. Clark, Jr., Ph.D., Professor
Douglas E. Conkin, Ph.D., Lecturer
Perry T. Cupps, Ph.D., Professor Emeritus
Edward J. DePeters, Ph.D., Assistant Professor
Sergei Doroshov, Ph.D., Associate Professor
J. Warren Evans, Ph.D., Professor
Thomas R. Famula, Ph.D., Assistant Professor
Graham A. E. Gall, Ph.D., Professor
William N. Garrett, Ph.D., Professor
Paul W. Gregory, Sc.D., Professor Emeritus
Dennis Hedgecock, Ph.D., Lecturer
Ronald R. Hechler, Ph.D., Adjunct Professor
Hubert Heitman, Jr., Ph.D., Professor
J. L. Hull, M.S., Adjunct Lecturer
Robert C. Laben, Ph.D., Professor
Oskar Lang, Dip., Vet. Med. Vienna, Adjunct Lecturer
Yu-Bang Lee, Ph.D., Assistant Professor
Glen P. Loggreen, Ph.D., Professor Emeritus
Joan M. Macy, Ph.D., Assistant Professor
Verne E. Mendel, Ph.D., Professor (Animal Science, Animal Physiology)
James H. Meyer, Ph.D., Professor
Gary P. Moberg, Ph.D., Associate Professor
James G. Morris, Ph.D., Professor
Edward O. Price, Ph.D., Professor
David W. Robinson, Ph.D., Professor
Wade C. Rolls, Ph.D., Professor Emeritus
Nathan E. Smith, Ph.D., Professor
John R. Thompson, Ph.D., Assistant Professor
Robert W. Touchberry, Ph.D., Professor
Dana B. Van Liew, B.S., Adjunct Lecturer
William C. Weir, 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 and care of animals and their utilization by man for food, fiber, work, research, companionship and recreation. The study of animals is achieved through biological, physical and social sciences such as chemistry, biochemistry, genetics, physiology, nutrition, economics, mathematics and their integration in the various animal science courses.

Career opportunities for graduates cover a wide range from farming and ranching through all of the industries, institutions and professions that service 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 satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

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Animal Science

Preparatory Subject Matter
General biological sciences: Biological Sciences 1, Zoology 2-2L, and either Botany 3 or Botany 2
Physical sciences: Chemistry 1A, 1B, 8A, 8B, and 10 units of mathematics, including statistics
Animal science: Animal Science 1, 2, and 41; or 1, 2, and 24 (for Aquaculture specialty) 10-11

Depth Subject Matter
Phylogenetic Sciences 101A-101B (Biochemistry 101A-101B may be substituted with consent of adviser) 6-7
Genetics: Genetics 120, Animal Genetics 107 9
Nutrition (Nutrition 110 and 121; or 103 and either 122 or 123) 7
Physiology 110, 110L
Aquaculture and Aquatic Technology 161A-161B (for Aquaculture specialty only) 6
Animal science, a minimum of 26 units
Select at least two courses from Animal Science 114, 115, 119, 140, 160, and at least seven courses from Animal Science 104, 105, 105L, 123, 124, 128, 131, 135, 141, Bacteriology 177, 177L, Animal Genetics 108, Physiology 121, 121L, 130, Nutrition 122, 122L, 123, 142, Environmental Studies 151, 151L.

Breadth Subject Matter
Writing and expression (see College requirement, page 74) 8
Additional social sciences and humanities 12

Unrestricted Electives
43-48
Faculty advisers assist students in selecting electives according to individual interests and objectives.

Total Units for the Major
180

Major Adviser: R. C. Laben

Advising Center for the major is located in 181 Agriculture Sciences Building (762-6118). Students must secure their academic adviser through this office upon entering the major.

Graduate Study.

The Department of Animal Science offers a program of study and research leading to the Master of Science degree. Details of this program may be obtained by contacting the graduate adviser. See also page 97.

Graduate Adviser: H. Heitman.

Related Courses. See Food Science and Technology 120.

Courses in Animal Science

Lower Division Courses
1. Domestic Animals and Man (4) I. Smith
Lecture—3 hours; laboratory—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, pets and meat and dairy products.

2. Introductory Animal Science (3) III.
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1 and Biological Sciences 1 recommended. Growth, reproduction, nutrition, health, and disease control in domesticated animals; the application of sciences to animal production.

Units earned in satisfaction of the American History and institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

15. Introductory Horse Husbandry (3) II. Evans
Lecture—3 hours; laboratory—2 recommended. An introduction to the care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of owners of light horses, rearing of foals.

21. Livestock and Dairy Cattle Judging (2) I, II. Van Liew Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat and dairy cattle. Relationship between form and function, form and carcass quality and form and milk production.

22A-22B. Animal Judging (2-2) I, II. Van Liew Laboratory—4 hours, weekend field trips. Prerequisite: course 21. The study of individual and group classes of animals with emphasis on visual appraisal of conformation and its use in livestock judging. Participation in interscholastic and intercollegiate judging competition. (P/N grading only.)

24. Introductory Aquaculture (3) III. Clark
Lecture—3 hours. Prerequisite: Biological Sciences 1. Aquatic animals with particular reference to growth, reproduction, inheritance, nutrition and disease.

31A. Perspectives in Animal Science (1) I, Bywater Lecture—1 hour. Consideration of the broad scope of opportunities in Animal Science and related fields and assessment of information on basic ingredients for a successful career. Of special interest to students of the campus. (P/N grading only.)

31B. Current Topics in Animal Science (1) I, Bywater
Lecture—1 hour; occasional discussion. Lectures, assigned reading and discussion of topics of current concern in the broad fields of animal science. Topics may include land utilization; livestock and game production; nutritional, genetic, physiological and health management. (P/N grading only.)

31C. Prospects in Animal Science (1) III. Heitman
Lecture—1 hour, occasional discussion. Examination of factors which may influence future relationships between man and other domesticated animals, farm management, food, space and environment; animal and animal product analogs. (P/N grading only.)

40. Domestic Animal Production (4) I, II. DePeters
Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 1 and 2. Introduction to the principles of farm animal husbandry. Animal species to be discussed include dairy and beef cattle, horses, swine, poultry, and game birds. Topics are industry trends, general husbandry, nutrition, and reproduction. Laboratory exercises will utilize field trips and animal husbandry practices.

43. Elements of Livestock Management (3) III. Bywater
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 41 and Economics 1A recommended. Introduction to the concepts of factors affecting and interactions between biological and economic efficiency, and implications for the organization and management of livestock businesses.

The Staff (Heitman in charge)
Discussion—1 hour; laboratory—3 hours. The application of the principles of animal husbandry; the art and science of management of beef and dairy cattle, horses, sheep, swine, and laboratory animals. (P/N grading only.)

92. Internship in Animal Science (12-2) I, II. III. The Staff (Department Chairperson in charge)
Laboratory—3 hours. Prerequisite: consent of instructor. Work-learning experience off and on campus in dairy, live stock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Request form must be met. (P/N grading only.)

98. Directed Group Study (1-5) I. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Selected topics relating to the animal sciences. Primarily for lower division students. (P/N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Problems in animal biology, physiology and pathology. (P/N grading only.)

Upper Division Courses
104. Principles of Domestic Animal Behavior (3) I. Price
Lecture—3 hours. Prerequisite: Biological Sciences 2 or Zoology 2 or the equivalent. To examine the basic principles of animal behavior as applied to domesticated species. Emphasis will be on animal development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. Students who have had Zoology 155 may receive only 2 units of credit for this course.

105. Behavioral Adaptations of Domestic Animals (2) II. Price
Lecture—2 hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals that are involved in management practices.

106L. Behavioral Adaptations of Domestic Animals Laboratory (2) II. Price Laboratory—3 hours, plus 3 hours to be arranged. Prerequisite: the student to be in class the first day. To provide a research experience investigating the behavior of selected domestic animal species. Methods of data collection and analysis will be discussed.

114. Dairy Cattle Production (4) III. Smith
Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107. Recommended: Nutrition 103 and 110 and course 124, or the equivalent. An introduction to the principles of animal nutrition, physiology and related fields applied to conversion of animal feed to human food through dairy animals. Genetic, environmental and management factors of variation in milk composition and yield; economic and energetic efficiency of milk production.

115. Horse Production (4) I. Evans
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15, Genetics 120; Nutrition 103 or 110; Physiology 110. Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry.

116. Meat Animal Production (4) III. Garrett
Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110. Physiology 110. Application of the sciences of nutrition, physiology and genetics to the development of efficient management programs for beef, sheep, and swine production. Similarities and differences among animal types in affecting management practices. Methods of improving carcass and meat quality.

118. Intensive Livestock Production (3) III. Heitman, Labin
Zinn
Lecture—3 hours. Prerequisite: Nutrition 103 or 110; course 1, Genetics 120 or Animal Genetics 107 recommended. Principles and techniques of swine, dairy, beef, and swine and swine operations. Growth and fattening; lactation; feeding practices; methods of evaluating body composition of meat animals. (P/N grading only.)

119. Experimental Agriculture (5) I, II.
Liang
Lecture—3 hours; discussion—2 hours; laboratory—30 hours. Prerequisite: upper division standing in biological discipline with background in physiology, genetics, microbiology, or biochemistry and consent of instructor; introductory course 24 and course 131 strongly recommended. Application forms available in Animal Science Advising Center. In-depth study at the Bogeda Marine Laboratory, interpreting data and drawing empirical conclusions. Principles from genetics, nutrition, pathology, physiology and related fields as applied to practical aspects involved with culture of aquatic species with food production potential.

123. Animal Growth (4) II. Garrett, Ashmore, Bradford
Lecture—4 hours. Prerequisite: upper division course in genetics, physiology, and animal husbandry. Basic and practical aspects of prenatal, postnatal and adult growth of animals focusing on nutritional, physiological, and genetic effects and interrelationships.

124. Lactation (4) II. Baldwin, Labin
Lecture—3 hours; laboratory—3 hours. Prerequisite: Physiology 110 and Nutrition 110 or the equivalent background knowledge. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and milk performance.

125. Linear Programming in Animal Agriculture (2) III. Bywater
Lecture—1 hour; discussion—1 hour. Prerequisite: intended for seniors with an understanding of animal production and of nutrition at least equivalent to Nutrition 103 or 110. Non-theoretical treatment of linear programming and its applications in animal agriculture emphasizing farm planning and ration formulation. Intended to provide hands-on experience in linear programming and applying linear programs. (P/N grading only.)

131. Reproduction and Early Development in Aquatic Animals (4) II. Doroshov
Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 100; Wildlife and Fisheries Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction in aquatic invertebrates and fertility of animals commonly used in aquaculture.

133. Meet and Meet Animal Evaluation (3) I, II.
Labe
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2 or 21 recommended. Correlation of live animal conformation and degree of finish with carcass traits, transformation
of live animal to carcass, criteria for evaluation and grading of carcasses as related to meat palatability, ante- and post-mortem handling as related to meat quality.

135. Experimental Biochemistry Laboratory (4) I, Adams Lecture—2 hours; laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology; consent of instructor. Course is designed to introduce students to the concepts of research. Experience in research animal care, tissue sampling and handling techniques, a variety of commonly used laboratory analysis methods, cost analysis, literature review and publication writing are provided. Not open to students who have received credit for Biochemistry 101L.

140. Management of Laboratory Animals (4) Adams Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110; Physiology 110. Application of nutrition, physiology, genetics and management systems of experimental animals. Management procedures will be examined in view of experimental needs, government regulations, and animal health.

141. Management of Nonhuman Primates (3) III, Moberg Lecture—2 hours; laboratory—3 hours. Prerequisite: Physiology 110 and consent of instructor. Examination of current husbandry practices used to maintain primates in zoos, breeding colonies, and laboratories. The application of concepts of basic sciences to problems in reproduction, behavior, and emotional stress, and health will be discussed. Enrollment priority to Animal Science majors. Offered in odd-numbered years.

160. Range Livestock Production (4) III, Morris, Raguse (Agronomy and Range Science) Lecture—3 hours; discussion—1 hour. Prerequisite: Nutrition 103 or 110 or 122. Range Science 100 or 130 or 140; upper division standing. Application of principles of animal and range science to the extensive production of livestock and related forest and range. Emphasis is on beef and sheep production systems from perennial and annual range types. (Same course as Range Science 160.)

190. Prosemnar in Animal Science (1) L, Heitman 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) Seminar—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly discussions on research problems, progress of projects 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—varies. Prerequisite: completion of 94 units and consent of instructor. Work-learning experience off and on campus in dairy, livestock and aquaculture production, research and teaching in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Request Form must be met. (P/NP grading only.)

197. Tutoring in Animal Science (1-2) I, II, III. The Staff (Chairperson in charge) Prerequisite: Animal Science or related major; advanced standing; consent of instructor. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching materials. May be repeated once for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Selected topics relating to the animal sciences. (P/NP grading only.)

199. 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 and small domestic animals. (P/NP grading only.)

Graduate Courses

205. Computer Analysis of Biological Data (3) III, Farnum Lecture—2 hours; laboratory—6 hours. Prerequisite: Agricultural Science and Management 150. The use of matrix algebra, regression and least squares programs to manipulate and analyze biological and ecological data. Lecture will be concerned with the analytical procedures used in the programs as well as interpretation of computer output.

210. Advanced Meat Science and Technology (3) II, Lee Lecture—2 hours; discussion—1 hour; laboratory—3 or 4 sessions. Prerequisite: Food Science 120 or the equivalent; courses 137, 139, and 140 recommended. Integration of muscle biology and biochemistry with the basis of meat tenderness, physicochemical properties of meat emulsion; new concepts in fresh and cured meat processing technology; energy efficiency in processing and marketing of meat products. Offered in even-numbered years.

289. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science and food science. Open only to graduate and advanced undergraduate students. Offered in even-numbered years.

290. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (S/U grading only.)

291. Supervised Teaching in Animal Science (2) I, II, III. The Staff (Chairperson in charge) Supervised teaching—6 hours. Prerequisite: consent of instructor. Practical experience in teaching Animal Science at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. An evaluation letter will be sent to the Graduate Adviser with a copy to the student. (S/U grading only.)

292. 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. (Sect. 1, 2, 3, letter grading; from Sect. 4 on—S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Anthropology

Anthropology is a broad and diverse field with faculty members representing various subdisciplines. Students interested in the scientific study of human origins, primate studies and the fundamentals of biology as these relate to Homo sapiens should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas, linguistics (language in culture and society with an emphasis on linguistic field methods), and archaeology (prehistoric and the techniques and methods of archaeology) should enroll in the Bachelor of Arts degree program.

A.B. Major Requirements:

Preparatory Subject Matter

- Anthropology 1, 2, 3, 4
- Statistics 13
- Geography 1 or 2
- Language 18 or 19

Depth Subject Matter

- Anthropology 102, 103A, 109, 110, 120
- Anthropology, one course from 111, 112, 129
- Physical anthropology, one course
- Ethnography, one course
- Archaeology, one additional course
- An additional unit selected from the following: any upper division anthropology course, Art 150, 151, 152, Genetics 100A, 100B, 116

Total Units for the Major

64-82

Anthropology

B.S. Major Requirements:

Preparatory Subject Matter

- Anthropology 1, 2, 3, 4
- Biological Sciences 1
- Chemistry 1A, 1B
- Statistics 13, 32, or 102
- Zoology 2, 4
- Chemistry 8A-8B or Mathematics 16A-16B
- Foreign Language 12 units (or the equivalent)

Depth Subject Matter

- Six courses in anthropology, at least 3 in physical anthropology, and the remaining 3 chosen in consultation with major adviser

Total Units for the Major

91-104

Recommended

- Geography 1, 2, 3, 4
- Physiology 2A, 2B, 2C

Bachelor of Science List of Courses

- Physical anthropology: 120, 151, 152, 153, 154A, 154B, 155, 156, 157, 157L


Minor Program Requirements:

General Anthropology

- Anthropology 120

- Anthropology 153, 154A, 154B, 156, 157, 157L

- Anthropology 102, 103A, 109, 110, 120
- Anthropology, one course from 111, 112, 129
- Physical anthropology, one course
- Ethnography, one course
- Archaeology, one additional course
- An additional unit selected from the following: any upper division anthropology course, Art 150, 151, 152, Genetics 100A, 100B, 116

Total Units for the Major

64-82
Upper Division Courses

101. Principles of Human Ecology (4) II. Davis
Lecture: 3 hours; discussion—1 hour. Prerequisite: Biological Sciences 7 or Anthropology 101 recommended. An examination of the critical variables in the processes that relate man to his environment. Emphasis on the biological, cultural, social, and psychological factors which encourage stability or change in human ecological relationships. (Same course as Environmental Studies 101.)

102. Theory in Social and Cultural Anthropology (4) I. Boyd
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 or consent of instructor. An introduction to varieties of explanation in anthropology; discussion of controversy surrounding relations between the designation of food areas, choice of concepts, and selection of facts in the construction of anthropological theory.

103A. Archaeological Theory and Method (4) I. Bettsgerer
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 3, and Statistics 13. Theory and method of prehistoric archaeology.

103B. New World Prehistory: The First Arrivals (4) III. True
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Early man in the New World. Cultural adaptation and development of early hunting and gathering peoples in North and South America.

103D. New World Prehistory: Archaic Adaptations in New World Prehistory (4) II. Bettsgerer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The collectors: cultural diversification in post-Paleoindian settings.

103E. New World Prehistory: Formative Lifeways in North and South America (4) III. Baumhoff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The farmers: the transition from a hunting and gathering subsistence to sedentary farming in the American Southwestern, Mesoamerican, and Andean South American areas.

103F. New World Prehistory: The High Cultures: Mesoamerican and Andean South America (4) III. Baumhoff
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—3 hours; discussion—1 hour. A study of the phenomena of race mixture (miscegenation), intermarital marriage, and mixed (hybrid) human populations. Emphasis will be placed on the social and cultural effects of race mixture and of the interaction of racism and sexual behavior.

105A. Indians of North America (4) III. Osment
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians of North America: origins, languages, civilizations, and history.

105B. Indians of South America (4) III. Osment
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. An introductory survey of the Indians of South America: origins, languages, civilizations, and history.

106A. Prehistory of California and the Great Basin (4) II. True
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Description and analysis of peoples of California and the Great Basin (and their remains) from earliest times to Euro-American contact.

106B. Ethnography of California and the Great Basin (4) III. Baumhoff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Description and analysis of the native peoples and groups of California and the Great Basin since Euro-American contact.

106C. Ethnography of California and the Great Basin (4) III. Forbes
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Description and analysis of the native peoples and groups of California and the Great Basin since Euro-American contact.

107A. Old World Prehistory (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The beginnings and development of cultural phenomena during the Paleolithic epoch. Typical student is expected to have a survey of known cultural phenomena beginning some 2 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. Baumhoff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The first farmers. Development of a new way of life following the end of the Paleolithic. A critical and comprehensive 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. Baumhoff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. The development of civilization. Bronze and iron age culture in Africa, Asia, and Europe. An introduction to 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 sociocultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and how this as well as the background for present-day conditions.

109. Phonetics (4) I. Wall
Lecture—3 hours; discussion—1 hour. Through grounding in articulatory phonetics with some orientation to the fundamentals of acoustic phonetics. (Same course as Linguistics 108.)

110. Elementary Linguistic Analysis (4) II. Olmsted
Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. An introduction to phonemic theory, morphophonemics, morphemics, and syntax. (Same course as Linguistics 110.)

111. Intermediate Linguistic Analysis (4) III. Olmsted
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Continuation of course 110. Advanced work in phonemics, morphophonemics, morphemics, and syntax. (Same course as Linguistics 111.)

112. Comparative Linguistics (4) I. Olmsted
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Introduction to the methodology of linguistic reconstruction. (Same course as Linguistics 112.)

114. The Ethnography of Speaking (4) I. Wall
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 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 multilingualism. (Same course as Linguistics 114.)

118. Introduction to Ethnographic Research (4) III. Wall
Lecture—3 hours; discussion—1 hour. Prerequisite: course 102. Guidelines for the proper conduct of ethnographic research; standards for evaluating ethnographic literature.

118. Ethnosemantics (4) II.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or the equivalent. An examination of the use of linguistic, cognitive psychological, and mathematical analyses in the study of meaning of folk classification systems. Emphasis will be placed upon the development of skills in the collection and analysis of folk classification.

119. Culture and Personality (4) I. Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 4 or Linguistics 1. An introduction to the inclusive term of the "individual" in non-human primate, foraging, horticultural, pastoral, agricultural, and industrial societies. Impact of labor and political organization, socialization, and class and state formation, change, poverty, warfare and the emergence of world cultural systems.

120. Language and Culture (4) III. Wall
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 4 or Linguistics 1. Language and thought; systems of classification; linguistic aspects of culture and society.

121. Folklore (4) I. Crowley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 4 or Linguistics 1. Language and thought; systems of classification; linguistic aspects of culture and society.

122. Economic Anthropology (4) II. Davis
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in nonindustrial societies; its social and cultural setting and its modern changes.

123. Political Anthropology (4) II.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 4 or Linguistics 1. An introduction to political organization and decision-making processes in primiparous, tribal, and peasant political organization. Some attention will be given to political modernization within the setting of the colonial situation.

124. Religion in Society and Culture (4) I. Curley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism,
magic and witchcraft, rituals and symbols, and religious movements. Extensive discussion of ethnographic examples of the influence of social functions of religious institutions.

125. Comparative Educational Anthropology (4) III. Lecture—3 hours; discussion—1 hour. A comparative analysis of educational systems in terms of their embodiment of cultural traditions and cultural values. Examination of content, mode of instruction, and social relationships with educational institutions in several different cultures.

126. Anthropology of Development (4) III. Boyd Lecture—3 hours; hours discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Social and economic consequences of technological innovation are examined. Application of anthropological theory to cases of rural economy and society.

127. Urban Anthropology (4) III. Joseph Lectures—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of approaches to urban living: political structures, organization of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies.

128. Kinship and Social Organization (4) III. Davies Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical discussion of social organization with primary emphasis on typology and classification of family and kinship systems.

129. Sex Roles: An Anthropological Perspective (4) III. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Sex roles in primitive and complex societies. Impact of different political and economic systems on male and female activities and identities in evolution. Analysis of contemporary women's movement around the world.

130. 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.

131. Peoples and Cultures of Southeast Asia (4) III. Davies Lecture—3 hours; laboratory—1 hour. Prerequisite: course 2 or equivalent, or consent of instructor. The development of major cultural traditions, the patterns of ecological relationships, and the social structure of ethnic and regional groups in Southeast Asia. Offered in even-numbered years.

132. Culture and Conflict in the Middle East (4) III. Joseph Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 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 changes.

133. Peoples of Africa (4) III. Curley Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of Eastern, Central, and Southern Africa with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be the continuities and discontinuities between periods prior to European contact and the present.

134. Peoples of Afromerica (4) III. Crowley Lecture—3 hours; discussion—1 hour. A study of the cultural and social development and the contribution of Africans to the national cultures of the Americas.

135. Cultural Ecology (4) III. Orlove Lecture—3 hours; discussion—1 hour. A study of the cultural and social development and the contribution of Africans to the national cultures of the Americas.

136. Cultural and Environmental Perception (4) III. Orlove Lecture—3 hours; discussion—1 hour. An examination of man's relationship to the environment through the study of culture. The nature of subjective models and their impact on perceived behavior. Focuses upon classification and decision making. (Same course as Environmental Studies 141.)

137. Contemporary Societies of South America (4) III. Orlove Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. An introductory survey of the history and contemporary structure of South American society. Socio-economic and political organization in the countries of the continent and patterns of national integration and conflict.

138. Ethnology of Europe (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Sociology 1 or the equivalent. Ethnographic survey of selected areas of Europe as examples that illustrate issues of general theoretical concern. Attention will be given to problems rising from the urbanization process and to relationships between national governments and rural populations.

139. Peoples of the Pacific (4) III. Boyd Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania emphasizing origins, prehistory, and social organization of peoples of Polynesia, Micronesia, and Melanesia. Consideration of recent changes and appropriate ethical standards and effective solutions.

140. Primates Evolution Laboratory (3) III. Lecture—1 hour; laboratory—4 hours. Prerequisite: course 155 or 151 (may be taken concurrently). Osteological, dental, and neuropsychological studies of living and fossil primates. Limited enrollment.

141. Primates Evolution (4) III. McHenry Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; Zoology 2 recorated. The origin and relationships of the prosimians, monkeys, and apes.


143. Human Biological Variation (4) I. Smith Lecture—3 hours; discussion—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 racial differences among those in blood groups, plasma proteins, red cells enzymes, pedi-ology, morphology, pigmentation and dermatoglyphics.

144. Ecology and Sociobiology of Primates (5) I. Rodman Lecture—3 hours; discussion—1 hour; term paper. Prereq. ures: course 2 or consent of instructor. Study of ecological and evolutionary dynamics of social systems of prosimians, monkeys, and apes, and the place of social behavior in the primate in the context of contemporary theory and practice.

145. Ecology and Sociobiology of Primates (4) III. Rodman Lecture—2 hours; laboratory—4 hours. Prerequisite: course 154A, Statistics 13 (or the equivalent), and consent of instructor. Continuation of course 164A for students interested in methods of studying, describing and analyzing the ecology and sociobiology of primates. Laboratory consists of direct observation of prosimians and local apes with quantitative analysis of observations. Offered in even-numbered years.

146. Comparative Primate Anatomy (4) III. McHenry Lecture—2 hours; laboratory—1 hour. Prerequisite: course 1 or the equivalent. Introduction to the study of the human skeleton, including bone growth, pathology, radiology, evolution, dentition, and variations in race, sex, and age. Offered in odd-numbered years.

147. Anthropological Genetics (3) III. Smith Lecture—4 hours; laboratory—4 hours. Prerequisite: course 1 or Biological Sciences 1, and either Genetics 100B or 120. Processes of heredity and variation and genetic differences among human populations. Special attention will be given to the adaptive significance of genetic variation in human groupings and the evolutionary processes that affect genes.

157. Laboratory in Anthropological Genetics (2) III. Smith Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 or Biological Sciences 1, and either Genetics 100B or 120; enrollment limited to 15. Laboratory for students interested in understanding genetic variation in human populations. Methods by which genetic variation in human populations, human erythrocyte antigens, red cell enzymes and proteins, and cell enzymes and proteins are detected and described. Offered in even-numbered years.

158. Peasant Society and Culture (4) II. Orlove Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Comparative study of peasant communities, utilizing anthropological methods, analysis of urban-rural relations, problems of economic development and social change.

138. Anthropology of Complex Societies (4) II. Orlove Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Examination of local-level social complex societies, major topics include patron-client relations and brokers, regional systems, ethnicity, adoption and maintenance of local institutions and informal social relations. Examples are taken from urban areas and peasant groups.

140. Cultures of China and Korea (4) III. Wallacker (Cultural 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.

141. Culture of Japan (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Japanese cultural traditions; social structure and the political system.

144. Special Study for Honors Students (1-5) I, II, III. The Staff (True in charge) Prerequisite: open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. (PFP grading only.)

145. Field Course in Archaeological Methodology (3) III. True Laboratory—4 hours. Prerequisite: course 3. Lectures, museum preparation, and weekend excavations. May be repeated for credit with consent of instructor. Limited enrollment.

146. Archaeological Methodology (3) III. Bethel Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Museum preparation, advanced field investigations, and guidance in preparation of museum material for public display. May be repeated for credit with consent of instructor. Limited enrollment.

147. 777. Tutoring in Anthropology (1-5) I, II, III. The Staff Tutorial—1-5 hours. Prerequisite: upper division standing with at least an A grade in anthropological Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (PFP grading only.)

148. Directed Group Study (1-9) I, II, III. The Staff (Chairperson in charge) Discussion—3 hours. Prerequisite: consent of instructor. Directed reading and group study of selected anthropological problems. (PFP grading only.)

149. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PFP 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 on their international aspects.

202. History and Theory of Physical Anthropology (4) III. The Staff Seminar—3 hours. The history of thought in physical anthropology. 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) III. Bethelg Seminar—3 hours. The history of thought in archaeology and analysis of research methods.

204. Contemporary Issues in Anthropological Theory (4) III. Boyd Seminar—3 hours; discussion—1 hour. Prerequisite: course 2, 102 or consent of instructor. Advanced consideration of fundamental issues in anthropological theory. Examination of critical evaluation of major contemporary debates among proponents of competing theories.

206. Research Design and Method in Social Anthropology (5) I. Joseph Seminar—4 hours; weekly meeting with instructor for in-depth work on proposal writing. Formulation of research problems; relationships between theory and method; funding, pre-fieldwork, procedure, the community field research techniques, problems of ethics; intensive work on proposal writing.

209. Objectives and Methods for College Teaching of Anthropology (2) I, II, III. The Staff Discussion—2 hours. Prerequisites: appropriate training and experience. Prereq.: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience as an undergraduate.

210. Aspects of Culture Structure (4) I, II, III. Seminar—3 hours. Analysis of various phases of culture, such as religion, economics, law, and folklore.
211. Advanced Topics in Cultural Ecology (3). Prerequisite: Lecture—3 hours. Prerequisite: graduate standing. Anthropologists are invited to discuss the current state of the field, with a focus on the cultural and social structures of the world's major regions. The course will cover recent research in a variety of areas, including human development, social change, and cultural diversity.

216. Problems in Archaeological Method (4). Prerequisite: Seminar—3 hours. Techniques for analyzing archaeological data; application of various prehistoric cultures. May be repeated for credit.


218. Topics in North American Prehistory (4). Prerequisite: Seminar—3 hours. Prerequisite: graduate standing. Advanced study on current problems in North American prehistory and paleoecology. May be repeated for credit only if material is unique for that student and with consent of instructor.

220. Field Course in Linguistics (4). Prerequisite: Seminar—2 hours. Laboratory—2 hours. Prerequisite: consent of instructor. Focus on the phonological analysis of languages, with an emphasis on the use of electronic recording, transcription, and analysis.

221. Rural Transformation in Postcolonial Societies (4). Prerequisite: Seminar—3 hours. Prerequisite: courses 220, 226, or consent of instructor. Problems of rural transformation and the role of politics in the development of new political and social systems. Attention will be given to the implications of this interaction for rapid economic growth.

222. Problems in Urban Anthropology (4). Prerequisite: Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on some of the following topics: class, gender, race, migration, and political economy.

223. Economic Anthropology (4). Prerequisite: Seminar—3 hours. Prerequisite: consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.


228. Problems in Afro-American Studies (4). Seminar—3 hours. Prerequisite: consent of instructor. Study of the social, cultural, and political history of African Americans.

241. Topics in North American Ethnology (4). Prerequisite: Seminar—3 hours. Prerequisite: consent of instructor. Study of the social, cultural, and political history of North American Indian societies.

245. Ethnology of Northern and Central Asia (4). Prerequisite: Seminar—3 hours. Prerequisite: consent of instructor. Study of the social, cultural, and political history of the indigenous peoples of Central and Northern Asia.

252. Human Evolution Seminar (4). Prerequisite: Seminar—3 hours. Prerequisite: consent of instructor. Study of the human evolutionary process, including the emergence of hominids, Australopithecus, Homo erectus, and Homo sapiens.

253. Seminar in Human Biology (4). Prerequisite: Seminar—3 hours. Prerequisite: consent of instructor. Study of selected topics in human biology.

254. Primate Behavior (4). Prerequisite: Seminar—3 hours. Prerequisite: course 154B or equivalent. Focus on the study of primates, with particular emphasis on preparation for field studies.

265. Concepts and Problems in Applied Anthropology (4). Seminar—3 hours. Prerequisite: consent of instructor. Advanced study in culture change; case studies of directed culture change; problems of planning and evaluation; use of ethnographic theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

280. Ethnological Theory and Method (4). Prerequisite: Seminar—3 hours. Prerequisite: consent of instructor. Advanced study in ethnographic theory and method; utilization of diverse types of data, especially documentary sources to reconstruct socio-cultural history. Individual attention directed to the applied uses of ethnology in the solution of contemporary social problems.


298. Group Society (1-4). Prerequisite: Seminar—3 hours. The Staff (Chairperson in charge) (SU grading only.)

2991. Research Seminar (1-12). Prerequisite: Seminar—3 hours. The Staff (Chairperson in charge) (SU grading only.)

2992. Dissertation Research (1-12). Prerequisite: Seminar—3 hours. The Staff (Chairperson in charge) (SU grading only.)

Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)

Marc Pilisuk, Ph.D., Chairperson of the Department

Department Office, 106 AOB-4 (752-0770)

Faculty

J. Howard Adams, Ph.D., Associate Professor
Edwin B. Almro, Ph.D., Assistant Professor
Louise M. Bachtol, Ed.D., Professor
Keith Barton, Ph.D., Associate Professor
Brenda K. Bryant, Ph.D., Associate Professor
Glen Burch, Ed.D., Lecturer Emeritus
Frances Butler, M.A., Professor
L. Clair Christensen, M.A., Adjunct Lecturer
Susan Crockenbeck, Ph.D., Associate Professor
Noreen G. Dowling, Ph.D., Adjunct Lecturer
Jack D. Frazee, M.A., Adjunct Lecturer (App/ Behavioral Sciences, Anthropology)
Ishia Fujimoto, M.A., Lecturer
Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education
Dolph E. Gotteli, M.A., Associate Professor
James Greshop, Ph.D., Adjunct Lecturer
Lawrence V. Harper, Ph.D., Professor
Glen R. Hawkes, Ph.D., Professor
Sarah H. Hutchison, M.Ed., Lecturer
Elwood M. Juergens, Ph.D., Professor Emeritus
George Kagiwada, Ph.D., Associate Professor
Rosemarie Kraft, Ph.D., Assistant Professor
Gyorgy Laky, M.A., Associate Professor
James G. Leising, Ph.D., Lecturer and Supervisor of Teacher Education
Peter C.Y. Leung, M.S., Lecturer
George C. Longfield, M.F.A., Associate Professor
David B. Lynn, Ph.D., Professor Emeritus
E. Dean MacCannell, Ph.D., Professor Emeritus
Jacquelyn Mitchell, Ed.D., Assistant Professor (App/ Afro-American Studies)
Heige B. Olsen, Senior Lecturer
Robert P. Panting, M.E., Adjunct Lecturer
Marc Pilisuk, Ph.D., Professor
Mary C. Regan, Ph.D., Professor
David Risling, M.A., Senior Lecturer
Victoria Z.Rossbach, M.A., Professor Emeritus
Katherine W. Rossbach, M.A., Professor Emeritus

JoAnn A. Stabb, M.A., Lecturer
Onville E. Thompson, Ph.D., Professor
B. Nancy Welker, M.A., Senior Lecturer
Miriam J. Wells, Ph.D., Associate Professor
Emmy E. Werner, Ph.D., Professor

The Major Program

The Applied Behavioral Sciences major is a major discipline program that is individually tailored by the student along with faculty advisers. The major emphasizes the integration of theory and practice in the study of social problems. It features a significant component of field experience, and that it assists 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 recent courses approved for the major 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.

Applied Behavioral Sciences

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Depth Subject Matter</th>
<th>Individualized Program, including senior project, to be determined by student and advisory committee</th>
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<tbody>
<tr>
<td></td>
<td>Applied behavioral sciences, upper division courses</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Behavioral and social sciences, upper division courses</td>
<td>40</td>
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Breadth Subject Matter

A list of suggested courses 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 skills in oral and written communication.

Unrestricted Electives

Total Units for the Major

180

Breadth Subject Matter

A list of suggested courses in each of the study areas, (a) through (e), may be obtained from the Advising Office, 119 AOB-4.

Other Requirements

Admission: develop 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 satisfactory completion of supervised field experience, internship, thesis, or other creative activity.

Major Adviser. M. J. Wells.

Advising Center for the major is located in 119 AOB-4 (752-2244).
Minor Program Requirements:
The Department of Applied Behavioral Sciences offers the following minor programs:

UNITS

Aging and Adult Development .................. 24-30
Applied Behavioral Sciences 177, 191 .......................... 6
Human Development 100C .................. 4
Psychology 113 ................................ 4
Support Systems, Human Development 110, .......................... 110
Applied Behavioral Sciences 177 .. 178
Application, at least 2 units of practicum .......... 2-8
Asian American Studies .................. 20
Asian American Studies 1, 100 or 110, and 140 or 156 .... 2
Two courses selected from the following in consultation with faculty adviser .......................... 8
Asian American Studies 111, 112, .......................... 113
Community Development .................. 23
Applied Behavioral Sciences 19, 151, 152, .......................... 164
Two courses selected from the following: 170 series .......... 15
(b) Applied Behavioral Sciences 162, 163 8
Applied Behavioral Sciences 171, 172, 173, 174, 175, 176, 177
Minor Adviser. M. J. Wells, Graduate Study. See page 37 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, II, Fujimoto Lecture—2 hours. An interdisciplinary orientation to the critical issues of human ecology and the numerous crises that bear upon the world community. Special emphasis is placed on the interrelationships of the natural ecosystem, population growth, and control, availability of resources, social development, and economic stability. (PnP grading only.)

18. Science and Society (3) III. Dowling Lecture—2 hours; discussion—1 hour. Assumptions and biases in different fields, of knowledge, taboo topics, and the nature of evidence in the natural and academic communities; fit between University education and issues of society.

19. The Community (3) MacCannell Lecture—3 hours. Exploration of ways in which people come together, and how this is reflected in the expression of community; examination of the dynamics of community change.

47. Orientation to Community Resources (2) I, II, III. The Staff (Pilskik in charge) Field trip—3 days; seminar—three 2-hour sessions. (Course given between quarters) Prerequisite: consent of instructor. Field trip to educational, social, and welfare agencies in California. Observation and discussion with staff members of different agencies which serve the needs of familiy and children. Advance reservations required. (PnP grading only.)

49. Internship (1-12) I, II, III. The Staff (Pilskik in charge) Field placement—3-6 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus. In community and institutional settings. (PnP grading only.)

50. Summer Study for Undergraduates (1-5) I, II, III. The Staff (Pilskik in charge) (PnP grading only.)

Upper Division Courses

151. Community Research and Analysis (4) I, II, Fujimoto Lecture—4 hours. Prerequisite: consent of instructor. Theories on and evolving uses of the research 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) I, II. Fujimoto Lecture—4 hours. Prerequisite: course 151 recommended. Introduction to principles and strategies of building institutions so community people can effect change. Examination of styles of citizen participation and control and the various NOTE: For key to footnote symbols, see page 128.

roles of change agents in working with communities for their own self-development.

153. Community Organizations, Institutions and Resources (4) III. The Staff (Pilskik in charge) Lecture—4 hours. Prerequisite: course 151 or 152. Analysis of resources, organizations, institutions, agencies and groups in the community, and how each affects the development process.

154. Theory in Community Change (4) II. The Staff Lecture—4 hours. Prerequisite: course 151, plus one other course in Applied Behavioral Sciences. Consideration of the concepts and issues in change process pertinent to community development.

155. Communication Skills for Community Development (4) II, Pilskik Lecture—4 hours. Prerequisite: course 151 or 152. Communication skills and techniques in community development programs, to include group process, role-taking, interpersonal relationships and methods useful in community development.

159A. Field Experience in Community Development (12) III. Fujimoto Prerequisite: courses 151 and 152, or consent of instructor. Field assignment-internship with community and grassroots groups, analysis of resources and alternatives for resources and potential programs to fill identified needs.

159B. Field Problems (3) III. Fujimoto Seminar—3 hours. Prerequisite: course 158A and consent of instructor. Developing and implementing and evaluating field research and problem solving.

160A. Institutional Research Methods in Applied Behavioral Sciences (4) II, MacCannell Lecture—4 hours. Prerequisite: upper division status; courses 162 and 164. Field methods and basic procedures for conducting research in behavioral science research methodology to multidisciplinary problems confronting organizations. Students electing this course may not receive credit for Neville Studies 140.

160B. Research Design and Analysis of Institutions (4) II, Regan Lecture—3 hours; discussion—1 hour. Prerequisite: course 160A and either Education 114, Statistics 13, or consent of instructor. Applied behavioral science research design and analysis for organizational research. Methods of data analysis, tests of significance, and use of computer in data processing.

162. People, Work and Technology (4) I, Wells Lecture—4 hours. Prerequisite: consent of instructor. Course in the social sciences (e.g., Sociology 1, Anthropology 102, Economics 1, 18, or labor history). Relationship between work, technology, and people's lives. Such topics as industrialization, bureaucracy, rationalization, shape of the work-linked community, education and the labor market, and work and the economic system and the future of work.

163. Behavior of Community Organizations (4) I, Lecture—4 hours. Prerequisite: course 162 or consent of instructor. How community organizations function and how members of organizations relate to each other, the organization, and those who owe allegiance to the organization. Effects of leadership, motivation, group dynamics, communications, and power to be considered.

164. Theories in Organizational Change (4) III. Regan Lecture—2 hours; discussion—2 hours. Prerequisite: course 162. The organization as an open system which changes in response to its environment. Emphasis on structural, technological and humanistic approaches to change.

165. Family Management in Contemporary Society (4) II, The Staff Lecture—4 hours. Prerequisite: Human Development 110 and Economics 1, 14. Prereq: consent of instructor. Influence of social, economic, political and technological environments on contemporary family roles and family management strategies used by families and types of social support systems needed.

171. Housing (4) III, Wells Lecture—4 hours. Exploration of the shelter aspects of family environments. 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) I, Wells Lecture—4 hours. Prerequisite: upper division standing. 8 units of sociology or anthropology or anthropology. Study of the phenomena of social inequality in U.S. Various approaches to inequality will be examined, including structural and historical explanations, prejudice and discrimination, the "cultural revolution," and arguments concerning race, sex, and genetic potential.

173. The Continuing Learner (4) II. Dowling Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the nature and role of adult education in the community. Designing of adult education programs.


175. Education in the Community (4) I, Gieshop Lecture—4 hours. Prerequisite: upper division standing. Philosophical consideration of the function of education in the community. Relationships of community and non-formal education in formal education, and schooling to individual, community and national development. Study of planning process and role of education in institutional and social settings.

178. Comparative Ethnicity (4) III, Mitchell Lecture—4 hours. Prerequisite: upper division standing. 8 units of sociology or anthropology or combination. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies.

177. Social Aspects of Aging (4) I, Burch Lecture-discussion—4 hours. Prerequisite: Human Development 100C or Psychology 115 recommended. Major characteristics, needs and interests of older people in contemporary America. Emphasis on social problems and community approaches to their solution.

190. Proseminar in Applied Behavioral Sciences (1) I, II, III, II, II, Regan Seminar—1 hour. Prerequisite: consent of instructor. Discussions of selected critical issues in the applied behavioral sciences. Required of seniors in the Applied Behavioral Sciences major. May be repeated for credit. (PnP grading only.)

191. Proseminar: Issues in Aging (2) III, Burch, Haywood Seminar—2 hours. Prerequisite: consent of instructor. Discussion of selected critical issues in aging.

192. Internship (1-12) I, II, III, The Staff (Pilskik in charge) Field placement—3-36 hours. Prerequisite: completion of 64 units and consent of instructor. Supervening internship, off and on campus, in community and institutional settings. (PnP grading only.)

195. Senior Project in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Pilskik in charge) Prerequisite: major in Applied Behavioral Sciences and consent of instructor. Guided research leading to compilation of senior thesis. May be repeated for credit. (PnP grading only.)

1977. Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Pilskik in charge) Prerequisite: consent of instructor. Leading of small voluntary study groups. (PnP grading only.)

197T. Community Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Pilskik in charge) Prerequisite: consent of instructor. Supervised tutoring in the community. (PnP grading only.)

198. Directed Group Study I (1-5) I, II, III. The Staff (Pilskik in charge) (PnP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Pilskik in charge) (PnP grading only.)

Graduate Courses

201. Planning Processes in Applied Behavioral Sciences (4) I, Thompson Lecture—3 hours; supervised practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, including new concepts, theories, and methods for planning with application to educational institutions. Agencies and the community.

202. Systems Approach for Organizational Change (4) II, Regan Lecture—3 hours. Supervised practice in an institution studying the process of change—3 hours. Prerequisite: course 201. Study of institutional processes, resource allocations, communication networks, program priorities and obstruct mechanisms needed for change.

203. Evaluation and Decision Making (4) III, Goldman Lecture—3 hours; supervised practice in an institution studying the process of change—3 hours. Prerequisite: course 202. The study of decision-making behavior, theoretical formulations of evaluation and decision making, value conflicts, multiple information requirements at different organizational levels, research techniques and the role of evaluation in programs.

Applied Behavioral Sciences

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240. Community Development: Research and Analysis (4) [MacCannell]
Seminar—4 hours. Prerequisite: course 160A or Sociology 46A or the equivalent and a course in statistics. Methods of analyzing institutional, community, and regional social structure, as preparation for planned change. Research design and the management of large-scale data files.

241. The Economics of Community Development and Planning Strategies (4) [S. Hoehn (Agricultural Economics)]
Seminar—4 hours. Prerequisite: course 240 and a course in economics. Economic theory and planning strategies affecting nonmetropolitan communities. Human resources, community services and infrastructure, industrialization and technological change, policies and plans for mobilizing resources for community development.

242. Community Development: Program Management (4) [III. The Staff (Pilsak in charge)]
Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or city level.

243. Professional Skills for Human Service and Community Development (4) [Pilsak]
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate student standing in a social science discipline. Theory of interpersonal communication and small group process as applied to development of professional skills as community developer, program administrator and/or consultant.

290. Seminar (1-3) I, II, III. Thompson
Seminar—1 hour. Analysis of research in applied behavioral sciences. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Pilsak in charge)

299. Research (1-6) I, II, III. The Staff (Pilsak in charge) (SU grading only)

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Applied Physics
See Physics

Aquaculture
See Animal Science

Art
(College of Letters and Science)
Ralph M. Johnson, M.S., Chairperson of the Department
Department Office, 101 Art Building (752-0105)

Faculty
L. Price Anderson, Jr., Ph.D., Lecturer
Robert C. Amos, M.F.A., Professor
Joseph A. Baird, Ph.D., Professor
Richard D. Cramer, M.F.A., Professor Emeritus
Daniel J. Crowley, Ph.D., Professor (Art, Interdisciplinary)
Mary H. Fong, Ph.D., Associate Professor
Robert J. Grigg, Ph.D., Associate Professor
William Henderson, M.F.A., Associate Professor
Harvey Himmelberg, M.A., Professor
Seymour Howard, Ph.D., Professor
Ralph M. Johnson, M.S., Professor
Daisuke S. Mace, Ph.D., Assistant Professor
Manuel J. Neri, Professor

Roland C. Petersen, M.A., Professor
Jeffrey Ruda, Ph.D., Assistant Professor
Cornelia Schutz, M.F.A., Associate Professor
Daniel Shapiro, Professor
Wayne Thiebaud, M.A., Professor
Garner H. Tullis, M.A., Associate Professor

The Major Programs
The Department of Art offers undergraduate majors in Art Studio and in the History of Art, each leading to the Bachelor of Arts degree. Both programs provide general education and preparation for further training. Some degree candidates work toward a teaching credential — some enter graduate programs here or elsewhere.

In general, members of the Studio faculty are active in research as painters, sculptors, ceramists, printmakers, photographers, and filmmakers; members of the History faculty are actively engaged in historical scholarship. Each of these activities is precisely associated with subject matters taught in the classroom, both undergraduate and graduate. Limited undergraduate offerings in museum methods and conservation are given; more extensive graduate work in these fields is anticipated.

Portfolios. Entering 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 their work which is subject to faculty perusal at such times as when the student is declaring the major, enrolling in overflow courses, requesting independent study courses, etc.

Transfer Students. Before enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

Art History
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Preparatory Subject Matter</th>
<th>Depth Subject Matter</th>
<th>Total Units for the Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 1A, 1B, 1C</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One course in sculpture or ceramics</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four courses from Group C, History of Art: select 2 courses each from two separate periods (e.g., 154A, 154B and 178B, 178C)</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five additional courses from Group C, History of Art, or D, Special Study Courses</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommended
See recommended courses following the Art Studio major requirements below.

Art Studio
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Preparatory Subject Matter</th>
<th>Depth Subject Matter</th>
<th>Total Units for the Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three courses from Art 2, 3, 4, 5, 6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two courses from Art 1A, 1B, 1C</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparatory Subject Matter</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six courses, under three different artists, from Group A, Practice of Art, or D, Special Study Courses</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One course from Group B, Theory and Criticism</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two courses from Group C, History of Art</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommended
Both Art History and Art Studio Majors
(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);
(c) Students preparing for graduate work in any of the environmental design professions should take Art 2, 3, 5, 12, 12A, 12B, 12C, 148, 148. 184.

Teaching Credential Subject Representative, Department Chairperson. See page 103 for the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the M.A. degree in the practice of art and the M.A. degree in the history of art. Detailed information regarding graduate study may be obtained from the Announcement of the Graduate Division.

Courses in Art
Lower Division Courses

1A. Ancient Art (4) [I. Howard]
Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves of the hold of the Roman Empire.

1B. Medieval and Renaissance Art (4) [II. Grigg]
Lecture—3 hours; discussion—1 hour. Christian, Barbarian, Moslem, and Classical traditions in European Art from the fourth through the sixteenth centuries.

1C. Baroque and Modern Art (4) [II. III. Macleod, Ruda]
Lecture—3 hours; discussion—1 hour. Major and minor masters of the Western world after the Counter Reformation.

1D. Asian Art (4) [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 Mao's China.

2. Drawing (4) [I. II. III. Staff]
Laboratory—8 hours; to be arranged—4 hours. Form and composition in black and white.

3. Drawing 11 (4) [II. III. Staff]
Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form and composition in color.

4. Life Drawing (4) [I. II. III. Staff]
Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form in composition using the human figure as subject.

5. Sculpture (4) [I. II. III. Staff]
Laboratory—8 hours; to be arranged—4 hours. Form in space using plaster and other materials.

10. Introduction to Art: History and Appreciation (4) [I. II. III. Thiebaud, Tullis]
Lecture—3 hours; term paper or gallery studies and reviews. Understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. (PRN grading only.)
Asian-American Studies

178A. Baroque Art (4) III. Baird Lecture—2 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) III. Ruda Lecture—2 hours. Painting in Western Europe in the seventeenth century: especially the Dutch, Flemish, French, and Italian painting movements. Works of art and artists. Emphasis on French (Impressionism, Post-Impressionism, etc.).

180A. Art in the Age of Revolution (4) I. Macleod Lecture—3 hours; term paper or gallery studies and review. Development of themes in European painting from 1815 to 1860 and their political implications. Artists to be studied include Goya, David, Delacroix, Constable, Turner, and Courbet.

183B. Painting from Cézanne to Manet (3) I. Macleod Lecture—3 hours; term paper or gallery studies and review. Nineteenth-century developments. Emphasis on France (Impressionism, Post-Impressionism, etc.).

183C. Painting in Europe, 1900-1945 (4) III. Macleod Lecture—3 hours; term paper or gallery studies and review. Analysis and modernism in painting from the beginning of the century until the end of World War II (Cubism, Fauvism, Bauhaus, Surrealism, etc.). Artists include Picasso, Matisse, Kandinsky, Mondrian, Ernst.

183D. Modern Sculpture (4) III. Howard Lecture—3 hours; term paper or gallery studies and review. Sculpture Neo-Classicism to the present.

183E. Art since 1945 (4) I. Macleod Lecture—3 hours; class report and term paper. Prerequisites: 183A, 183C. Contemporary painting and sculpture in Europe and America from World War II to the present.

184A. Architecture in the Twentieth Century (4) I. Conner Lecture—3 hours; term paper and field trip. Styles 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.

185A. Art of Latin America (4) I, II, B. Lecture—3 hours; term paper or gallery studies and review. Architecture, sculpture, and painting in Mexico from 1530 to the present. The American Southwest, the colonial art of Mexico and Spanish America, and modern architecture in Brazil. European and Latin American contributions to the New World.

188B. Architecture of the United States (4) III. Baird Lecture—2 hours; term paper or gallery studies and review. American building, with emphasis on early colonial, Georgian, nineteenth, and twentieth-century developments. Particular attention to Northern California in the latter part of the course.

188C. Painting of the United States (4) I. 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 architects and movements.

190. Proseminar in the History of Art (4) I, II. The Staff (Chairperson in charge) Lecture—3 hours; term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substantial paper in a particular area of art history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrollment.

Group D: Special Study Courses

192. Internship in Museums (2-12) I, II. The Staff (Chairperson in charge) Practical work experience. Supervised program of student internship in a public museum or private organization with major art collections. To be taken as part of the music major only, during following courses 401 or 402. May be repeated once for credit. (P/NP grading only.)

195. Directed Group Study (1-5) I, II. The Staff (Chairperson in charge) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II. The Staff (Chairperson in charge) (P/NP 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.

204. Problems in Representation and Iconology (4) II. Howard Seminar—3 hours; term paper. Research into the symbolic meanings of historic motifs in art, and their visual representation.


251. Seminar in Primitive Art (4) I. Crowley Seminar—3 hours. Selected areas of special study in the arts of Africa, Oceania, and Pre-Columbian America. In certain years, study of the Indians of the Americas, pre-Columbian 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.

255. Seminar in Ancient Art: Rome (4) II. Howard Seminar—3 hours. Selected areas of special study in Roman art from Republican to late Imperial.

263. Seminar in Chinese Art (4) I. Fong Seminar—3 hours; paper. Selected areas of special study in Chinese Art.

276. Seminar in Medieval Art (4) III. 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) III. Grigg Seminar—3 hours. Selected areas of special study in Netherlandish 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 Florentine to Cinquecento.

279. Seminar in Baroque Art (4) III. Baird Seminar—3 hours. Selected areas of special study in Baroque art from late sixteenth to late eighteenth centuries.

280. Seminar in Modern European Art (4) III. Macleod Seminar—3 hours. Selected areas of special study in art since 1800 in Europe.

288. Seminar in American Art (4) III. Baird Seminar—3 hours. Selected areas of special study in art in the United States from colonial times to the present.

290. Seminar (4) I, II, III. The Staff Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

291. Seminar: Critical Evaluation (1) I, II, III. The Staff Graduate Adviser in charge) Seminar—1 hour. May be repeated for credit. (SU grading only.)

292. Seminar: Comprehensive Qualifying (1) I, II, III. The Staff (Graduate Adviser in charge) Seminar—1 hour. A further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (SU grading only.)

299. Individual Study (1-6) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

300. Comprehensive Project (0) 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. (SU 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 146).

Related Courses

For other Asian languages, see Oriental Languages and Civilizations.

Courses in Asian American Studies

Lower Division Courses

1. Introduction to Asian American Studies (4) I, III. Amoral Lecture—3 hours; discussion—1 hour. Asian American experience, 1850 to present with focus on development of a sense of history and identity in context of the larger American society.

2. Contemporary Asian Experience in America (4) II. Kagawa Lecture-discussion—4 hours. Analysis of ethnicity, race, and culture as it relates to the identity and growth of the Asian American community.

20. Asian Calligraphy (3) I, II. Leung Lecture—2 hours; laboratory—3 hours. Prerequisite: knowledge of Chinese, Mandarin or Japanese helpful. Introduction to Asian calligraphy stressing the technique of writing.

29. Internship (1-12) I, II. The Staff (Paid in charge) Field placement—3 to 36 hours. Prerequisite: consent of instructor. Supervised internship off and on campus in Asian community and institutional settings related to Asian American concerns. (P/NP grading only.)

Upper Division Courses

100. Asian American Communities (4) II. Kagawa Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Political and social status, occupation, income, education, health, housing, and civic culture of various Asian American communities in the United States; segregation in international and intercultural communities, relations between rich and poor, patriotism, exploitation; mobility within each ethnic group.

110. Institutional Racism and the Asian American (4) II. Kagawa Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Historical and contemporary effects of institutional patterns on Asian Americans.

111. Alienation and the Asian American (4) II. Kagawa Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. An examination of self-awareness, alienation, and the perspective of Asians in America. Emphasis will be placed on the problems of identity formation of Asian Americans.

112. Asian American Women (4) II. The Staff Lecture—4 hours. Prerequisite: course 1 or 2. History and struggle of Asian women in America; critically analyze their media images and stereotypes; and discuss in-depth the role of Asian American women in the community movement for social change.

140. Speech Patterns of Asian Americans (4) III, IV. Leung Lecture—4 hours. A general introduction to bilingualism as a social issue; survey of bilingual communities, problems of bilingual speakers, linguistic effects of bilingualism, particularly the effects of Asian languages in the speech patterns of Asian Americans. (P/NP grading only.)

150A. Pilipino Experience (4) II. Atwood Lecture—3 hours; discussion—1 hour. Culture and history of the Philippines from pre-Hispanic to the present.

150B. Culture and History of the Philippines from pre-Hispanic to the present.
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 include: agricultural meteorology, air-pollution forecasting and control, weather modification, climate studies 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.

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Preparatory Subject Matter</th>
<th>68</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Mathematics (Mathematics 21A, 21B, 21C, 22A, 23A or Statistics 32)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Computer science (Engineering 5 or Mathematics 26)</td>
<td></td>
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<tr>
<td>3</td>
<td>Physics (Physics 8A-88BC)</td>
<td></td>
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<tr>
<td>10</td>
<td>Chemistry (Chemistry 1A, 1B)</td>
<td></td>
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<tr>
<td>10</td>
<td>Biological science (Biological Sciences 1, Botany 2 or Zoology 2-2L)</td>
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<tr>
<td>12</td>
<td>English arts and humanities elective (2 units)</td>
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<tr>
<td>1</td>
<td>Meteorology (Atmospheric Science 20-20L)</td>
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<tr>
<th>Depth Subject Matter</th>
<th>30</th>
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<tbody>
<tr>
<td>11</td>
<td>Atmospheric Science 110A, 110B, 120, 121A, and 121B</td>
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<tr>
<td>17</td>
<td>Upper division Atmospheric Science courses selected with adviser’s approval</td>
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<table>
<thead>
<tr>
<th>Subtotal Subject Matter</th>
<th>28</th>
</tr>
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<tbody>
<tr>
<td>9</td>
<td>Social sciences and Humanities electives</td>
</tr>
<tr>
<td>19</td>
<td>Restricted Electives</td>
</tr>
<tr>
<td>21</td>
<td>Resource and environmental sciences electives</td>
</tr>
<tr>
<td>6</td>
<td>Coordinated group of courses to be chosen with adviser’s approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science</td>
</tr>
<tr>
<td>33</td>
<td>Unrestricted Electives</td>
</tr>
</tbody>
</table>

Total Units for the Major: 180

Major Adviser: J.J. Carroll (Land, Air and Water Resources).

Advising Center is located at the College of Agricultural and Environmental Sciences, 122-H Holton Hall, 122-H Holton Hall, Resource Sciences Teaching Center (752-1669).

Graduate Study: You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees. Detailed information can be obtained from the graduate adviser and the Announcements of the Graduate Division.

Graduate Adviser: B.C. Wane (Land, Air and Water Resources).

Related Courses: See Civil Engineering 149, 242; Environmental Studies 150A, Environmental Geology 131; Geography 3; Physics 105C, Resource Sciences 203; Water Science 202.

NOTE: For key to footnote symbols, see page 126.

Courses in Atmospheric Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122-H Holton Hall (752-1669).

Lower Division Courses


20L. Introduction to Meteorology Laboratory (1) (J.J. Carroll). Laboratory—3 hours; one or more field trips. Prerequisite: course 20 (preferably taken concurrently). Introduction to atmospheric instruments and observations; cloud observation; atmospheric soundings; weather maps and charts; weather forecasting.


21. Directed Group Study (1-5) (J.J. H., III) (J.J. C.). Course and instructor: Work-learning experience of and on campus in resource science. Directed study supervised by a member of the faculty. (P/N grading only.)

26. Special Study for Undergraduates (1-5) (J.J. H., III) (J.J. C.). (P/N grading only.)

Upper Division Courses

110. Micrometeorology (3) (J.J. Carroll). Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 20A, 20B, 121A, 121B (concurrently); knowledge of Fortran (Engineering 2). Examination of thermodynamic 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) (J.J. 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 dewpoint forecasts, tropical meteorology, satellite meteorology and numerical analysis of meteorological data.

120. Atmospheric Thermodynamics and Statics (3) (J.J. Wane). Lecture—2 hours; laboratory—6 hours. Prerequisite: Physics 8C, 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.

141A. Atmospheric Dynamics (3) (J.J. Wane). Lecture—3 hours. Prerequisite: course 120. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relation to atmospheric circulation; waves in the atmosphere, vorticity. The dynamical basis of modern numerical methods in meteorology.

141B. Atmospheric Dynamics (3) (J.J. Wane). Lecture—3 hours. Prerequisite: course 120. The dynamics of fluid motion in geophysical and laboratory systems: Rosby waves; Kelvin waves; the effect of turbulence; boundary layers; the Ekman layer; the dynamics of convective motion: the Rayleigh problem; penetration convection; plume models, cumulus models.

142. Meteorological Instruments and Observations (3) (J.J. C.). Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 20 or the equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.
Avian Sciences

125. Atmospheric Physics (3) We, Caroll Lecture—3 hours. Prerequisite: course 120. Study of physical processes in the atmosphere. Emphasis will be given to microphysics of cloud growth and atmospheric radiative processes and their effect on climate.

131. Air Pollution Meteorology (3) III. Piochovni Lecture—3 hours. Prerequisite: Physics 2C, Mathematics 168, Chemistry 1B, or consent of instructor. Comprehensive overview of the relationship of meteorology to air pollution. Topics include: types and sources of pollutants; photochemistry, diffusion and transport, monitoring and air quality standards, and meteorological weather modification; and air pollution climatology.

133. Biometeorology (4) I, Hatfield Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 and an upper division course in a biological discipline; or permission of the instructor. An introduction to biometeorology and survey of research in atmospheric and biological interactions. Physical basis for plant, animal and human responses and adaptations to short-term and long-term meteorological events.

150. Numerical Weather Prediction (4) I, Grodahn Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, 121A, 121B, or equivalent in 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 boundary layer; effects on surface fluxes; methods of observation. Turbulent diffusion in the boundary layer. Micrometeorology and near ground surfaces.

192. Atmospheric Science Internship (1-12) II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of four units and consent of instructor. Work experience off campus in atmospheric science. Internship supervised by a member of the faculty. (PNP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: three upper division units in Atmospheric Science. (PNP 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 a grade of at least an overall B average. (PNP grading only.)

Graduate Courses

250. Atmospheric Processes (3) III. Caroll, Weare Lecture—3 hours. Prerequisite: Mathematics 22B-22C; Physics 1C. Advanced phenomenological and physical study of atmospheric processes and processes including radiation, stastics, thermal structure and weather phenomena. An emphasis on presentation of the major topics studied in Atmospheric Science 20, 110A-110B, 121A-121B, and 125. Credit not allowed for students who have completed any of these courses.

210. Atmospheric Physics (3) III. Weare 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, global atmospheric chemistry, and the physical and dynamical processes in the upper atmosphere.

221. Advanced Atmospheric Dynamics (3) III. Grodahn Lecture—3 hours. Prerequisite: courses 120, 121A, 121B, or the equivalent. The energetics of atmospheric flows will be examined. Particular emphasis will be placed on the interactions of various space and time scale phenomena on energy transfers and transformations. Offered in even-numbered years.

222. Advanced Boundary Layer Meteorology (3) I. Murp Lecture—3 hours. Prerequisite: course 125. Conservation equations for turbulent boundary layers; similarity principles; the Reynolds equations; surface layer relationships; resolving turbulence. Growth of the boundary layer by entrainment; the marine boundary layer; special topics.

230. Atmospheric Turbulence (3) II. Shaw Lecture—3 hours. Prerequisite: course 121B or 156. Dynamics and energetics of turbulence in the atmosphere including vortex dynamics. Statistical description of turbulence. Eulerian and Lagrangian scales, spectral analysis, and turbulence sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Offered in even-numbered years.

231. Advanced Air Pollution Meteorology (3) I. Caroll Lecture—3 hours; discussion—1 hour. Prerequisite: course 131 and Civil Engineering 148. Course emphasizes an interdisciplinary approach to understanding atmospheric processes and air pollutants, transported and diffused from primary and secondary sources; their effects on local radiation budget, cloud and precipitation formation and secondary pollutant formation.

233. Topics in Advanced Biometeorology (3) II. Hatfield 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 weather regime. Quantification of weather parameters for optimum biological response. Offered in odd-numbered years.

240. General Circulation of the Atmosphere (3) II. Grodahn Lecture—3 hours. Prerequisite: courses 120, 121A, 121B. Description of global angular momentum, mass and energy balances. An introduction to general circulation of the atmosphere and ocean. The interaction of physical processes on which they depend and relationships of these balances to weather and climate.

241. Climate Dynamics (3) III. Weare Lecture—3 hours. Prerequisite: courses 120, 121A, 121B or the equivalent, Engineering—Applied Science 115 or the equivalent/computer programming experience; course 100 recommended. Dynamics of climatic variations, Global and zonal average energy balance models. Parameterizations of radiative transfer, convection, and ocean circulation. Introduction to the equilibrium climate models. Offered in even-numbered years.

250. Meso-Scale Meteorology (3) II. The Staff Lecture—3 hours. Prerequisite: graduate standing, course 150, or consent of instructor. Study of weather systems over horizontal distances between 25 and 2500 kilometers. Methods of observation. Study of numerical modeling of the structure and temporal behavior of these weather systems. Offered in even-numbered years.

259. Seminar (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (SU grading only.)

259. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only.)

259. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Avian Medicine

See Epidemiology and Preventive Medicine

Avian Sciences

(College of Agricultural and Environmental Sciences)

Aviation Science

James R. Millam, Ph.D., Assistant Professor
Frank X. Oglesby, Ph.D., Professor
Pran N. Vohra, Ph.D., Professor
Wesley W. Weathers, Ph.D., Associate Professor
Barry W. Wilson, Ph.D., Professor
Wilbur O. Wilson, Ph.D., Professor Emeritus
Allen E. Woodard, M.S., Adjunct Lecturer

The Major Program

Avian Sciences is the study of birds and the ways in which they relate to and are useful to man. The major provides a balanced program if your interest lies in birds — including the study of avian wildlife and their environments, production and marketing of domestic birds and eggs, caged exotic bird management, and basic and applied laboratory research on birds and a broad knowledge of biological science. You may seek a career in health-oriented research, the teaching of biology, gamebird production, domestic and foreign agricultural and advisory services, governmental agencies or a diversified and progressive poultry industry. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field permit you to play a large role in selecting and designing your own course work. You may specialize in a bachelor's program that qualifies you for a particular job; or you may choose a program to meet other broad educational goals. Independent study, undergraduate research, and work-learning experiences are features emphasized in the program.

Avian Sciences

B.S. Major Requirements:

- For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.

UNITS

Preparatory Subject Matter...

Avian sciences...

Bacteriology 2, Animal Science 1, 2...
Zoology 2, and/or Plant Science 1 or 2...
Chemistry (Chemistry 1A, 1B, 8A and/or 8B)...
Statistics (Statistics 13)...
Physics (Physics 1A and 1B)...

Depth Subject Matter...

Biochemistry (Biochemistry 101A, 101B)...
Genetics (Genetics 100A, 100B)...
Nutrition (Nutrition 110)...
Physiology (Physiology 120B)...

Laboratory units in above listed subjects...

Specialized courses related to avian species...

Breadth Subject Matter...

English and/or rhetoric, choose from English 1, 2, 3, 5, 5P, and/or Rhetoric 1, 3...
Social sciences and humanities electives...

Restricted Electives to supplement or expand any of the above areas...

Unrestricted Electives...

Total Units for the Major...

Major Advisor: C.R. Grau.
Advising Center for the major is located in 215 Asmundson Hall (752-1300).

Graduate Study. Further training is available through graduate or professional programs in animal physiology, genetics, nutrition, or veterinary medicine. The M.S. degree is offered in Avian Sciences. Detailed information on graduate study is available through the graduate adviser, or obtain the Announcement of the Graduate Division. See also page 103.

*Units earned in satisfaction of the American History and Institutions requirement may be replaced by satisfaction of the Social Sciences and Humanities requirements.

*A student may take one quarter of work-learning experience for a maximum of 15 units.
Courses in Avian Sciences

Lower Division Courses


11. Laboratory in Applied Avian Biology (2) Ogawara Lecture—1 hour, laboratorv—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) Ernst, Ogawara Lecture—3 hours; conference—1 hour. A survey of industries concerned with poultry products in the U.S. and various regions of the world; hatchery, industry, feed industry, egg industries, etc. Other specialized enterprises. Offered in even-numbered years.

13. Birds, Man, and the Environment (3) III. Grau, B. W. Wilson Lecture—2 hours, discussion—1 hour, project requiring minimum 20 hours; field trip. Prerequisite: course in biology recommended. Bird in the world of man: folklore, art, literature, urban, rural, domestication, nutrition, game birds, zoo, falconry, endangered species, public health, in recreation.


15. Biology of Birds of Prey (3) III. Weathers Lecture—2 hours; two field trips optional. Prerequisite: some familiarity with raptors and species course 13 recommended. Introduction to birds of prey with emphasis on anatomy, physiology, behavior, handling, and husbandry.

92. Internship in Avian Sciences (1-12) I, II, II. The Staff (Chairperson in charge) Laboratory—1-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Work-study on and off campus in poultry, gamebirds or exotic bird production, management on a business or industry, or agency concerned with these enterprises. Compliance with Internship Approval Request form essential. (PNP grading only.)

99. Special Study under Graduate Students (1-5) I, II, II. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Problems in avian biology, nutrition, breeding, and physiology of poultry and wild birds and their products. (PNP grading only.) Uper Division Courses

100. The Biology of Birds (3) III. Weathers Lecture—2 hours; discussion—1 hour. Prerequisite: background in general biology recommended. Aspects of biology (anatomy, physiology, behavior, nutrition, reproduction, and adaptation) that govern the life of birds. Emphasis on those features of birds, domestic, wild and experimental, which are distinctive and unique for animals with feathers.

100L. Biology of Birds Laboratory (1) III. Weathers Laboratory—3 hours. Prerequisite: course 100 (concurrently). Laboratory exercises in production, incubation, nutrition, and physiology of domestic and wild birds.

102. Fertility and Hatchability in Birds (3) III. Abbott Lecture—2 hours; two field trips. Prerequisite: Biological Sciences 1 and Chemistry 8A. Reproduction in domestic and wild animals; research in poultry and Gamebirds, avian reproduction, and behavioral factors on embryonic development; special emphasis on effects of diet, drugs and pesticides.

103. The Avian Egg (1) III. Grau Lecture—1 hour; laboratory 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 and composition, appearance, genetics and environmental influences, including pollution. Eggs as foods for human. Offered in odd-numbered years.

105. Caged Exotic Bird Management (3) I. Grau Lecture—2 hours. 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 avian physiology, breeding, nutrition, diseases, history, incubation, space and other environmental needs, and history of use by man. Relationships between poulty and cage bird business will be explored.

110. Comparative Avian Microeconomics (4) II. Ogawara Lecture—2 hours; laboratory—6 hours. Prerequisite: Zoology 21L, and Phiolology 110. Development and aging of specific organs and tissues unique to avian species will be studied in chickens, quail, turkeys and raptors, as well as mutatons available at AVS. Comparators will be made to reptiles and mammals in many cases.

120. Game Bird Production (3) III. Woodard Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Science 12, course 100. Introdues the husbandry of popular game bird species kept in captivity. Course will cover such basic factors as game bird identification, incubation, housing, breeding, nutrition, diseases, sanitation and marketing.

130. Genetics of Poultry (3) I. Alphonso Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Genetics 106. 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) II. Vohra, Grau Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 6A or consent of instructor. Comparison of digestive tracts, food habits, effects of nutrients on growth, sexual maturity, egg production, fertility and hatchability of eggs of wild and domestic species of birds. Effects of pesticides and other non-nutrient substances on production.

190. Prospecting in Avian Sciences (1) I, II, II. Kratzer, Weathers, Woodard Seminar—1 hour. Prerequisite: upper division standing in avian biology or consent of instructor.

192. Internship in Avian Sciences (1-12) I, II, III. The Staff (Chairperson in charge) Lecture—1-36 hours. Prerequisite: completion of a minimum of 84 units; 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 enterprises. Compliance with Internship Approval Request form essential. (PNP grading only.)

195. Topics in Current Research (1-3) I, II, III. The Staff (Chairperson in charge) Lecture-discussion varies. Hours will depend on instructor with the number of units being commensurate with time in class. Prerequisite: consent of instructor. Discussion of topic 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) Prerequisites: vary depending upon course being tutored. Prerequisite: Avian Sciences related major; advanced standing consent of instructor. Tutoring of students in lower division avian sciences courses, weekly conferences with instructors in charge of course; written critiques of teaching procedures. (PNP grading only.)

198. Directed Group Study (1-9) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PNP 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 poultry and wild birds and their products. (PNP grading only.)

Graduate Courses

202L. Laboratory in Avian Experimental Embryology and Teratology (3) III. Abbott Laboratory—1 hour. Prerequisite: consent of instructor. The causes of abnormal morphogenesis in avian embryos including genetic, chemical, and physical-environmental factors; the application of transplantation, or in vivo culture and other experimental techniques. Offered in odd-numbered years.

Bacteriology

Course (College of Letters and Science)

JaRue S. Manning, Ph.D., Chairperson of the Department
Department Office, 156 Hutchison Hall (752-0262)

Faculty

Stanley W. Artz, Ph.D., Assistant Professor
Paul Baumann, Ph.D., Professor
Robert E. Hunger, Ph.D., Professor Emeritus
John L. Ingram, Ph.D., Professor
Sydney G. Kustu, Ph.D., Associate Professor
JaRue S. Manning, Ph.D., Professor
Allen G. Marr, Ph.D., Professor
John C. Meeks, Ph.D., Assistant Professor
Herman J. Pfaff, Ph.D., Professor (Bacteriology, Food Science and Technology)
David Pratt, Ph.D., Professor
Willard P. Segel, Ph.D., Lecturer
Effinor Me. Starr, Ph.D., Professor
William E. Timberlake, Ph.D., Associate Professor
Mark L. Wheelis, Ph.D., Associate Professor

The Major Programs

The undergraduate major programs provide a balance of studies in the biology of bacteria and other microorganisms, along 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 degree for certain courses in organic chemistry that have been taken at other institutions prior to 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.

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Bacteriology

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.

Bacteriology

A.B. Major Requirements:

Preparatory Subject Matter

- Bacteriology 2 or 102, 3
- Biological Sciences 1
- Chemistry 1A, 1B, 1C, 5A, 8A, 8B
- Statistics 13
- Mathematics 16A-16B or 21A-21B
- Physics
  - Recommended: Physics 2A, 2B, 2C

Depth Subject Matter

- Bacteriology 105, 130A, 106-106L, or 120-120L, or 130B-130B, or 177-177L
- Biochemistry 101A, 101B, 101L
- Genetics 100A-100B or 120
- Additional units from Bacteriology 120, 120L, 120T, 120L, 106, 106L, 109, 130L, 150, 177, 177L, Biological Sciences 162, Botany 114, 118, 119, Veterinary Microbiology 127, 129, 129L, 129T

Total Units for the Major

69-62

Bacteriology

B.S. Major Requirements:

Preparatory Subject Matter

- Bacteriology 2 or 102, 3
- Biological Sciences 1
- Chemistry 1A, 1B, 1C
- Statistics 13
- Mathematics 16A, 16B, 16C, or 21A, 21B, 21C
- Physics 2A, 2B, 2C

Depth Subject Matter

- Bacteriology 105, 130A, 106-106L, or 120-120L, or 130B-130B, or 177-177L
- Biochemistry 101A, 101B, 101L
- Genetics 107A, 107B, 128A, 128B, 128C
- Additional units from Bacteriology 120, 120L, 120T, 120L, 106, 106L, 109, 130L, 150, 177, 177L
- Recommended: Chemistry 106: a course in computer programming.

Total Units for the Major

103-111

Breadth Subject Matter

- College of Agricultural and Environmental Sciences students
  - 24
  - English and/or rhetoric
  - 4
  - Social sciences and/or humanities
  - 16
  - Additional requirements as described on page 74.

College of Letters and Science students:
- Refer to page 90 for a description of requirements to be completed in addition to the major.

Major Advisers:

Honors and Honors Program: See major advisories listed above.

Teaching Credential Subject Representative: W. P. Segel. See page 103 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, Botany, Food Science, Preventive Technology, Genetics, Viticulture and Enology, and the Schools of Medicine and of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Department of Bacteriology.

Related Courses: For other courses related to Bacteriology see course offerings in the Departments of Biological Sciences, Botany, Epidemiology and Preventive Technology, Food Science and Technology. Medical Microbiology, Plant Pathology, Veterinary Microbiology.

Faculty of the Department of Bacteriology also teach or participate in the following courses: Biological Sciences 1, 162, Food Science and Technology 106; Veterinary Microbiology 128.

Courses in Bacteriology

Lower Division Courses

- Lecture—3 hours. Prerequisite: Biological Sciences 1. The biology of bacteria with some of its applications.

3. Bacteriological Laboratory Techniques (1) I, II, Ill. Wheelis
- Laboratory—3 hours. Prerequisite: Biological Sciences 1. Designed to acquaint student with basic techniques of bacteriology, with major responsibility for organizing and accomplishing wet-chemistry testing with student. (P/NP grading only.)

10. Biology of the Bacteria (3) II. Wheelis
- Lecture—3 hours. Survey of the diversity of bacteria—their metabolism, genetics, and habitats. Emphasis on importance to man—role of bacteria in global element cycles, 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, Ill. The Staff (Manning in charge)
- Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

NOTE: Bacteriology 105 and 106 are designed for declared majors in Bacteriology and allied fields. Bacteriology 102 is primarily designed for Biologic Sciences majors and other upper division and graduate students.

- Microbiology and Society (4) I, Stall
- Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and consent of instructor. Introductory courses in biology recommended. Microbiology and microbiology, with particular attention to human welfare and experience. Nature and classification of microbes. Ways in which they harm, and otherwise affect man, including environmental, literary, historical, intellectual, aesthetic, ethical, legal, economic, and political aspects. Limited to 24.

102. General Bacteriology (4) I. Baumann
- Lecture—4 hours. Prerequisite: Biological Sciences 1 and Chemistry 8B. Mathematics 16A recommended. Biology of bacteria and bacterial viruses. Survey course dealing with the physiology, genetics, and taxonomy of bacteria and their relationship 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, Segel, Wheelis
- Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 2 or 102, and 3, Chemistry 8B (or 128A and 128A)
- 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

106L Laboratory: Physiological Basis of Bacterial Diversity (2) 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. Meeks
- Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106, Biochemistry 101A. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats.

120L. Microbial Ecology Laboratory (3) III. Meeks
- Laboratory—6 hours; one optional weekend field trip. Prerequisite: course 106 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from several 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.

130A. Bacterial Physiology and Genetics (3) II. Ingraham
- Lecture—3 hours; laboratory—6 hours. Prerequisite: course 101B (may be taken concurrently); Genetics 100A; Mathematics 16A. The physiology and regulation of bacterial growth including the effect of the environment, mapping techniques and the use of mutants in problem solving.

130B. Bacterial Physiology and Genetics (3) III. Arzt, Kustu
- Lecture—3 hours. Prerequisite: course 103A. Gene regulation, Prokaryotic nitrogen metabolism. Structure and function of the bacterial cell envelope; synthesis of peptidoglycan and lipopolysaccharide; active transport of nutrients; chemotaxis.

150L. Laboratory in Eukaryote Protostroph Yeasts (3) II. Pfaff
- Lecture—3 hours. Prerequisite: course 2. Biochemistry 101A recommended. Diversity among eukaryotic protists with special emphasis on yeasts and yeast-like fungi and their relationships to the higher fungi. Selected fungal pathogens to man.

150L. Laboratory in Eukaryote Protostroph Yeasts (3) I. Pfaff
- Lecture—3 hours. Prerequisite: courses 3, 150 (may be taken concurrently). Observation of morphology of cells and spores and selected yeasts and yeast-like fungi. Isolation and identification of selected yeasts from natural habitats. Nutritional experiments.

177L. Metabolism of Anaerobic Bacteria (3) III. Macoy (Animal Science)
- Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101B (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria, a consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding anaerobic pathways.

177L. Laboratory in Metabolism of Anaerobic Bacteria (2) III. Macoy (Animal Science)
- Laboratory—6 hours. Prerequisite: courses 3, 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experiments dealing with certain characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in odd-numbered years.

190C. Undergraduate Research Conference (1) I, II, III. The Staff (Manning in charge)
- Discussion/conference—1 hour. Prerequisite: upper division standing; consent of instructor. Presentation and critical discussion of student research activities: designed for advanced undergraduate students. May be repeated for a maximum of 3 units of credit when subject matter differs. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
- Laboratory—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Bacteriology Department faculty. (P/NP grading only.)

197T. Tutoring in Bacteriology (1-5) I, II, III. The Staff (Chairperson in charge)
- Tutoring—1-5 hours. Prerequisite: course 3, and 18 upper division units in Bacteriology or consent of instructor. Assist in undergraduate laboratory courses supervised by teaching assistants or faculty; in discussion sections supervised by faculty, and in setting and grading "drop-in" offices for individual help. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. (P/NP grading only.)
Biochemistry: Biochemistry (Graduate Group)

Graduate Courses
200A-200B-200C. Microbiology for First-Year Graduate Students (3-3-3) I-II-III. The Staff (Manning in charge)
Lecture—3 hours. Prerequisite: first-year graduate standing with interest in Bacteriology. A survey of general microbiology at the graduate level.

255. Bacterial Diversity, Ecology and Systematics (4). I. Staff
Lecture-discussion—2 hours; laboratory—3 hours; term projects and papers. Prerequisite: consent of instructor. Introduction to study of diversity of morphologically unusual bacterial life and extreme habitats. Diversification elements of prokaryotes. Organismic associations. Principles and procedures of bacterial taxonomy.

210. Comparative Studies of Prokaryotes (3). III. Baumann
Lecture—2 hours; discussion—1 hour, term paper. Prerequisite: courses 105, 130A. Biochemistry 171A-110B or the equivalent. Consideration of the various methods used to establish relationship among prokaryotes and their application to selected bacterial groups. Significance of the results with respect to bacterial evolution and classification. Offered in odd-numbered years. Limited enrollment.

215. Recombinant DNA (2). I, Timberlake
Lecture—2 hours. Prerequisite: courses 130A-130B or Biochemistry 171A-110B; Genetics 100A, 100B, 102 (may be taken concurrently). Application of the recombinant DNA technology to modern problems in biology, biochemistry and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA and selection procedures.

212L. Recombinant DNA Laboratory (4). I. Timberlake
Discussion—1 hour; laboratory—9 hours. Prerequisite: course 130L or Biochemistry 101L, Genetics 100L and 102 (may be taken concurrently), or consent of instructor. Application of the recombinant DNA technology to modern problems in biology, biochemistry and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA and selection procedures.

230. Bacterial Physiology (2). II. Ingham
Lecture—2 hours. Prerequisite: course 130B. Biochemistry 110B. Selected topics in bacterial physiology. Offered in even-numbered years.

240. Biology of Autotrophic Prokaryotes (3). I, Meeks, Wheelis
Lecture-discussion—3 hours. Prerequisite: Biochemistry 101B. Biochemistry and ecology of photosynthetic bacteria, and of methylotrophic bacteria, with special emphasis on the mechanisms of ATP and reductant generation. Offered in even-numbered years.

250. Yeasts and Related Organisms (5). I, Paff, Miller
Lecture—3 hours; laboratory—6 hours. Prerequisite: consent of instructor. Morphology, development, classification, and distribution of yeasts, relation to other fungi; growth requirements; physiological activities. Offered in odd-numbered years.

260. Bacterial Genetic Regulatory Mechanisms (3). II. Arzt
Lecture-discussion—3 hours. Prerequisite: general knowledge of nucleic acid biochemistry and bacterial genetics. Analysis at the molecular level of genetic regulation in selected bacterial systems. Specific systems discussed will include the following types of regulation: control of transcription initiation and termination; translational control; RNA modification effects; autoregulation; control circuits in bacterial viruses; supercontrols. Offered in even-numbered years.

270. Advanced Animal Virology (3). III. Manning
Lecture—3 hours. Prerequisite: consent of instructor. Selected advanced topics on biological and biochemical properties of animal viruses. May be repeated for credit. Offered in even-numbered years.

290C. Advanced Research Conference (1). I, II, III. The Staff (Manning in charge)
Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical evaluation of student's research activities. Designed for advanced graduate students. May be repeated for credit. (SU grading only.)

291. Selected Topics in Bacteriology (1). I, II, III. The Staff (Manning in charge)
Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (SU grading only.)

292. Seminar in Bacterial Physiology, Genetics and Virology (1). Baumann; II, Arzt; III, Pratt
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in bacterial physiology, genetics and virology with presentations by individuals students. (SU grading only.)

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

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological sciences: Biology Sciences 1</td>
<td>4-8</td>
</tr>
<tr>
<td>and at least one course from Bacteriology 2-3 or 102-3, Ecology 2 or Zoology 2-2L</td>
<td>9-11</td>
</tr>
<tr>
<td>Chemistry 1A-1B-1C, 5 or 44-A4-4C</td>
<td>15-19</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C</td>
<td>15-19</td>
</tr>
<tr>
<td>and one additional course in statistics (e.g., Statistics 11, or 130A)</td>
<td>13-16</td>
</tr>
<tr>
<td>Physics 12 units minimum (Physics 2A-2B-C or 3A-3B-C or 4A-4B-C)</td>
<td>12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>30-41</td>
</tr>
<tr>
<td>Biochemistry 101A-101B-101C</td>
<td>11</td>
</tr>
<tr>
<td>Genetics 100A-100B or 120</td>
<td>4-6</td>
</tr>
</tbody>
</table>

1 Physics 80 is optional. Students electing the Physics 8 sequence should elect Mathematics 21A-21B-21C and 22A-22B-22C.

NOTE: For key to footnote symbols, see page 128.

Physical chemistry: Chemistry 107A-107B-108 or 110A-110B-110C 9

Breadth Subject Matter 32

College of Agricultural and Environmental Sciences students

English 1, 2, 20, or .03, plus 4 additional units from the above or from English 3, 104, Rhetoric 1, 3, Comparative Literature 1, 2, 3, Philosophy 4 or 10 8

Social sciences and humanities (including foreign languages and additional English and rhetoric courses) 24

College of Letters and Science students

Refer to page 90 for a description of requirements to be completed in addition to the major.

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 advisor).

Recommended: Biochemistry 190 and one upper division chemistry course.

Unrestricted Electives (including 199, etc.) 34-44

Total Units for the Major 150

Major Adviser: L. Sprechen (Biochemistry and Biophysics).

Advising Center for the major is located in 150 Mirk Hall (752-0410).

Graduate Study. See page 103, and under Biochemistry (A Graduate Group), below.

Courses. See under Biochemistry and Biophysics.

Biochemistry (A Graduate Group)

Roy H. Doi, 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 Advisers. See Class Schedule and Room Directory.

Courses in Biochemistry

Graduate Courses

200. Seminar (1). I, II, III. The Staff (Manning in charge)
Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12). I, II, III. The Staff (SU grading only.)
Cours es in Biochemistry and Biophysics

Questions pertaining to the following courses should be directed to the instructor or to the Division of Biological Sciences, 150 Mirk Hall.

Upper Division Courses

101A. General Biochemistry (3) I, II, III. Etzler, Lagarias, McNamee, Villarino, Sprechman

Lecture—3 hours. Prerequisite: Chemistry 98B or 128B. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with emphasis on enzymes and biopolymers, plants and microorganisms.

101B. General Biochemistry Laboratory (3) I, II, III. Etzler, McNamee, Villarino, Sprechman, Conn, Lagarias

Lecture—1 hour laboratory—3 hours. Prerequisite: course 101A. Continuation of 101A.

201A. Physical and Chemical Biochemistry (4) I. Bruening, Ingram

Lecture—4 hours. Prerequisite: course 101B; Chemistry 107B or 110C, 128C. Biochemical thermodynamics and physical properties of macromolecules, equilibrium and kinetics of chemical processes, enzymes.

201B. Metabolism and Bioenergetics (3) I. Chaykin

Lecture—3 hours. Prerequisite: course 201A. Intermediate metabolism of amino acids, nucleotides, lipids and carbohydrates; biological oxidation reactions; roles of vitamin D in metabolism; catalytic strategies of biosynthesis and biodegradation.

201C. Molecular Biology (3) I. Hershey (Biological Chemistry). Cribb, Cribb, Dunn, Drabavsky (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 post-transcriptional control of gene expression, examples of the above from eukaryotic and prokaryotic cells and viruses.

201D. Integration of Metabolism and Regulatory Phenomena (2) I. Preus, Freedland (Physiological Sciences), Walsh (Biological Chemistry)

Lecture—2 hours. Prerequisite: course 201B or consent of instructor. Comprehensive discussion of various regulatory mechanisms that occur in the control of metabolism; e.g., regulation at enzyme level, integration of metabolic pathways from the whole animal view including homeostasis, hormonal influence on enzymes, comparative aspects of metabolism and regulation of one amino acid and lipid metabolism in mammals.

202A. Cellular Biochemistry (4) I, McNamee

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 movement and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system.

202A-202B. Advanced Biochemical Methods (1-1) I, II. Etzler, Do

Lecture—1 hour. Prerequisite: course 202A (may be taken concurrently), and 101I or the equivalent. Laboratory methods and procedures in biochemical research.

202L. Advanced Biochemistry Laboratory (5) I, II, III. Graduate Group Staff (Etzler, Do in charge)

Laboratory—15 hours. Prerequisite: course 202A (may be taken concurrently), and 101L or the equivalent. Two five-week 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) III. Preus

Lecture—2 hours. Prerequisite: course 201B. Chemistry, metabolism, and biological function of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides. Offered in even-numbered years.

204. Selected Topics in Nucleic Acids and Molecular Biology (2) II. Bruening, Dunn, Do

Lecture—1 hour. Discussion—1 hour. Prerequisite: course 201C, consent of instructor. Relation of structure and function of DNA and RNA to genetic information, and protein synthesis. Each offering will consist of a topic selected from rapidly advancing areas of nucleic acid biochemistry and molecular biology. May be repeated for credit when different topic is studied. (SU grading only.)

205. Biochemical Mechanisms (3) I. Ingram

Lecture—3 hours. Prerequisite: course 101B or consent of instructor. Chemistry 110C, 131. Bond structure and biochemical chemical. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

206. Physical Biochemistry of Macromolecules (3) I. Chri- dilis, McNamee

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. Chemistry 110C. Application of modern physical concepts and experimental methods to the problem of large molecules of biological interest. Offered in even-numbered years.

207. Lipids (3) I. Stumpf

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. Discussion of chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, sphingolipids, carotenoids and steroids. Offered in even-numbered years.

208. Membrane Biochemistry (2) II. McNamee

Lecture—2 hours. Prerequisite: course 201E. Advanced topics in membrane biochemistry with emphasis on the structure and function of the membrane proteins and lipids. Offered in even-numbered years.

210. Protein Biochemistry (3) II. Preus

Lecture—3 hours. Prerequisite: course 201C. Physical, chemical, and physical and biological aspects of proteins, peptides, and proteins. The biological aspects include protein function, biosynthesis and biodegradative pathways, and nutritional requirements for amino acids.

212. Chemical Modifications of Proteins (3) III. Feeney (Food Science and Technology)

Lecture—3 hours. Prerequisite: course 101B, Chemistry 128C. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions.

213. Principles of Comparative Biochemistry (3) I. Daniell (Biological Chemistry), Feeney (Food Science and Technology)

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis, biochemical unity and diversity; the evolution of structures, and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism, and excretion. Offered in odd-numbered years. (Same course as Biological Chemistry 213.)

215. Kinetics of Biological Systems (2) III. Ingram

Lecture—2 hours. Prerequisite: course 201E. Fourier (iii) and (iii) basic concepts of behavior of multifac- table biological systems, mathematical methods and analy- sis of typical data with accent on computer use, in particu- lar, the kinetics of multienzyme catalytic steady state systems, perturbed systems, and reactions in a metabolic sequence. Offered in even-numbered years.
Biological Sciences

Faculty
Faculty includes members from departments of Animal Physiology, Bacteriology, Biochemistry and Biophysics, Botany, Genetics, and Zoology, and academic advisers for divisional majors and instructors of upper division courses in curricula of divisional majors.

Kathleen M. Fisher, Ph.D., Associate Professor Wiltraud P. Segel, Ph.D., Lecturer

Programs of Study
The Division of Biological Sciences is an intercollege unit which coordinates the teaching and research activities of the departments of Animal Physiology, Bacteriology, Biochemistry and Biophysics, Botany, Genetics, and Zoology. Four majors leading to an A.B. degree are offered in Biological Sciences, Bacteriology, Botany, and Zoology. Seven majors are offered within the Division leading to a B.S. degree in disciplines of the six above-named departments, and in Biological Sciences. The major programs are described under the respective departmental listings, except for the majors in Biological Sciences (outlined below).

The Major Programs
The major programs in Biological Sciences provide an opportunity for broader study of basic biology than is possible with most departmental majors. The programs provide suitable undergraduate preparation for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. Students interested in a career involving considerable personal interactions, such as those of the health sciences area, may be best served by the Bachelor of Arts program, for those interested in a more laboratory-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 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.

Biological Sciences

A.B. Major Requirements:

Preparatory Subject Matter

Biological Sciences 1 5
Botany 2 5
Zoology 2-5 6
Chemistry 1A, 1B 10
Mathematics and statistics 6
Recommended: Chemistry 1C, Physics 2A, 2B, 2C

Genetics 100A-100B or 120 4-6

Restricted Electives, sufficient to achieve a total of 36 upper-division units in the biological sciences, and to include at least one course from the three Area lists (animal biology, microbiology, and plant biology) shown below, and at least one course from each of the five Group Requirement lists, a through e 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 sequential courses connected by a hyphen must be taken.)

Area lists:


Microbiology: Microbiology—all upper division courses except Bacteriology 101; Biological Sciences 162; Botany 114, 118, 119; Entomology 140, 156; Geology 111B; Medical Microbiology 107; Plant Pathology 120, 121, 129, 130, 150, Veterinary Microbiology 107; Botany 101, 105, 108, 114, 118, 121, 130, 140, 141, 143, 152, 190; Environmental Horticulture 105, 107, Plant Science 101, 103; Range Science 100; Resource Sciences 110.

Note: Botany 114, 118, or 119 may be used for either microbiology or plant biology (not both). Bacteriology 102 (when taken in place of Bacteriology 2) will not count toward the upper division unit requirement in the major, but will fulfill the microbiology Area requirement.

Total Units for the Major 108-114

Breadth Subject Matter
College of Agricultural and Environmental Sciences:

Additional requirements as described on page 74

Total Units for the Major 108-114

B.S. Major Requirements:

Preparatory Subject Matter

Biotechnology 2 or 102, 3
Biological Sciences 1 5
Botany 2 5
Chemistry 1A-1B or 4A-4B 5
Mathematics 16A, 16B, 16C 5
Physics 2A, 2B, 2C 5
Statistics 13 or 102 5
Zoology 2-2L 5
Recommended: Chemistry 5, Physics 3A, 3B, 3C

Depth Subject Matter

Biochemistry 101A-101B or Physiological Sciences 101A-101B 5
Genetics 100A-100B or 120 4-6

Restricted 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 three Area lists (animal biology, microbiology, and plant biology) shown below, and at least one course from each of the five Group Requirement lists, a through e 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 sequential courses connected by a hyphen must be taken.)

Area lists:


Microbiology: Microbiology—all upper division courses except Bacteriology 101; Biological Sciences 162; Botany 114, 118, 119; Entomology 140, 156; Geology 111B; Medical Microbiology 107; Plant Pathology 120, 121, 129, 130, 150, Veterinary Microbiology 107; Botany 101, 105, 108, 114, 118, 121, 130, 140, 141, 143, 152, 190; Environmental Horticulture 105, 107, Plant Science 101, 103; Range Science 100; Resource Sciences 110.

Note: Botany 114, 118, or 119 may be used for either microbiology or plant biology (not both). Bacteriology 102 (when taken in place of Bacteriology 2) will not count toward the upper division unit requirement in the major, but will fulfill the microbiology Area requirement.

Total Units for the Major 78-84

Biological Chemistry

See Medicine

Biological Sciences

Intercollege Division

Donald L. McLean, Ph.D., Dean, Division of Biological Sciences
Armand R. Maggenti, Ph.D., Associate Dean
Division Office, 171 Mirk Hall (752-0410)

NOTE: For key to footnote symbols, see page 128.

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Biological Engineering

Course List for Group Requirement
(b) Population Biology and Ecology: Anthropology 154A, Bacteriology 120, Botany 117, 141, Entomology 104, Environmental Studies 100, 121; Genetics 106; Geology 116, 150C; Wildlife and Fisheries Biology 110, 151; Zoology 127.
(c) Evolutionary Biology: Anthropology 151, 152; Botany 140; Genetics 103; Geology 107; Plant Science 103; Zoology 128, 148.
(d) Physiology: Bacteriology 130A-130B, Botany 111A-111B; Physiology 110, 111; Plant Pathology 130; Zoology 142, 144, 146, 148, 154. Bachelor of Arts majors may satisfy the Physiology group requirement with Biochemistry 101A-101B.
(e) Molecular and Cell Biology: Biochemistry 133, 143, 153; Botany 130; Genetics 126; Medical Microbiology 107; Physiology 100A-100B; Veterinary Microbiology 126; Zoology 121A, 121B, 166.

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. Students in the College of Agricultural and Environmental Sciences may use up to 6 units of 199A-199B, but not more than 2 units of 199A, while students in the College of Letters and Science may use up to 6 units of 199 courses but no units of 1997 courses.

Major Adviser. Contact Division Office for adviser assignments.

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 two 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 preparatory work; substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

Information on completion of the minor program can be obtained from the Division Office.

Biological Sciences Courses

UNITES

Botanical Sciences 22-24
Genetics 120 or 100A-100B 4-6
Additional upper division units to include 18

Area Requirements
Courses in two of three areas: Animal Biology, Microbiology, and Plant Biology. An extensive list of courses which satisfy area requirements can be found under the Biological Sciences major program description above. (Courses can be used to simultaneously satisfy both the area and group requirements.)

Group Requirements
At least one course or course sequence must be selected from four of the following five groups
(b) Ecology: Anthropology 154A, Botany 101, Environmental Studies 100, Geology 116, Wildlife and Fisheries Biology 110, 121, 125.
(c) Evolution: Anthropology 151, Botany 140, Genetics 103, Geology 107, Zoology 149, 148
(d) Physiology: Bacteriology 130A, 130B, Botany 111A, 111B, Physiology 110
(e) Cell and molecular biology: Biochemistry 101A-101B; Botany 130, Physiology 100A-100B

Minor Adviser. Same as for major.

Courses in Biological Sciences

Lower Division Courses

1. Principles of Biology (5) I. Thornton (Botany), Segal (Bacteriology), Fisher (General Sciences), II. Pratt; Bacteriology (III), Wilson (Zoology)
Lecture—4 hours OR lecture—2 hours plus autotutorial—2 hours; laboratory—3 hours. Prerequisite: Chemistry 112. Interdisciplinary course designed for majors in the biological sciences. The emphasis is on the unity of basic biological principles, including structure and function, reproduction, genetics, evolution, and ecology.

10. General Biology (4) I. Wolfe (Zoology); II. Ketelapper (Botany); III. Jameson (Zoology)
Lecture—2 hours; discussion—1 hour. Consideration of the major features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology. Not open for credit to those who have had course 1.

12. Human Sexuality (2) I. Hildebrandt (Zoology)
Lecture—2 hours. Vocabulary; structure and function of genital system; sexual response; menstruation; fertility; birth control; pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communication; attitudes and values; sexual dysfunctions; love-making. (Prerequisite: 101B grading only.)

16. 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 introduction to the biological, clinical and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background.

98. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

11.5. Problems in Marine Biology (15) III.
Full-time study at Bodega Marine Laboratory. Prerequisite: consent of instructor based on adequate preparation for topic under consideration, i.e., appropriate laboratory courses in invertebrate zoology (normally Zoology 112A or 112B), microbiology (normally Bacteriology 105 or 120), paleontology, geology, or botany; junior standing. Lecture, laboratory and field work, and directed study of a selected focal topic in marine biology; stressing experience in original research. Offered depending upon availability of instructors. Limited enrollment.

162. General Virology (4) I, Pratt (Bacteriology); Shalla (Plant Pathology); Breshears (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.

187T. Tutoring in Biological Sciences (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: upper division standing with major in a biological science. Assisting in courses under the direction of the faculty. (P/NP grading only.)

188. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

210. Effective Teaching of College Biology (2) III. Fisher
Informal lecture-discussion—3 hours. Teaching function of an academic career: objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussions; examinations and grading; evaluation; counseling; innovation. (SU grading only.)

211. Designing Instruction in the Biological Sciences (3) III. Fisher
Lecture—1 hour, laboratory—6 hours. Prerequisite: graduate standing. Students will each develop a unit of biological science instruction (such as a lecture, laboratory experiment, syllabus, chapter test, audiovisuals) with consideration to goals; objectives; selection of appropriate pedagogical strategies, methods, and source materials; organization; development of unit.

298. Group Study (1-5) I, II, III, The Staff (Associate Dean in charge)
Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.

Biomedical Engineering (A Graduate Group)

Stanley A. Brown, D.Eng., Chairperson of the Group
Group Office, Temporary Building 139 (752-3303)

Faculty

Stanley A. Brown, D.Eng., Associate Professor (Orthopaedic Surgery)
Fitz-Roy E. Curry, Ph.D., Associate Professor (Human Physiology)
John M. Horowitz, Ph.D., Professor (Animal Physiology)
Tien C. Hsia, Ph.D., Professor (Electrical and Computer Engineering)
Maury L. Hull, Ph.D., Assistant Professor (Mechanical Engineering)
Andrew C. Jackson, Ph.D., Assistant Adjunct Professor (Human Physiology, Primary Medicine)
David F. Katz, Ph.D., Associate Professor (Residency (Obstetrics and Gynecology)
James F. Shackelford, Ph.D., Associate Professor (Materials Science and Engineering)
Robert E. Smith, Ph.D., Assistant Professor (Physical Education)
Keith R. Williams, Ph.D., Assistant Professor (Physical Education)

Graduate Study. The Graduate Group in Biomedical Engineering offers a program of study and research leading to the Ph.D. degree. For detailed information regarding graduate study in biomedical engineering address the chairperson or adviser of the group.

Graduate Adviser. R.E. Curry (Human Physiology)

Courses in Biomedical Engineering

Graduate Courses

210. Introduction to Biomaterials (4) II. Brown (Orthopaedics)
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; infection, wound and fracture healing, blood coagulation; properties of bones, joints, and blood vessels; biocompatibility of orthopaedic and cardiovascular materials.

252. Advanced Information Systems (3) II. Walters
Lecture—2 hours; laboratory—2 hours. Prerequisite: experience in initial phases of data preparation, editing and sorting; Community Health 151 or the equivalent; must be able to perform at graduate level. To increase through examples, projects and discussions, understanding of the components of information systems, including hardware, software, economics and people, and to prepare students to apply this understanding in the solution of specific problems in the creation, design and implementation of information systems. (Same course as Community Health 252.)

290. Seminar (2) I, II. The Staff (Chairperson in charge)
Seminar—2 hours. Special topics in biomede, research and applications. Includes such topics as instrumenation, simulation and modeling, physiological and computer applications, artificial organs and assistive devices. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)
Botany
(College of Letters and Science)

Michael G. Barbour, Ph.D., Chairperson of the Department
David E. Bayer, Ph.D., Vice Chairperson, Agricultural Botany

Department Office, 143 Robbins Hall (752-0617)

Faculty
Fredrick T. Addicott, Ph.D., Professor Emeritus
Floyd M. Ashton, Ph.D., Professor
Daniel I. Axelrod, Ph.D., Professor Emeritus
Michael G. Barbour, Ph.D., Professor
David E. Bayer, Ph.D., Professor
Bruce A. Bonner, Ph.D., Associate Professor
Paul A. Castelfranco, Ph.D., Professor
Aiden S. Crafts, Ph.D., LL.D., Professor Emeritus
Herbert B. Currier, Ph.D., Professor Emeritus
James A. Doyle, Ph.D., Professor
Emmanuel Epstein, Ph.D., Professor (Botany; Land, Air and Water Resources)
Richard H. Falk, Ph.D., Associate Professor
Emmet G. Gifford, Jr., Ph.D., Professor
Hendrik J. Katerina, Ph.D., Professor
Donald W. Kyhos, Ph.D., Professor
Norine J. Lang, Ph.D., Professor
William J. Lucas, Ph.D., Associate Professor
Jack Major, Ph.D., Professor Emeritus
Terence M. Murphy, Ph.D., Professor
Robert F. Norris, Ph.D., Associate Professor
Robert W. Peary, Ph.D., Associate Professor
Steven R. Radsovich, Ph.D., Associate Professor
Professor
Thomas L. Root, Ph.D., Associate Professor
Alan J. Sterner, Ph.D., Associate Professor
C. Ralph Snook, Ph.D., Professor Emeritus
Robert M. Thornton, Ph.D., Associate Professor
John M. Tucker, Ph.D., Professor
Grady L. Webster, Ph.D., Professor
T. Elliott Wehr, 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 (shape and form), physiology (plant function), taxonomy (plant classification), ecology (plant and environmental relationships), paleobotany (fossil plants), and studies of specific plant groups such as phycology (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 conservation organizations. Plant scientists who 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 with the pharmaceutical, petroleum or chemical industries, seed companies, fruit growers, and food companies. Because we are more aware of the need for the control and management of our environment, the necessity for trained environmentalists and ecologists will probably continue to increase.

Students who wish a less intensive program in botany than that offered by the two Bachelor of Science major options, but one that acquaints a student with plant life and its importance, should elect the Bachelor of Arts major program.

NOTE: For key to footnote symbols, see page 128.

Students majoring in Botany in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantial material in 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 the College of Letters and Science and the College of Agricultural and Environmental Sciences.

Botany

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Biological Sciences 1</td>
<td>5</td>
</tr>
<tr>
<td>Botany 2</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A, 1B</td>
<td>8, 8B</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>16</td>
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<tr>
<td>Statistics 3 or 102</td>
<td>4</td>
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<tr>
<td>Zoology 2-2L</td>
<td>4-6</td>
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<tr>
<td>Zoology 3-3L</td>
<td>4-6</td>
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Depth Subject Matter:

| Botany 102 or 108, 111A, 111B, 111H, 111I | 14 |
| Genetics 120 | 4 |

Additional upper division units in Botany or related natural science courses | 8-9 |

Total Units for the Major | 75-78 |

Recommended Botany 118, 119, Chemistry 1C

For students with interests in specialized areas of botany (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.) certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major advisor.

B.S. Major Requirements:

Option I: For those who plan (a) advanced study in some areas of botany or a related discipline, (b) to obtain a general secondary teaching credential, or (c) a training for a position requiring a detailed knowledge of plants.

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<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>Botany 2</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry 1A, 1B, 1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 8A-BB or 128A-128B-128C-129A</td>
<td>6-11</td>
</tr>
<tr>
<td>Physics 2A, 2B, 2C</td>
<td>9</td>
</tr>
<tr>
<td>Mathematics 1A, 1B, 1C</td>
<td>8</td>
</tr>
<tr>
<td>Zoology 2-2L; or Bacteriology 2 or 102, 3; or Geology 3-3L</td>
<td>4-6</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
</tbody>
</table>

Depth Subject Matter:

| Botany 105, 114, 116, 118, 119, 130 | 18 |
| Physics 9A-BB or 128A-128B-128C-129A | 6-11 |
| Botany 105, 106, 111A, 111B, 111H, 111I | 37 |

Total Units for the Major | 101-110 |

Recommended Botany 199 (3-5 units); German, French, or Russian; for students with interests in specialized areas of botany (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major advisor.

Option II: For those who plan advanced study in physiology and/or biochemistry of plants.

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
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<tbody>
<tr>
<td>Biological Sciences 1</td>
<td>5</td>
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<tr>
<td>Botany 2</td>
<td>5</td>
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<tr>
<td>Chemistry 1A-1B-C or 4A-4B-4C</td>
<td>15-19</td>
</tr>
<tr>
<td>Chemistry 8A-BB or 128A-128B-128C-129A</td>
<td>6-11</td>
</tr>
</tbody>
</table>

Mathematics 16A-16B-16C or 21A-21B-21C | 9-12 |
Physics 2A-2B-2C and 3A-3B-3C | 12 |
Statistics 13 or 102 | 4 |

Depth Subject Matter:

| Biochemistry 101A, 101B, 101L | 14 |
| Botany 105, 111A, 111B, 111L | 4 |
| Genetics 120 | 4 |
| Chemistry 107A, 107B | 6 |
One course each in three of the following four areas | 12-15 |
(a) Taxonomy and evolution: Botany 102, 108 |
(b) Morphology and cytology: Botany 116, 130, 140 |
(c) Physiology and mycology: Botany 114, 118, 119 |
(d) Ecology: Botany 117 |

Total Units for the Major | 106-121 |

Recommended Botany 199 (3-5 units); German, French, or Russian; Engineering 5 or Mathematics 29.

Certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major advisor.

Breadth Subject Matter:

| College of Agricultural and Environmental Sciences students | 24 |
| English and/or rhetoric | 6 |
| Social sciences and humanities | 16 |

Additional requirements as described on page 74.

College of Letters and Science students: Refer to page 90 for a description of requirements to be completed in addition to the major.

Major Advisors: E.M. Gifford, A.J. Sterner, K. Wells (for B.A. and B.S., Option I); P.A. Castelfranco (B.S., Option II).

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Botany</th>
<th>UNITS</th>
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<tr>
<td>To satisfy the requirements for a Botany minor, a student must complete Botany 2 (equivalent to introductory botany course)</td>
<td>5</td>
</tr>
<tr>
<td>Upper division units including at least one course from each of the four groups</td>
<td>18</td>
</tr>
<tr>
<td>(a) Structural botany: Botany 105, 114, 116, 118, 119, 130</td>
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<tr>
<td>(b) Physiological botany: Botany 111A, 111B, Plant Science 102</td>
<td></td>
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<tr>
<td>(c) Ecological botany: Botany 101, 117, 141, Zoology 149</td>
<td></td>
</tr>
<tr>
<td>(d) Systematics and evolution: Botany 102, 108, 114, 116, 118, 119, 140</td>
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</table>

Botany 114, 116, 118 and 119 may be offered toward satisfaction of either group (a) or (c) above. However, a single course may not satisfy both group requirements.

Minor Advisor. Same as for Major above.

Honors and Honors Program. Students on the honors list may elect to substitute a maximum of 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. See pages 75 and 95 for Dean's Honors List information.

Teaching Credential Subject Representative. K. Wells. See page 103 for the Teacher Education Program.

Graduate Study. Graduate programs leading to M.S. and Ph.D. degrees are offered in cytology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, physiology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.
110. Survey of Plant Communities of California (3) I. Barbour
Lecture—2 hours; field trip—4 to 8 days. Prerequisite: course 2. Survey of structure and function of vascular plant communities, tissues, organs, and cells with an emphasis on development. Current literature in plant development is discussed.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: computer science and biology. Laboratory involves assembly and use of computer methods to study systematics and ecology, including measures of similarity and difference, cluster analysis, ordination techniques, and evolutionary estimating procedures. A project using these methods is offered in the second semester.

111A. Introduction to Plant Physiology (3) I. Stemler; II. Murphy
Lecture—3 hours. Prerequisite: course 2, Chemistry B or (may be taken concurrently). Fundamental activities of plants; the plant cell as a functioning unit. The processes of absorption, movement, and utilization of water and minerals. Water loss, photosynthesis, transpiration, transpiration: transpiration; respiration; growth; development and reproduction.

111B. Introduction to Plant Physiology Laboratory (3) I. Stemler; II. Murphy
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 intake, absorption, transpiration, and movement, and utilization of water and minerals. Photosynthesis; transpiration; respiration; growth; development and reproduction.

112A. Problems in Plant Physiology (1) I. Stemler; II. Murphy
Discussion—1 hour. Prerequisite: course 111A (concurrently). Discussion of problems and applications. Principles relate to principles mastered in course 111A. Students will be assigned problems each week that show novel applications of the principles discussed in the lecture course and will prepare answers to problems delivered orally during the class period. (P/N grading only.)

112B. Problems in Plant Physiology (1) I. Bonnor; III. Murphy
Discussion—1 hour. Prerequisite: course 111B (concurrently). Discussion of problems and applications relating to principles presented in course 111B. Students will be assigned problems each week that show novel applications of the principles discussed in the lecture course and will prepare answers to problems delivered orally during the class period. (P/N grading only.)

114. Ecology and Evolution of Vascular Plants (4) I. Clifford
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1. Introduction to form, structure, and developmental history of selected plant groups from major phyla. Emphasis is given to living forms and their evolution and to the relationships of plants to past eras; structure-function relationships and adaptations to changing environments.

117. Plant Ecology (4) I. Barbour; III. Murphy
Lecture—3 hours, laboratory—6 hours, field trips—1 to 6 field trips total. Prerequisites: course 111B and plant identification (course 102 or 108) strongly recommended. The study of interactions between plant populations and their environment. Special emphasis on California. Students taking course 117 may not receive credit for course 101.

118. Physiology of Seed Plants (5) I. South
Lecture—2 hours; laboratory—6 hours; field trips—1 to 6 field trips total. Prerequisites: course 120 or Ecology B. Principles of seed plant structure and function, including cellular, functional, and ecological aspects of the vascular plants. Temperature, light, and water effects on growth and reproduction.

119. Introductory Mycology (5) I. Wells
Lecture—3 hours; laboratory—6 hours; field trips—1 to 6 field trips total. Prerequisites: course 2 or Bacteriology 2 and 3; and Introductory genetics course recommended. Introduction to structure, taxonomy, and ecology of selected species of the major divisions of the fungi.

120. Introduction to Weed Science (3) I. Bayer
Lecture—2 hours; demonstration—3 hours. Prerequisites: course 111B or Plant Biology 85. Principles of weed science including mechanical, biological, and chemical control methods. Weeds in agriculture, herbicides, labora
tory exercises stress identification and utilization. Environmental significance and exploitation of freshwater and marine forms considered.

121. Biology of Weeds (3) I. Radschew
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2. Origin and evolution, beneficial and harmful aspects, reproduction of dispersed seed germination and dormancy, growth and development, ecology, interaction of weeds and crops, natural succession, and herbicide induced succession. Laboratories will emphasize taxonomy of weeds and demonstrate principles discussed in lectures.

122. Action of Herbicides (3) I. Apthorp
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120: Soil Science 100; courses 111A and 111B recommended for influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on crops. Physical and molecular fate of herbicides in soils.

190. Graduate Seminar in Botany (1 to 3) I. III. The Staff
Discussion—1 hour. Prerequisite: open to majors in senior standing or seniors by message. Independent study of selected topics under the direction of a member of the staff. Completion will involve the writing of a senior thesis. (P/N grading only.)

197. Tutoring in Botany (1-5) I. II. III. The Staff
Prerequisite: upper division standing in botany or consent of instructor. Undergraduate students who desire teaching experience. Contact the department for more information. (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.)

201. Advanced Botany (1-5) I. II. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses

201A-201B. Advanced Biological Ecology (4-4) I. II. Peary, Salt, Schoener, Toft and (in charge)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 125 or an equivalent advanced undergraduate course in ecology. Examination of major ecological concepts using current ecological research. (Same course as Ecology 201A-201B and Zoology 201A-201B.)
Plant Ecophysiology (3) III, Peary
Lecture—4 hours. Prerequisite: courses 111A, 111B, 117, and consent of instructor. Study of the mechanisms of physiological adaptation of plants to their environment.

Ecophysiological Methods (3) III, Peary
Lecture—1 hour; laboratory—4 hours; project; one Saturday laboratory. Prerequisite: courses 111A, 117, and consent of instructor. A laboratory and lecture course covering basic concepts underlying the research methodologies useful in plant ecophysiology.

Advanced Plant Physiology (2) II, Castelfranco
Lecture—3 hours. Prerequisite: course 111B: Chemistry 107A or consent of instructor. Cellular physiology, plant water relations, transpiration, and membrane transport.

Advanced Plant Physiology (3) III, Bonner
Lecture—3 hours. Prerequisite: course 111B, Biochemistry 101A; courses 205A and 205B. Biochemistry 101B recommended. Internal and environmental regulation of plant growth and development.

Advanced Plant Physiology Laboratory (3) I, Lucas
Laboratory—6 hours; term paper. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments demonstrate the theory and practice of modern instrumentation, and are designed to illustrate selected matter of course 205A.

Advanced Plant Physiology Laboratory (3) I, Castelfranco
Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently). Biochemistry 101B. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

Advanced Plant Physiology Laboratory (3) III, Bonner
Laboratory—8 hours. Study: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

Physiology of Herbicidal Action (3) II, Ashton
Lecture—3 hours. Prerequisite: courses 111B, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants.

Light and Plant Growth (3) I, Bonner
Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C. Photosynthesis of C3 and C4 plants, and some emphasis on experimental approaches.

Plant Morphogenesis (3) III, Rost
Lecture—2 hours. Prerequisite: course 105 or 116. Survey of recent advances in the study of growth and the development of form, with special reference to higher plants. Some emphasis on experimental approaches.

Plant Morphogenesis Laboratory (2) II, Rost
Laboratory—6 hours. Prerequisite: course 200 (may be taken concurrently) and consent of instructor. Procedures, principally experimental, used to study the development of plant form.

Special Topics in Plant Physiology (2) I, — III, Lucas
Seminar—2 hours. Analysis in depth of recent advances in plant physiology. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures. May be repeated for credit. (Grading only.)

Special Topics in Plant Physiology, Systematics, and Ecology (2) II, Rost
Seminar—2 hours. Analysis in depth of recent advances in plant physiology, systematics, and discussions by research specialists. Term paper integrating and analyzing lectures. May be repeated for credit. (Grading only.)

Biological Electron Microscopy (1) II, — II, III, Lucas

Biological Electron Microscopy Laboratory (3) II, — II, III, Lucas
Laboratory—4 hours. Prerequisite: consent of instructor, course 231 (may be taken concurrently). An introduction to biological electron microscopy. Areas covered: specimen preparation and microscope operation. Limited enrollment.

Pollination Ecology (4) II, III, Thorp (Entomology), Webster
Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: consent of instructor. Theory of ecological relationships between plants and their pollinators with emphasis on insect pollination. Review of adaptations of both flowers and insects, and survey of the correlation of pollination relationships. Offered in even-numbered years. (Same course as Entomology 245.)

Principles of Plant Taxonomy (4) II, Tucker
Lecture—2 hours; laboratory—6 hours. Prerequisites: course 108; Genetics 103 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—taxonomy, embryology, biochemistry, etc.—elucidate problems of taxonomic relationship, mainly of genera and higher categories.

Experimental Plant Taxonomy (2) II, Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 108; course 117 and Genetics 103 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants.

Experimental Plant Taxonomy (2) II, Kyhos
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 205A. A continuation of course 205A. Study of variation in natural population in relation to taxonomy; the application of population sample analysis, cytotaxonomy, protoplast transplantation, etc. to the study of taxonomic problems and the clarification of relationships.

Plant Acltology (3) II, Major

Plant Systematics (3) III, Major
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 1117; Soil Science 120 recommended. Theories and methods involved in the study of structure, composition, boundaries, ecology, and classification of vegetation, with particular emphasis on California plant communities.

Seminar (1) I, Tucker; II, Wells; III, Doyle
Seminar—1 hour. (Grading only.)

Research Conference in Botany (1) I, II, III, The Staff
Conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research projects in botany. May be repeated for credit. (Grading only.)

Seminar in Botany (1) I, Castelfranco; III, Keilhapper
Seminar—1 hour. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. (Grading only.)

Seminar in Mycology (1) I, Butler (Plant Pathology); III, Wells
Seminar—1 hour. Review and evaluation of current literature and research in mycology. (Grading only.) (Same course as Plant Pathology 265.)

Tutoring in Botany (1-3) I, II, III, The Staff
Prerequisite: graduate standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. (Grading only.)

Group Study (1-5) I, II, III, The Staff (Chairperson in charge)

Research (1-12) I, II, III, The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Grading only.)

Professional Course
The Teaching of Botany (2) II, III, The Staff (Chairperson in charge)
Discussion—2 hours. Prerequisite: graduate standing; current appointment as a teaching assistant in Botany. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, including laboratory work, and the formulation of questions and topics for examinations. (Grading only.)
knowledge of German or Russian. High school students should note that the preparation for either the A.B. or 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 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:

<table>
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<tr>
<th>Subject Matter</th>
<th>UNITS</th>
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<tbody>
<tr>
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<td>5-12</td>
</tr>
<tr>
<td>Chemistry II</td>
<td>5-12</td>
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Total Units for the Major 72-79

Chemistry

B.S. Major Requirements:

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<th>Subject Matter</th>
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<td>5-12</td>
</tr>
<tr>
<td>Chemistry II</td>
<td>5-12</td>
</tr>
</tbody>
</table>

Total Units for the Major 98-102

Major Advisers:

Honors and Honors Program. The honors program comprises 6 units of course 194H.

Teaching Credential Subject Representative. C.P. Nash. See page 103 for the Teacher Education Program.

Graduate Study. The Department of Chemistry offers, or in conjunction with, the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry.

Courses in Chemistry

Lower Division Courses

1A. General Chemistry (5). Allen, Keeler. Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry; or high school physics; or introductory college mathematics (with an average grade of B or higher); or second-quarter standing. Fundamental principles of chemistry. Stoichiometry, properties, and theory of gases, first law of thermodynamics, atomic and molecular structure, colligative properties of solutions.

1B. General Chemistry (5). Baich, Voiman; III. True. Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 1A or 1A. Continuation of course 1A. Chemical reactions; reaction mechanisms; electrochemistry; introduction to qualitative analysis.

1C. General Chemistry (5). Baich, Voiman; III. Allen. Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 1B or 4B. Continuation of course 1B. Chemical kinetics; introduction to concepts and reactions of complex ions and molecules, application of principles of chemistry to problems of quantitative analysis. Students who have had course 4B may receive only 4 units of credit for course 1C.

4A. General Chemistry (5). Maki. Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Mathematics 21A or 16A (may be taken concurrently). High school chemistry or consent of instructor. An introduction to atomic and molecular structure and binding, states of matter, thermochromy and chemical equilibrium. Courses 4A-4B-4C are equivalent to course sequence 1A-1B-1C-5. The sequence 4A-4B-4C is primarily for students majoring in the physical sciences.

4B. General Chemistry (5). III. Nash. Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4A. Continuation of and quantitative treatment of chemical equilibria with applications to precipitation reactions, acid-base reactions, complexation reactions, and oxidation-reduction reactions. Elementary thermochromy and chemical kinetics. The laboratory will emphasize quantitative techniques.

4C. General Chemistry (5). III. Hope. Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4B. Continuation of course 4B. Topics in systematic inorganic chemistry, nuclear chemistry, introduction to organic chemistry and the functional group concept, biological applications. Laboratory will emphasize qualitative analysis and preparative techniques.

5. Quantitative Analysis (4) II, III. Nash. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with a grade of C or higher. An introduction to the principles and methods of quantitative chemical analysis with emphasis on the application of equation theory to analytical problems. Students who have received credit for the 4A-4B-4C sequence may enroll in course 5 for 2 units only; not open to students who have received credit for 4A-4B-4C.

8A. Organic Chemistry; Brief Course (3). S. Sommer, B. Bottini, E. Friedrich; III. Musker. Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. Students with course 8B an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than chemistry.

8B. Organic Chemistry; Brief Course (3). D. Holt, II, III. Sommer, III. Bottini. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 8A. Continuation of course 8A. The laboratory is concerned primarily with the study of the properties and chemistry of the common classes of organic compounds.

10. Concepts of Chemistry (4) I, 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. Group directed 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). III. Meares, Schmid. Lecture—3 hours. Prerequisite: course 4C or 5 or consent of instructor. Mathematics 16C or 21C; one year college physics. A basic course in physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium and chemical reaction principles. Empirical kinetic theory of gases and liquids. Transport processes in liquids and solutions.

107B. Physical Chemistry for the Life Sciences (3). II, Schmid, True. Lecture—3 hours. Prerequisite: course 107A or 110A. Continuation of course 107A. Electrochemistry and the thermodynamics of simple electrolyte solutions. Chemical rate processes, introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and catalytic systems. Considerations on biomolecular reactions.

108. Physical Chemistry of Macromolecules (3). III. Schmid. Lecture—3 hours. Prerequisite: course 107B or 110C. Properties and characterization of macromolecules with emphasis on proteins. Structural thermodynamics, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

110A. Physical Chemistry: Thermodynamics (3). III. Keizer, Voiman; III. Rock. Lecture—3 hours. Prerequisite: course 5 or 4C; Mathematics 21C or 16C; one year of college physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry: Quantum Mechanics (3). III. LaMar, II, McCourt. Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.


111A. Physical Chemistry: Methods and Applications (4) I, II, III. Hope. Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107B or 110C (may be taken concurrently). Lecture topics include statistical thermodynamics, basic electronics, diffraction methods, and optical systems. Laboratory exercises will involve computer practice, thermodynamic measurements on non-electrolyte systems, and structural properties of molecules.

111B. Physical Chemistry: Methods and Applications (4) II, III. Hope. Lecture—1 hour; laboratory—9 hours. Prerequisite: course 111A or consent of instructor. Lecture topics will include distribution equilibrium and solvation methods. Laboratory exercises will involve kinetics and mechanism, electrochemistry, distribution, equilibrium, chromatography, and electrophoretic techniques.

121. Introduction to Molecular Structure and Spectra (4) III. LaMar. Lecture—4 hours. Prerequisite: course 110C. Modern theoretical and experimental methods used to study problems of molecular structure and binding; emphasis on spectroscopic techniques.

124. Inorganic Chemistry (4) II. Powell. Lecture—4 hours. Prerequisite: course 107B or 110B; 128B (any of which may be taken concurrently). Bonding, structure, and reactivity of inorganic compounds, including organometallic complexes and inorganic aspects of biochemical and physical chemistry.

126. Nuclear and Radiochemistry (3). III. Root. Lecture—3 hours. Prerequisite: course 110B (may be taken concurrently with consent of instructor). Introduction to theory and experimental methods in nuclear and radiochemistry including nuclear properties, radioactive decay, isotope effects, nuclear thermodynamics, radiation effects, and short-lived radotracer applications in mechanistic and physical chemistry.

128A. Organic Chemistry (3) I. Schone, II, Musker, III. Kurth. Lecture—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; chemistry majors should enroll in course 128A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry. Only two units credit allowed students having had course 128B.

128B. Organic Chemistry (3) I, II, III. E. Friedrich; II, Smith, III. Rosenfeld. Lecture—3 hours. Prerequisite: course 128A or consent of instructor, course 128A strongly recommended; chemistry majors should enroll in course 128B concurrently. Continuation of course 128A with emphasis on aromatic and haloalkanes, substitution reactions, elimination reactions, and the chemistry of carbononyl compounds. Introduction to the application of spectroscopic methods.

128C. Organic Chemistry (3) I, II, Miller; III. Sommer. Lecture—3 hours. Prerequisite: course 128B; chemistry majors should enroll in course 128C concurrently. Continuation of course 128B with emphasis on condensations and the chemistry of the amine, phenols, and sugars: selected biologically important compounds.
129A. Organic Chemistry Laboratory (2Q). Kurrth; II, S. Fried- rich; III, S. Friedrich
Lecture—2 hours, laboratory—3 hours. Prerequisites: course 1C or 4C with a grade of C or higher. 129A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds. Only one unit credit allowed students having had course 88.
Laboratory—6 hours. Prerequisites: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.
129C. Organic Chemistry Laboratory (2Q). Kapper, II, Miller; III, Doi
Laboratory—6 hours. Prerequisites: courses 128C (may be taken concurrently) and 129B. Continuation of course 129B.
130. Qualitative Organic Chemistry (4Q) III. Miller
Lecture—1 hour; laboratory—9 hours. Prerequisites: courses 5, 128C, 129C. The application of physical and chemical techniques to the qualitative identification of organic compounds.
131. Modern Methods of Organic Synthesis (4Q) II. Zweifel
Lecture—4 hours. Prerequisites: course 129C, or consent of instructor. Introduction to modern synthetic methodology in organic chemistry with emphasis on stereo selective reactions and application to multistep syntheses of organic molecules containing multifunctionality.
140. Synthetic Methods (4Q) II. Power
Lecture—1 hour; laboratory—9 hours. Prerequisites: courses 124, 129C, 129D. An integrated inorganic-organic course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using a wide range of methods.
150. Chemistry of Natural Products (3Q) I, Smith
Lecture—3 hours. Prerequisites: course 128C. Chemistry of terpenes, steroids, aminohetero- and alkaloids. Isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.
149H. 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.)
197. Projects in Chemical Education (1-4) I, II, III. The Staff
(Chairperson in charge)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only.)
198. Directed Group Study (1-6) I, II, III. The Staff (Chairper- son in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)
199. Special Study for Advanced Undergraduate (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

Graduate Courses
210A. Advanced Physical Chemistry: Thermodynamics (4Q), McQuarrie
Lecture—3 hours; either discussion—1 hour or paper at discretion of instructor. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, and solutions; surface effects; chemical equilibriuim. Thermodynamics of gravitational, electrical, and magnetic fields. The Third Law. Applications to biophysical problems.
210B. Advanced Physical Chemistry: Quantum Chemistry (4Q) II. Fink
Lecture—3 hours; discussion—1 hour or paper at discretion of instructor. Prerequisite: consent of instructor. Principles of quantum chemistry and their applications to atomic and molecular structure and spectroscopy, and to chemical bonding.
210C. Advanced Physical Chemistry: Kinetics (4Q) III. Case
Lecture—3 hours; discussion—1 hour or paper at discretion of instructor. Prerequisite: consent of instructor. Chemical kinetics in gases and liquids including the kinetic theory of gases, statistical theories of bimolecular and unimolecular reactions, introduction to trajectory methods, equilibrium structure of liquids, transport processes in fluids, photochemical processes, and relaxation kinetics.
219. Spectroscopy of Organic Compounds (4Q) III. E. Fried- rich
Lecture—4 hours. Use of spectroscopy in organic chemistry for the identification of compounds and the investigation of stereochemical and reaction mechanism phenomena.
221A-H. Organic Chemistry (3Q) I, II, III. The Staff
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course.
228. Principles of Transition Metal Chemistry (3Q) I, Balch
Lecture—3 hours. Prerequisite: course 124 or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.
227F. Special Topics in Inorganic Chemistry (3Q) I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented special topics courses in inorganic chemistry.
223A-L. Special Topics in Physical Chemistry (3Q), I, II, III. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in physical chemistry. Topics will vary each time the course is offered.
223C. Physical Organic Chemistry (4Q), Rosenfeld
Lecture—4 hours. Modern concepts of substitution, elimination, and addition reactions, rearrangements, and stereochemistry.
290. Seminar (1) I, II, III. Power, Rosenfeld, Volman
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)
293. Introduction to Chemistry Research (1Q) I. The Staff
(Directorate in charge)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.)
296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.)

Professional Course
390. Methods of Teaching Chemistry (3Q) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate student standing in Chemistry; consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of tests and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and observing and guiding student laboratory work. Participation in the teaching program required for Ph.D. in Chemistry. May be repeated for credit. (S/U grading only.)

Classics

See Mexican-American (Chicano) Studies

Child Development
See Human Development

Chinese

See Asian American Studies, and Oriental Languages and Civilizations

Classics

(1College of Letters and Science)
Department Office (Spanish and Classics), 622 Sproul Hall (752-0853)
Faculty
Richard E. Grimm, Ph.D., Associate Professor
Lynn E. Roller, Ph.D., Assistant Professor
Wesley Thompson, Ph.D., Professor
David A. Traill, Ph.D., Associate Professor

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, philosophy, history, and oratory. Both majors emphasize 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 western 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 traditionally looked with favor on highly qualified students with training in Latin or Greek.

Chicano Studies

See Mexican-American (Chicano) Studies

NOTE: For key to footnote symbols, see page 126.
# Classical Civilization

## A. B. Major Requirements:

### Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Greek 1, 2, 3 or Latin 1, 2, 3 or the equivalent</th>
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</thead>
<tbody>
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<td>21-24</td>
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### Depth Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 121</th>
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<tr>
<td>5</td>
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</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 1, 2, 3</th>
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</thead>
<tbody>
<tr>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

### Total Units for the Major

- Latin: 36-48
- A. B. Major: 61-64

---

## Teaching Credential Subject Representative

R. E. Grimm. See page 103 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. Rolier

- Lecture—3 hours. An 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. Rolier

- 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) II. Rolier

- Lecture—3 hours. The development of Rome and its Empire as illustrated by the monuments.

---

## Greek

### A.B. Major Requirements:

#### Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
<th>Greek 1, 2, 3 (or the equivalent)</th>
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<tbody>
<tr>
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### Depth Subject Matter

<table>
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<th>Latin 121</th>
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<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 1, 2, 3</th>
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<tr>
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</table>

### Total Units for the Major

- Latin: 36-48
- A. B. Major: 61-64

---

## Latin

### A.B. Major Requirements:

#### Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Units</th>
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### Depth Subject Matter

<table>
<thead>
<tr>
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<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 1, 2, 3</th>
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<tbody>
<tr>
<td>15</td>
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</table>

### Total Units for the Major

- Latin: 36-48
- A. B. Major: 61-64

---

## Minor Program Requirements:

<table>
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<th>Units</th>
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<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 3</th>
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<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

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## Greek

### Lower Division Courses

1. Elementary Greek (3) I. The Staff

- Lecture—4 hours. Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a 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 Greek (5) II. The Staff


3. Elementary Greek (5) III. The Staff


---

## Minor Program Requirements:

<table>
<thead>
<tr>
<th>Units</th>
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<table>
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<tr>
<th>Units</th>
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</table>

<table>
<thead>
<tr>
<th>Units</th>
<th>Latin 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

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## Upper Division Courses

1. Attic Orators (4) II. Thompson

- Lecture—3 hours. Prerequisite: course 3.

2. Plate (4) I. Thompson

- Lecture—3 hours. Prerequisite: course 3.

3. Ephesians (4) I. Thompson

- Lecture—3 hours. Prerequisite: course 101.

4. Homer: Iliad (4) I. The Staff

- Recitation—3 hours; term paper. Prerequisite: course 3.

5. Homer: Odyssey (4) II. The Staff

- Recitation—3 hours; term paper. Prerequisite: course 3.

6. Menander (4) I. Thompson

- Lecture—3 hours; term paper. Prerequisite: course 3.

7. Sophocles (4) III. Grimm

- Lecture—3 hours. Prerequisite: course 103. Offered in odd-numbered years.

8. Aristophanes (4) III. Grimm

- Lecture—3 hours. Prerequisite: course 103. Offered in even-numbered years.

---

## Classical Civilization

A major in Classical Civilization involves a broad and deep study of the literature, art, and institutions of ancient Greece and Rome. Courses are available in Greek and Latin, as well as in the history of art and architecture. Graduate study is also available for those who wish to pursue a career in teaching or further academic research.

---

## Greek

Greek is a required component of the A. B. Major in Classical Civilization. Students are encouraged to take courses in both Greek and Latin to gain a well-rounded understanding of ancient civilizations.

---

## Latin

Latin is also a required component of the A. B. Major in Classical Civilization. Students are encouraged to take courses in both Greek and Latin to gain a well-rounded understanding of ancient civilizations.

---

## Minor Program Requirements

Students interested in pursuing a minor in Classical Civilization should complete at least 21 units in Greek or Latin, including courses in literature, art, and institutions of classical civilization.

---

## Courses in Classics

Courses in Classics include a variety of subjects, such as Classical Civilization, Greek and Roman Mythology, Greek Archaeology, Roman Archaeology, and more. These courses provide a comprehensive understanding of the ancient world, including its literature, art, and institutions.

---

## Graduate Courses

Graduate study in Classical Philosophy includes seminars and courses that cover a wide range of topics, from the study of Greek and Roman philosophy to the historical and critical study of ancient texts. Students are encouraged to take courses in both Greek and Latin to gain a deep understanding of the ancient world.

---

## Greek

Courses in Greek include Classical Civilization, Greek Archaeology, Roman Archaeology, and more. These courses provide a comprehensive understanding of the ancient Greek world, including its literature, art, and institutions.

---

## Latin

Courses in Latin include Classical Civilization, Latin Archaeology, Roman Archaeology, and more. These courses provide a comprehensive understanding of the ancient Roman world, including its literature, art, and institutions.

---

## Minor Program Requirements

Students interested in pursuing a minor in Classical Civilization should complete at least 21 units in Greek or Latin, including courses in literature, art, and institutions of classical civilization.
Clinical Pathology

(School of Veterinary Medicine)
Jiro J. Kaneko, D.V.M., Ph.D., Chairperson of the Department
Department Office, 1318 Haring Hall (752-0153)

Faculty
Bernard F. Feldman, D.V.M., Ph.D., Assistant Professor
Nerri C. Jain, M.V.Sc., Ph.D., Professor
Donald E. Jasper, D.V.M., Ph.D., Professor
Michael E. Mount, D.V.M., Ph.D., Assistant Professor
Oscar W. Schalm, D.V.M., Ph.D., Professor Emeritus
Joseph G. Zinkl, D.V.M., Ph.D., Assistant 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 101-101B or Physiological Sciences 101A-101B, consent of instructor. Principles, interpretation and applications of clinical hematology; comparison of blood cells, morphology and function. Consent of instructor required.

110. Comparative Pathology Laboratory (2 II). Kaneko, Zinkl, Jain, Feldman
Laboratory—4 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to lab-oriented methods and procedures of clinical hematology. Limited enrollment.

112. Clinical Biochemistry (3 I). Kaneko
Lecture—2 hours; laboratory—2 hours. Prerequisite: Physiology 112, 113; Zoological Sciences 101A-101B or Biochemistry 101A-101B, consent of instructor. Princi-
Community Nutrition
(College of Agricultural and Environmental Sciences)

The Major Program
Community Nutrition focuses on the biological, economic, environmental, and socio-cultural factors that influence dietary practices and nutritional status of individuals and groups. The aim of Community Nutrition is the application of this knowledge in the development and implementation of programs to improve the 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 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 programs (Economics option).

Advancement 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 required 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>Subject Matter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>50-52</td>
</tr>
<tr>
<td>Bacteriology with laboratory (Bacteriology 2, 3)</td>
<td>4</td>
</tr>
<tr>
<td>Biology (Biological Sciences 1)</td>
<td>5</td>
</tr>
<tr>
<td>Chemistry, general and organic (Chemistry 1A, 1B, 8A, 8B)</td>
<td>1-3</td>
</tr>
<tr>
<td>Computer logic or programming (Consumer Technology 31 or Mathematics 19)</td>
<td>4</td>
</tr>
<tr>
<td>Cultural social science (Anthropology 2, Geography 2 or Sociology 3)</td>
<td>4</td>
</tr>
<tr>
<td>Cultural food habits (Nutrition 20)</td>
<td>4</td>
</tr>
<tr>
<td>Oral and written expression (see College requirements, page 74)</td>
<td>8</td>
</tr>
<tr>
<td>Social research methods (Sociology 46A or Psychology 41)</td>
<td>4</td>
</tr>
<tr>
<td>Social statistics (Economics 12, Sociology 46B, or Statistics 13)</td>
<td>4-6</td>
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<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
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<tbody>
<tr>
<td>Biochemistry 101A-101B or physiological sciences (101A-101B)</td>
<td>5-6</td>
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<tr>
<td>Food Science and Technology 100A, 100B, 101A, 101B</td>
<td>10</td>
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<tr>
<td>Nutrition 110, 111, 111L, 116B, 118, 119, 120</td>
<td>27</td>
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<tr>
<td>Physiology 110, 110L</td>
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<table>
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<tr>
<th>Option Subject Matter</th>
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<tr>
<td>Socio-Cultural Option</td>
<td>48-51</td>
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<tr>
<td>Anthropology 101, 126</td>
<td>8</td>
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<tr>
<td>Anthropology 111 or Geography 170</td>
<td>4</td>
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<tr>
<td>Foreign language (French 1 and 2; German 1 and 2; Spanish 1 and 2)</td>
<td>12</td>
</tr>
<tr>
<td>Geography 175</td>
<td>4</td>
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<tr>
<td>Restricted electives (selected with consultation of adviser)</td>
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<table>
<thead>
<tr>
<th>Behavioral-Psychological Option</th>
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<tbody>
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<td>Education 110 or Psychology 130</td>
<td>4</td>
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<tr>
<td>Human Development 100B, 100C</td>
<td>12</td>
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<tr>
<td>Psychology 1, 108, 145</td>
<td>13</td>
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<tr>
<td>Restricted electives (selected with consultation of adviser)</td>
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<table>
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<tr>
<th>Economics Option</th>
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<tbody>
<tr>
<td>Agricultural Economics 100A, 100B</td>
<td>8</td>
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<tr>
<td>Consumer Economics 141, 149</td>
<td>7</td>
</tr>
<tr>
<td>Economics 1A, 1B</td>
<td>10</td>
</tr>
<tr>
<td>Mathematics 16A, 168</td>
<td>8</td>
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<tr>
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<table>
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<tr>
<th>Unrestricted Electives</th>
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<tr>
<td>Total Units for Degree</td>
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</table>

Major Adviser: K.G. Dewey (Nutrition).
Graduate Study: See page 97 and the Announcement of the Graduate Division.

Comparative Literature

(College of Letters and Science)
Robert M. Torrance, Ph.D., Program Director
Program Office, 912 Sproul Hall (752-1219)

Committee in Charge
Robert M. Torrance, Ph.D. (Comparative Literature), Chairperson
Samuel G. Armistead, Ph.D. (Spanish)
Richard N. Coope, Ph.D., F.A.H.A. (French)
Ruby Cohn, Ph.D. (Comparative Literature, Dramatic Art)
Alfonso De Petriss, Dottore in Filosofia Italiana
Roi H. Hoernmnn, Ph.D. (Comparative Literature, German)
Marianne Osborn, Ph.D. (English)
Valerie A. Tumin, Ph.D. (Russian)
Marian B. Ury, Ph.D. (Comparative Literature)

Faculty
Samuel G. Armistead, Ph.D., Professor (Spanish)
Richard N. Coope, Ph.D., F.A.H.A., Professor (French)
Ruby Cohn, Ph.D., Professor (Comparative Literature, Dramatic Art)
Roland W. Hoernmnn, Ph.D., Associate Professor (Comparative Literature, German)
Manfred Kusich, Ph.D., Associate Professor (French)
Peter M. Schaeffer, Ph.D., Associate Professor (German)
Robert M. Torrance, Ph.D., Associate Professor (Comparative Literature, German)
Marian B. Ury, Ph.D., Associate Professor (French)
Alan B. Williamson, Ph.D., Assistant Professor (English)

The Major Program
Few people would think of studying only English physics, German biology, French painting, or Spanish music. Yet most literature majors study books originally written in a single language. Comparative Literature, on the other hand, encourages students to read, and to think 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 combine courses in one or more national literature departments together with courses in Comparative Literature. Students who enjoy reading books, exploring ideas, and learning about different civilizations will find Comparative Literature a stimulating field of study.

The introductory course sequence, "Great Books of Western Civilization," provides both an overview of European literary culture from ancient times to the present and intensive practice in analytical thought and English composition. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign literature in the original language. No foreign language is required for the minor.

Students majoring in Comparative Literature choose a first and a second literature of concentration, one of which may be English. After the introductory sequence, each student's major course work is divided between courses in the two literatures of concentration and Comparative Literature courses. These Comparative Literature courses encourage students to take a broad view of a historical period, a theme, a genre, or a literary movement. The wide variety of options in the program permits great flexibility and encourages interdiscipli- nary 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 translating. Most Comparative Literature majors, however, are preparing for other careers that will employ the skills they have learned in the process of academic stimulation 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:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>12-42</td>
</tr>
<tr>
<td>Comparative Literature 1, 2, 3</td>
<td>12</td>
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</tbody>
</table>

Foreign language: sufficient preparation to insure satisfactory performance in the upper division level.

166
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.

Courses in Comparative Literature

Lower Division Courses

   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 Faith (4) I, II. 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. Director in charge.
   Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Goethe’s Faust to Beckett’s Waiting for Godot.

4. The Short Story and Novella (4) II. The Staff (Director in charge).
   Lecture-discussion—3 hours; term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with especial emphasis on the modern period.

5. Fairy Tales, Fables, and Parables (3) II. Ury
   Lecture-discussion—3 hours. An introduction to fairy tales, fables, and parables as recurrent forms and sources in literature, with readings from such diverse writers as Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges.

6. Myths and Legends (3) III. Ury
   Lecture-discussion—3 hours. An introduction to the comparative study of myths and legends, excluding those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, and Japanese literary sources.

7. Literature of Fantasy and the Supernatural (3) II. Hoermann
   Lecture-discussion—3 hours. An inquiry into the internecine tensions between the fantastic and the real in the literature of dreams and hallucinations, fabulous landscapes and voyages, grotesque satire, and gothic horror.

8. Utopias and Their Transformations (3) III. Hoermann
   Lecture-discussion—3 hours. A consideration, in literary works from different ages, of visionary and utopian variations on the perfection of a lost paradise, Golden Age, or Atlantik—and of the inhuman nightmares that occasionally result from perceptions of the utopian dream.

9A. Masterpieces of World Literature (2) II, III. The Staff (Director in charge).
   Lecture-discussion—one 2-hour session. A representative series of courses designed primarily to acquaint the non-literature major with some of the world’s most important literature; readings in English translation. Content will alternate among the following segments: (A) Gilgamesh, Ramayana, and Beowulf; (B) Aeneid, Beowulf, Shahnameh; (C) Metamorphoses, Decameron, African Nights, Canterbury Tales; (D) Chanson de Roland, El Cid, Igor’s Campaign, Monte D’Arab; (E) Salutriatia, Tristan and Iseult, Aucassin and Nicolette, Gawain and the Green Knight; (F) Swift, Rabelais, La Celestina, Simplicissimus; (G) Cervantes, Sakoku, Fielding, Voltaire; (H) Blake, Dickens, Shakespeare, Balzac, Dostoevsky, Caldeiron, Voltaire, Racine, Lessing; (I) Goethe, Byron, Shakespeare, Pushkin, Lermontov; (J) Hofmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville; (J) Flaubert, Turgenev, Galdós, Ibsen, Ibsen; (K) Balzac, Dos- toevsky/Tolstoj, Hardy, Shaw, Strindberg; (L) Unamuno, Seve, Conrad, Gide, Huxley, Faulkner; (M) Joyce/Yeats, Mann/Celine, Bulgakov/Tanizaki, O’Neill/Brecht, Lors Camus/Dostoievsky, Garcia Marquez/Grass, Borges/Sartre, Bellow/Novaly, Beckett/Pinter, Gentil/Dönhoff. May be repeated for credit in different subject area. Limited enrollment. (IPN grading only.)

*13. Dramatic Literature (4) III. Cohn
   Lecture-discussion—3 hours; term paper. An introduction, through careful reading of selected plays, to some of the major dramas of the earliest tragedies of ancient Greece to the contemporary theater of the Absurd.

15. The Spiritual Quest (3) I, III. Torrance
   Lecture-discussion—3 hours. An exploration of the unending search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in such works as the Bhagavad Gita, The Quest of the Holy Grail, Dante’s Purgatorio, and Melville’s Moby Dick.

20. Man and the Natural World (4) III. Torrance
   Lecture-discussion—3 hours; term paper. An introduction, through careful reading of selected plays, to some of the major dramas of the earliest tragedies of ancient Greece to the contemporary theater of the Absurd.

40. Introduction to Comparative Literature (4) I, Torrance
   Lecture-discussion—3 hours; term paper. An introduction to reading of different kinds of works, including poems, plays, short fiction, and a novel drawn from several literatures.

49. Freshman Seminar: General Topics in Comparative Literature (2) I. The Staff (Director in charge).
   Seminar—2 hours. Introductory comparative studies dealing with such topics as Utopia, childhood and adolescence, sense and nonse, and the voyage as recurrent themes in literature. (IPN grading only.)

50. Literary History of the Western World (3) I, II, III. Ury
   Lecture-discussion—3 hours; term paper. An examination of the changing relationship between the individual human being and his “natural” environment, whether cultivated or wild, as reflected in literary works from ancient times to the present by such authors as Hesiod, Virgil, Rousseau, Wordsworth, and Thoreau.

40. Introduction to Comparative Literature (4) I, Torrance
   Lecture-discussion—3 hours; term paper. An introduction to reading of different kinds of works, including poems, plays, short fiction, and a novel drawn from several literatures.

49. Freshman Seminar: General Topics in Comparative Literature (2) I. The Staff (Director in charge).
   Seminar—2 hours. Introductory comparative studies dealing with such topics as Utopia, childhood and adolescence, sense and nonse, and the voyage as recurrent themes in literature. (IPN grading only.)

53A-C. Literary History of the Western World (3) I, II, III. Ury
   Lecture-discussion—3 hours; term paper. A discussion course in English translation for students majoring in literature majors, dealing with the most important and representative works of the epic, drama and poetry generated by such cultures as the Buddhist, Hindu, Islamic and Zoroastrian. Readings will include for (A) China and Japan; Chuang Tzu, Water Margin, Pillow Book of Shi Shangron; Essays in Idleness, The I Ching, and kabuki drama; for (B) Greece and Rome, the Iliad, the Mahabharata, the Ramayana, and the Panchatantra; for (C) the Near East: Ibn Khaldun, Thousands and One Nights, the Shahnameh, Turkish folk tales, and Sufi mystical poetry.

NOTE: For key to footnote symbols, see page 128.

Comparative Literature

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge).
   Restricted to lower division students. (IPN grading only.)

99. Special Study for Undergraduates (1-9) I, II, III. The Staff (Director in charge).
   (IPN grading only.)

Upper Division Courses

100. Majors Colloquium (2) III. The Staff (Director in charge).
   Seminar—1 hour; term project. Weekly presentations and discussions of topics appropriate to the comparative study of literature. May be repeated once for credit. (IPN grading only.)

125. Women Writers (4) III. Ury
   Lecture-discussion—3 hours; term paper. An exploration of women’s differing views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte.

140. Thematic and Structural Study of Literature (4) II. The Staff (Director in charge).
   Lecture-discussion—3 hours; term paper. Interpretation of selected works illustrating the historical development of themes, as well as of formal and structural elements.

141. Literary Theory and Criticism (4) I, III. Torrance
   Lecture-discussion—3 hours; term paper. Exploration of literary theories and criticism with emphasis on specific objectives and possibilities of comparative literature.

142. Critical Reading and Analysis (4) I. The Staff (Director in charge).
   Lecture-discussion—3 hours; term paper. Prerequisite: consent of instructor. Close reading of selected texts, attention of very limited amount of material, with attention to the problems of texts in translation.

158A. Special Topics in Comparative Literature (4) I, II, III. The Staff (Director in charge).
   Lecture-discussion—3 hours; term paper. Intensive study of selected subjects: (A) The Play Within the Play; (B) The Lyric and Drama; (C) Women/Phallic Drama; (D) The Role of Philosophy in Literature; (E) The Role of Psychology in Literature; (F) The Religious Experience in Literature; (G) Literary Anthologies and Judgment. May be repeated for credit in different subject area.

190A. The Modern Novel (4) I, Torrance
   Lecture-discussion—3 hours; term paper. The changing image of man and his world as seen in novels by such writers as Joyce, Proust, Mann.

190B. The Modern Drama (4) I. Cohn
   Lecture-discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht.

191A. Tragedy (4) I, Cohn
   Lecture-discussion—3 hours; term paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present.

191B. Comedy (4) I, Cohn
   Lecture-discussion—3 hours; term paper. Comic attitudes towards life in literary works of different ages.

191C. Tragedamy (4) III. Cohn
   Lecture-discussion—3 hours; term paper. A survey of works in the mixed moods from ancient times to the present.

192. The Theory and Practice of Literary Translation (4) II. The Staff (Director in charge).
   Lecture-discussion—3 hours; term translation project. Prerequisite: competency in "source" language and consent of instructor. Theories and problems of rendering texts in foreign language into English.

163. Biography and Autobiography (4) III. Cee
   Lecture-discussion—3 hours; term paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. Offered in odd-numbered years.

164A. The Middle Ages (4) I, Torrance
   Lecture-discussion—3 hours; term paper. Readings in heroic epic, chivalric romances, and such major authors as Chaucer and Olivier, with emphasis on shared assumptions concerning man's place in the world.

194B. The Renaissance (4) II. Torrance
   Lecture-discussion—3 hours; term paper. Readings in major authors such as Petrarch, Machiavelli, Erasmus, Montaigne, Rabelais, Cervantes, and Shakespeare, with particular emphasis on changing conceptions of the possibilities and limitations of man.
Computing Science

See Engineering: Electrical and Computer Science, Mathematics, or Statistics

Consumer Economics
(Con涅e of Agricultural and Environmental Sciences)

Faculty
See under Department of Agricultural Economics.

Major Program and Graduate Study
See the major in Development, Resource, and Consumer Economics (page 171); and see pages 97 and 133.

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, 105 Voorhees Hall.

Upper Division Courses

141. Consumers and the Market (4) I, II, III. Kushman Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. The structure of the market and the effects of its performance on consumers. Agen-

cies aiding and protecting consumers, sources of information available to consumers. Students who have had or are taking Agricultural Economics 100A, Economics 100, or the equivalent may receive only 3 units of credit, so must enroll in course 141M.

141M. Consumers and the Market (3) II. Kushman Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. The structure of the market and the effects of its performance on consumers. Agen-

cies aiding and protecting consumers, sources of information available to consumers. Students who have had or are taking Agricultural Economics 100A, Economics 100, or the equivalent must enroll in this course (for 3 units) rather than course 141.

142. Personal Finance (3) I, II, III. Shepard Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning. (Same course as Agricultural Economics 142.)

196. Directed Group Study (1-5) I, II, III. The Staff (Chairpers-son in charge) (PFP grading only.)

199 Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PFP grading only.)

Graduate Courses

220. Economics of Consumer Policy (3) III. Lecture—3 hours. Prerequisite: one graduate course in economic theory and one course in econometrics or the equivalent. Policy criteria; sources of market failure; con-

sumer policy alternatives; empirical evaluation of selected economic policies.

258. Economics of Consumption (3) II. 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.

299. Seminar (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Consumer Food Science

(Con涅e of Agricultural and Environmental Sciences)

The Major Program

The Consumer Food Science major emphasizes both the biological and physical properties of foods and the socioeconomic and cultural aspects of food that relate to consumer acceptability and use. Students are provided with sufficient range in study of the biological, natural, and social sciences to prepare them for careers such as food product development, quality assurance, marketing, and sensory analysis, extension service, creative writing, and community service. The major provides academic preparation for those who plan to pursue careers in related fields.

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

Biochemistry (Biochemistry 101A-101B) 6
Biology with laboratory (Biology 10) 5
Chemistry, general and organic (Chemistry 1A-1B-1C, 8A-8B) 21
Mathematics and physics (Mathematics 19A, Physics 10) 7
Microbiology with laboratory (Bacteriology 2, 3) 4
Physiology (Physiology 110) 5
Statistics (Agricultural Science and Management 150) 4
Written and oral expression (see College requirement) 8

Depth Subject Matter

Community nutrition (Nutrition 118) 3
Consumer economics (Consumer Economics 141, 142) 7
Food Science and Technology including 100A, 100B, 101A, 101B, 107, Nutrition 20 or 120, and one additional course in each of food chemistry, food microbiology, and food processing 26
Human nutrition with laboratory (Nutrition 110, 111, 111L) 10
Consumer Science; Consumer Technology; Design

Breadth Subject Matter .............................................. 24
Principles of economics (Economics 1A-1B) .............................................. 10
Consumer behavior (Consumer Science 100) .............................................. 3
At least one course from two different areas: agricultural economics, applied behavioral sciences, consumer sciences, cultural anthropology, psychology, or sociology. Remainder in social sciences and humanities electives .............................................. 11
Restricted Electives .............................................. 20
Food related courses selected in accordance with student's educational goal with approval of adviser .............................................. 20
Unrestricted Electives .............................................. 30
Total Units for the Major .............................................. 180

Recommended
It is recommended that students interested in graduate work take Chemistry 5, English 101, Mathematics 16A-16B-16C and Physics 2A-2B-2C.

Major Advisor: H.G. Schutz (Textiles and Clothing).

Advising Center for the major is located in 109 Everson Hall (752-2512).

Graduate Study, Related graduate study and research leading to the M.S., degrees in Food Science or Nutrition is available. See page 103 and the Announcement of the Graduate Division for details on graduate study.

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 (page 168) and Home Economics (page 237) are related majors; for graduate study, see page 103.

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, 129 Everson Hall.

Lower Division Courses
47. Food Production Development Field Study (1) III, Schutz
Discussion-laboratory—3-hour sessions; field lab. To observe commercial aspects of the large-scale development, distribution and evaluation of food products intended for human consumption. Course given between Winter and Spring Quarters and considered a Spring course for pre-enrollment. Advance enrollment with instructor required. (PNP grading only.)

92. Internship in Consumer Science (1-12) II, III, The Staff
Laboratory—36 hours. Prerequisite: consent of instructor. Work-study experience on and off campus in a consumer science related area. (PNP 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.

135. Principles of Food Production Development (3) I, Schutz
Lecture—3 hours. Prerequisite: one course in introductory food science. Presents basic concepts of product research and development. Organization, activities, new product development, project management. Role of food regulations, consumerism, marketing, advertising, consumer research.

182. Internship in Consumer Science—(1-12) II, III, The Staff
(S.H. Zeronian in charge)
Laboratory—360 hours. Prerequisite: completion of minimum of 84 units, consent of instructor. Work-study experience on and off campus in a consumer science related area. (PNP grading only.)

196. Directed Group Study (1-5) I, II, III. The Staff (Zeronian in charge)
Group study or experimentation on consumer related topics. (PNP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Zeronian in charge)
Individual student reading, library research or experimentation. (PNP grading only.)

Graduate Courses
200. Consumer Research Methods (3) II, Schutz
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Topics will include consumer behavior and field attitude research, consumer sampling, measurement techniques, scales and methods of analysis.

Discussion-laboratory—5 hours. Directed exercises in using computers and computing calculators for solving selected agricultural, management, and production problems. Batch and time-sharing computing methods, programmable desk calculators. (PNP grading only.)

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. (PNP grading only.)

99. Special Study for Lower Division Students (1-6) I, II, III. The Staff (Garrett in charge)
(PNP grading only.)

Upper Division Courses
101. Engines for Automotive, Agricultural, Residential, and Recreational Use (3) II. Kaminaka
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction, operation, performance, and utilization. Properties of fuels, lubricants, and engine exhaust. Principles of combustion, carburation, and electrical systems.

111. Home Design (1-3) III, O'Brien
Lecture—1 hour. Prerequisite: upper division standing; Physics 28 and Chemistry 1B recommended. Sources of domestic water at remote locations: sanitary and irrigation applications; 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 the course. (PNP grading only.)

Prerequisite: consent of instructor. Directed exercises in planning and executing independent projects consistent with the student's abilities. (PNP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Garrett in charge)
(PNP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Garrett in charge)
(PNP grading only.)

Consumer Technology
(College of Agricultural and Environmental Sciences)

Faculty
See under Department of Agricultural Engineering.

Courses in Consumer Technology
Questions pertaining to the following courses should be directed to the Instructor or the Department of Agricultural Engineering, 2030 Bainer Hall.

Lower Division Courses
15. Experiments in Creative Woodworking (1) II, III. O'Brien
Laboratory—2 hours. Experimental comparison of techniques for creating objects and structures of wood. Physical principles and properties of woods as related to structural stability, selection and use of tools, and aesthetics in design; finishes to preserve, enhance, or create effects.

16. Experiments in Creative Metalworking (2) III. 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; design considerations; effects of techniques on quality and appearance; bases for self-evaluation of skills. Layout, cutting, forming, welding and finishing. (PNP grading only.)

17. Electrical Appliances and Systems (3) II, III. Hills
Lecture—1 hour; laboratory—3 hours. Characteristics and principles of electrical appliances and systems for lighting, heating, and power. Design, installation, operational testing, and control; safety; planning systems and selecting appliances.

22. Characteristics of Land Vehicles (1) I, Goss
Lecture—1 hour. Comparative study of the stability, control, performance and safety of various vehicles including automobiles, bicycles and motorcycles.

Design
(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

The Major Program
Design, as taught and practiced at UC Davis, brings together creativity and ingenuity, and is interdisciplinary in nature. This major attracts students who are interested in studies which will involve them in constructing the future shape of our everyday lives. The program is flexible, changing in content and size 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
Design

social tool. The program provides opportunities to acquire a knowledgeable and sound background in design, the skills to use it 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 fiber, graphic design, and industrial design. 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 or skill to one person or many, whenever the need arises.

The faculty is composed of a diverse group of designers and artists working in the fields of play environments and toys, wearable design and ethnic costume, the study of fantasy, printed images and book design, energy-efficient architecture, historical and contemporary textiles, interior design, handprinted and dyed textiles, constructed textiles, display and exhibition design, building renovation and conversion, contemporary furniture and small art press printing.

B.S. Major Requirements:

Preparatory Subject Matter 12
Introduction to design, Design 1 6
Drawing, Design 20A 4
Media, Design 20B 4

Depth Subject Matter 48
Individualized program of 48 units in Design courses to include at least 36 upper division units, determined by the student and faculty advisor. To include 192 or 199 course units as part of major requirements, the student must have prior approval of faculty advisor and the Master advisor.

Breadth Subject Matter 81
Natural sciences 27
Social sciences 27
Humanities 27

Unrestricted Electives 39

Total Units for the Major 180

Design

Additional Requirements
Development of a course of study, in consultation with an advisor, no later than the second quarter of the junior year.

Major Advisor: G. Liley (Applied Behavioral Sciences)

Courses in Design

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 140 Walker Hall (752-1165).

Lower Division Courses

6. Introduction to Design (4) I, II, III. 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 (Bertaux in charge) Studio—8 hours. Drawing for the designer, an aid to perception and communication of ideas, objects, and plans. May be repeated with a different instructor for a total of 8 units.

20B. Media (4) I, II, III. The Staff (Butler in charge) Studio—8 hours. Introduction to the tools, materials, and techniques used in the designer’s studio. May be repeated with a different instructor for a total of 8 units.

20C. Photographic Media (4) I, II, III. The Staff (Butler in charge) Studio—8 hours.

21. Drifting and Perspective (4) I, II, III. The Staff (Olsen in charge) Studio—8 hours. Prerequisite: course in course recommended. Creation of three-dimensional designs on two-dimensional surface.

22. Basic Imagery (4) I, II, III. Butler Studio—8 hours. Prerequisite: courses 6, 20A, 20B. Presentation of the fundamental of designed images, combining a theoretical perspective with practical use of the components of visual literacy. Specific focus upon (1) abstract structure, (2) symbolism, and (3) representation.

23. Personal Adornment (4) III. Stoba Studio—8 hours. Exploration of man’s image altered through ornamentation and its relation to the human structure.

24. Non-Loom Textiles (4) I, II, Lak Studio—8 hours. Contemporary approach to non-loom textile techniques, research, preparation, use, and history. May be repeated once for credit with different instructor.


26. Internship (1-12) I, II, III. The Staff (Olsen in charge) Field placement—3-36 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship, off and on campus, in areas of design, including environmental, costume, textile, graphic, museum, display, and interior design. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Olsen in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

126. Visual Presentation (4) II. Gotelli Studio—8 hours. Prerequisite: courses 6, 20A, 20B. Advanced study of display and exhibition design. Emphasis on concepts and techniques of three-dimensional design, including visual exhibit and museum installation.

130. Model Construction (4) I, II. Gotelli, II Studio—8 hours. Prerequisite: preparation in drafting and perspective recommended. Construction and presentation of working models from drawings of furniture, interiors, extens, and products.

131. Layered Textiles (4) II. Rivers Studio—8 hours. Prerequisite: background in drawing, personal adornment and non-loom textiles recommended. Exploration of multi-layered and multi-textured applique, patchwork, quilting, stump work. The individualized influence of materials and techniques of contemporary textiles.

132. Loomed Textiles (4) III. I, I, III. Lak Studio—8 hours. Prerequisite: course 24 recommended. Influences of material and techniques of the woven form of tapestry weaving and frame loom weaving, natural and simple loom construction. May be repeated once for credit with different instructor.

133A-133B-133C. Visual Imagery (4-4-4) I, II, III. Butler Studio—8 hours. Prerequisite: courses 20C, 22, 23. Studio 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.

134. Environmental Design (4) III. II. The Staff (Bertaux in charge) Studio—8 hours. Prerequisite: courses 21, 130 recommended. Exploration of specific problems in interior form and exterior space such as design for the disabled; and contemporary urban issues.

135. Furniture Design (4) I. Olsen Studio—8 hours. Prerequisite: course 21; course 180A recommended. Development of furniture for interior and exterior spaces, behavior and physical requirements cultural and historical expression, structural and aesthetic considerations.

140A. History of Design (3) I. The Staff (Butler in charge) Lecture—3 hours. Prerequisite: Art 1A and 1B (may be taken concurrently). The history of Western design from Ancient Egypt and the Middle East through the Atecan and Classical civilizations to the thirteenth century.

140B. History of Design (3) II. The Staff (Butler in charge) Lecture—3 hours. Prerequisite: Art 1A or consent of instructor. The history of Western design from the Renaissance through the Baroque, Rococo, and Neoclassicism of the eighteenth century, nineteenth century, industrialization to the emergence of modernism.

142A. World Textiles: Far East and Pacific (4) I, Rivers Lecture—3 hours; discussion—1 hour. Prerequisite: Art 1A. Exploration through lectures and visual material of the textile arts of Japan, China, Korea, India, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of these cultures.

142B. World Textiles: Middle East, Europe and United States (4) II. The Staff (Rivers in charge) Lecture—3 hours; discussion—1 hour. Prerequisite: 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 influences of Eastern textiles on textiles of Europe and the United States.

143. History of Costume Design (4) II. Stoba Lecture—3 hours; discussion—1 hour. Prerequisite: one course in art history. The history of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

144. History of Interior Design (4) II. The Staff (Gotelli in charge) Lecture—4 hours. Prerequisite: 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 swelling in its cultural setting and the development of the theory of modern interior design.


170A-170B-170C. Costume Design (4-4-4) I, II, III. Stoba Studio—8 hours. Prerequisite: courses 20A and 20B recommended. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary, and projected image of man as expressed through costume.

180A-180B-180C. Interior Design (4-4-4) I. Olsen, II, Bertaux; III, Gotelli Studio—8 hours. Prerequisite: Design 21 recommended. Analysis, organization, and solution of interior design problems involving the social, cultural, economic, and aesthetic needs of man. Consideration of the relationships of interior design, architectural and landscape design.

190. Proseminal (2) I, II, III. The Staff (Olsen in charge) Seminar—2 hours. Prerequisite: design major or consent of instructor. (P/NP grading only.)

191-D. Workshops in Design (4-12) I, II, III. The Staff (Olsen in charge) Seminar—1 hour; studio or field experience—2 hours per unit. Instructor and student determine units. Prerequisite: course 20A, 20B, upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: (A) Costume; (B) Environment; (C) Graphics; (D) Textiles. Credit limited to 12 units in one section or a combination of sections. Letter grading by contract.

192. Internship (1-12) I, II, III. The Staff (Olsen in charge) Field placement—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in areas of design including environmental, costume, textile, graphic, museum, display and interior design. (P/NP grading only.)

193. Directed Group Study (1-5) I, II, III. The Staff (Olsen in charge) Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study of Advanced Undergraduates (1-5) I, II, III. The Staff (Butler in charge) (P/NP grading only.)
Development, Resource, and Consumer Economics

(College of Agricultural and Environmental Sciences)

The Major Program

The major in Development, Resource, and Consumer Economics is designed to prepare you for a career in one or more of the following areas: the economics of community, regional and international development; the economics of human resources; the economics of natural resources; and consumer economics. This major enables you to prepare for further studies at the graduate level as well as to pursue career opportunities in government agencies on all levels, non-profit organizations, social agencies, research organizations, and with firms employing economists with this background. New directions of economic application of theory and research to social problems are reflected in this major. Flexibility is provided by options which allow you to focus either on the natural and agricultural sciences or on the social sciences.

Development, Resource, and Consumer Economics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs

Preparatory Subject Matter................................. 36
Written and oral expression (College requirement, page 14).............. 8
American History and Institutions......................... 8
Economic principles (Economics 1A-1B)...................... 10
Statistics (Statistics 103)................................ 4
Mathematics, including calculus............................. 6

Depth Subject Matter††...................................... 31-33
Theory, Agricultural Economics 100A-100B, Economics 101 or 125, 11-13
Quant methods, Agricultural Economics 106, 155.................. 8
Policy and Planning: choose four courses from Agricultural Economics 120, 148, Economics 125A, 125B, 130, 150B, Applied Behavioral Sciences 151, 152, Political Science 100, 174, Environmental Studies 160, 182, 186A, 168B, or the equivalent......................... 12

Breadth Subject Matter††................................. 32
Natural sciences (including Mathematics beyond Preparatory Subject Matter above) and agricultural and environmental sciences (excluding agricultural economics, consumer economics, and applied behavioral sciences)................................. 12 units minimum
Social sciences (excluding economics), history, and philosophy........... 20 units minimum

† Students meeting the American History and Institutions requirements may substitute Social Science as interpreted under the Social Sciences Breadth Subject Matter requirements.

†† Students graduating with this major are required to attain at least a C average (2.0) in all upper division Agricultural Economics, Consumer Economics, and Economics courses, plus any upper division courses taken at the University which are specialization requirements.

NOTE: For key to footnote symbols, see page 128.

Restricted Electives ..................................... 24
Specialization requirement:
(a) Select one or more from the following in the designated area of specialization:
Development economics: Agricultural Economics 108, 148
Natural resource economics: Agricultural Economics 106, 176
Human resource economics: Agricultural Economics 120, Consumer economics: Agricultural Economics 141, 142.
(b) 4 units of Agricultural Economics 190A-190B or 4 upper division units of restricted electives.

Unrestricted Electives ................................ 55-57
Total Units for the Major .......... 180

Breadth Subject Matter Contact departmental advisers for up-to-date lists of courses which are acceptable for this requirement.

Advising Center for major is located in 105 Voche Hall.

Major Adviser, J.E. Kushman (Agricultural Economics)

Dietetics

(College of Agricultural and Environmental Sciences)

The Major Program

The Dietetics major provides the student with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, and management. This major fulfills the academic requirements for admission into a dietetics internship or the equivalent which must be completed before qualifying for registration as a dietitian. Dietitians are sought for administrative, therapeutic, teaching, research, and public service positions in hospitals, schools, clinics, and other institutions. Students will be qualified for admission to graduate programs in dietetics, nutrition science, public health nutrition and food service management. Clinical Dietetics, Community Nutrition, and Food Service Management are the three options available with the Dietetics major.

Dietetics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs

Preparatory Subject Matter................................. 42-50
Written and oral expression (English I and Rhetoric 1 or 3).................... 8
Statistics (Statistics 13 or Economics 12)..................... 4-5
Physics (Physics 1A-1B or 2A-2B or 12 or 10 or Consumer Technology 17)....... 4-9
Chemistry, general and organic (Chemistry 1A, 1B, 5A, 5B).............. 16
Biology (Biological Sciences II).............................. 5
Microbiology with laboratory (Microbiology 2A, 2).................. 4
Computers logic and programming (Consumer Technology 9 or Mathematics 19)........... 1-3

Restricted Electives ..................................... 24
Specialization requirement:
(a) Select one or more from the following in the designated area of specialization:
Development economics: Agricultural Economics 108, 148
Natural resource economics: Agricultural Economics 106, 176
Human resource economics: Agricultural Economics 120, Consumer economics: Agricultural Economics 141, 142.
(b) 4 units of Agricultural Economics 190A-190B or 4 upper division units of restricted electives.

Unrestricted Electives ................................ 55-57
Total Units for the Major .......... 180

Breadth Subject Matter Contact departmental advisers for up-to-date lists of courses which are acceptable for this requirement.

Advising Center for major is located in 105 Voche Hall.

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Dietetics

(College of Agricultural and Environmental Sciences)

The Major Program

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Dietetics

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITs

Preparatory Subject Matter................................. 42-50
Written and oral expression (English I and Rhetoric 1 or 3).................... 8
Statistics (Statistics 13 or Economics 12)..................... 4-5
Physics (Physics 1A-1B or 2A-2B or 12 or 10 or Consumer Technology 17)....... 4-9
Chemistry, general and organic (Chemistry 1A, 1B, 5A, 5B).............. 16
Biology (Biological Sciences II).............................. 5
Microbiology with laboratory (Microbiology 2A, 2).................. 4
Computers logic and programming (Consumer Technology 9 or Mathematics 19)........... 1-3

Development, Resource, and Consumer Economics; Dietetics; Dramatic Art

Dramatic Art

(College of Letters and Science)

Robert A. Fahren, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Art Building (752-0888)

Faculty

Ruby Cohn, Ph.D., Professor (Dramatic Art, Comparative Literature)
Everard d'Harnoncourt Ph.D., Professor
Robert A. Fahren, Ph.D., Professor
Harry C. Johnson, M.A., Associate Professor
William E. Kleb, D.P.A., Associate Professor
Phyllis J. Kress, M.F.A., Instructor
Robert K. Sario, Ph.D., Professor
Theodore J. Shalk, Ph.D., Professor
Daniel E. Snyder, Professor
Alan A. Stambusky, Ph.D., Professor
Darrel F. Winn, M.A., Lecturer

The Major Program

Dramatic Art, with its courses in each of the scholarly and artistic areas of the discipline, and with its University Theatre Season and its Premiere 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
Dramatic Art

A.B. Major Requirements:

Preparatory Subject Matter

UNITIS
Dramatic Art 20, 21A, 24, 25 22
Dramatic Art 21B or 27 3-4
Additional units to total at least 22 lower division units in Dramatic Art 4-5

Depth Subject Matter

UNITIS
Dramatic Art 12A, 12B, 12A, 12B, 12B or 160B, 155, 156, 158, 159, 160A 36
In exceptional cases with the advisor's consent, the student may petition to substitute up to 8 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, 126, 150, 153, 155, 161; or, with the advisor's consent, from appropriat e 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, scene construction, costume construction, lighting, and stage managing or directing. Majors are also expected to attend theatre performances.

Total Units for the Major 82

Minor Program Requirements:

UNITIS
Dramatic Art 12A, 120A, 136, 156, 157 or 158 20

Major Advisers: W.E. Kieb, J.T. 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 103 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, design, 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. O'Hanlon

Lower Division Courses

10. Introduction to Acting (3) I, II, III. The Staff Laboratory-discussion—4 hours. Fundamentals of movement, stage presence, and improvisations. Selected reading and viewing of theatre productions intended for students not specializing in Dramatic Art.

Dr. Stephen C. Meyer.
Earth Sciences and Resources

Faculty

The Group consists of forty-four faculty members from the Departments of Applied Science Engineering, Chemistry, Civil Engineering, Environmental Studies, Geophysics, 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 materials science, nonrenewable resources, geochemistry and hydrogeology. 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, either 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.

Atmospheric processes, Atmospheric Science 200 Earth sciences and resources, Earth Sciences and Resources 201A, 201B, 201C
Solid-earth geophysics. Earth Sciences and Resources 240
Geology, Geology 115
Physical and chemical oceanography, Earth, Environmental Studies 150A
Groundwater hydrology, Civil Engineering 142

Specialization. Each student will pursue an individual program of advanced studies under the direction of a graduate study group. Specialization is required in any one of the areas of general interest but diverse backgrounds. Coursework in addition to the above is typically taken in the most appropriate graduate departments.

Graduate Advisers. K.L. Versouw (Geology); T.M. Powell (Environmental Studies); J.A. Cheney (Civil Engineering).

Courses in Earth Sciences and Resources

Graduate Courses

201A. Earth Science and Resources (3) I. The Staff. Lecture—3 hours. Prerequisite: Physics 8C, Mathematics 21C; Chemistry 4C, or consent of instructor. Advanced survey of the earth's structure and processes. Earth's internal structure from geophysical evidence. Plate tectonics nomenclature, plate tectonics and orogeny; igneous and metamorphic processes. Erosion and weathering. Open to graduate students in Geology only with consent of instructor.

201B. Earth Science and Resources (3) II. The Staff. Lecture—3 hours. Prerequisite: course 201A and Mathematics 22C, or consent of instructor. Continuation of course 201A, Clastic and carbonatic sediments, principles of stratigraphy, brittle and ductile deformation; tectonics and folding; region stratigraphies; energy resources; ore deposits; water resources; geologic engineering. Open to graduate students in Geology only with consent of instructor.

Earth Sciences and Resources (A Graduate Group)

Kenneth L. Versouw, Ph.D., Chairperson of the Group

Group Office, 175 Geology/Physics Building

752-6911/0350

NOTE: For key to footnote symbols, see page 128.
East Asian Studies; Ecology

240. Geophysics of the Earth (3) II. McClain (Geology)

297. Seminar in Earth Sciences (3) III. The Staff
Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Seminar on current area of research in earth sciences and resources. Topic will change from year to year. May be repeated for credit.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

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East Asian Studies

(College of Letters and Science)
Program Office, 912 Sproul Hall (752-1219)

Committee in Charge
Kye H. Kim, Ph.D. (Oriental Languages and Civilizations), Committee Chairperson
Mary H. Fong, Ph.D. (Art), Fall and Spring
Whalen W. Lai, Ph.D. (Religious Studies)
Don C. Price, Ph.D. (History)
Janet Shibamoto, Ph.D. (Oriental Languages and Civilizations)
Marlan B. Ury, 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 sustained work in an oriental language with courses on East Asian countries. The program provides preparation either for a career that involves working 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, history, oriental languages) within the major, to be chosen 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 42-48
History 9A, 9B 8
One course from Art 10, 20, Comparative Literature 53A, History 90A, 90B, Political Science 9, Religious Studies 4A, 70 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

Depth Subject Matter 36
History 1906-190C or 1948-194C 8
Political Science 142A or 142B 4
Anthropology 190 or 191 or Sociology 147 4
At least 20 units from the following courses, as approved by the Committee in charge 20
Agricultural Economics 125
Anthropology 109, 110, 111, 112, 120, 122, 123, 124, 125, 128, 135, 162, 190, 191, 192, 193, 194, 195, 196, 198
History 102G, 102H, 102N, 109A, 109B, 191A, 191B, 193, 194A, 194B, 194C, 194D, 195, 198, Japanese 121, Oriental Languages and Civilizations 100, 150; Political Science 127, 133, 136, 142, 145, 148A, 148B, Religious Studies 172; Sociology 118, 141, 147, 170, 170 (Other appropriate courses, including individual and group study courses (196, 199), as approved by the Committee in charge.)

Total Units for the Major 78-94

Recommended
Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison with the civilization of Asia, and to provide some experience to the other of the two countries. All courses counting toward the East Asian Studies major, including individual and group study courses (196, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominantly with China, Japan, or both.

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Ecology (A Graduate Group)

R. Morton Love, Ph.D., Chairperson of the Group

History 9A. History of East Asian Civilization (China)
9B. History of East Asian Civilization (Japan)
90A. Modernization of China
90B. Modernization of Japan
102D. Undergraduate Seminar: China to 1600
102H. Undergraduate Seminar: China since 1800
102N. Undergraduate Seminar: Japan
190B. Late Imperial China: Background to Revolution
190C. The Chinese Revolution
191A. Classical China
191B. High Imperial China
193. History of the People's Republic of China, 1949 to the Present
194A. Aristocratic and Feudal Japan
194B. Early Modern Japan
194C. Modern Japan
194D. Topics in Japanese Social and Economic History
195. Modern China and the West

Japanese
1-2-3. Elementary Modern Japanese
4-5-6. Intermediate Modern Japanese
101. Literary-Style Japanese
111. Japanese Composition
121-122-123. Modern Japanese: Reading and Discussion

Oriental Languages and Civilizations
100. Languages of Eastern Asia

Political Science
9. Introduction to Contemporary Problems of Asia
133. The American Role in East Asia
136. International Relations: East Asia
148A, 148B. Government and Politics in East Asia

Religious Studies
79. Introduction to Buddhism
172. Chinese (Zen) Buddhism

Sociology
147. Sociological Perspectives on East Asia

Course in East Asian Studies

Lower Division Course
1. Modern Chinese Literature (in English) (3) II. Gibbs
Lecture—3 hours. Introductory course requiring no knowledge of Chinese language or history, Reading and discussion of short stories and two novels. Designed to convey a feeling of what China has experienced in the twentieth century. (Offered Fall Quarters beginning 1982-83.)

Lecture—3 hours; term paper. Survey of traditional Korean civilization and its modern transformation, with emphasis on thought, religion, political and social life, art, and literature, and providing perspectives on contemporary Korea.

Ecology (A Graduate Group)

R. Morton Love, Ph.D., Chairperson of the Group

Group Office, 2148 Wickersham 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. Several areas of specialization 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 nor-
mathematically be expected to have completed a one-year sequence in basic biology, in elementary chemistry (organic chemistry strongly recommended), in elementary calculus (at least one 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 nor-
mally 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 one 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 140 (insect ecology), or Botany 117 (plant ecology).

b. Human Ecology courses: Environmental Studies/Anthropology 101 (principles of human ecology), Environmental Studies/Anthropology 141 (cultural ecology), Psychology 144 (envi-
ronmental behavior), or Geography 170 cultural ecology).

c. Physical and Chemical Ecology courses: Envi-
ronmental Studies 151-151L (environment), Environmental Studies 152A (physical and chemical oceanography), or Atmospheric Science 133 (biometeorology).

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 (1.4-1.6) Lee, A. M. Peay, S. Schowalter, T. (in charge), 10 credits. Lecture—Seminar—Lecture. Prerequisites: Zoology 125 or an equivalent advanced undergraduate course in ecology, Examination of major conceptual issues motivating current ecological research. (Same course as Botany 201A-201B and Zoology 201A-201B.)

210. Advanced Topics in Human Ecology (4) III. Orelove (En-
vironmental Studies)

Lecture—Seminar—Discussion. 2 hours. Prerequisites: graduate standing. Course stresses the commonalities that human ecologists have as social scientists who specialize in populational and environmental variables. General epistemological issues and theoretical models are reviewed. Simplicity and differences of human and biological ecology are examined.

211. Advanced Topics in Cultural Ecology (3) III. Orelove (En-
vironmental Studies)

Lecture—Discussion—Seminar. Prerequisite: graduate standing. Discussion and evaluation of theories of which relate environment, culture and social structure. The works of several major theorists will be examined with regard to analytical modes, empirical data, research methodologies, and modes of explanation. Offered in even-numbered years. (Same course as Anthropology 211).

212A. Environmental Policy Analysis (4) III. Babatant (En-
vironmental Studies)

Lecture—Discussion—Seminar. Required paper. Prerequisite: Environmental Studies 107 or 108, or an equivalent course in political science or environmental studies. An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on ecological and methodological issues. Offered in odd-numbered years. (Same course as Environmental Studies 212A.)

212B. Environmental Policy Analysis: Evaluation (4) III. Schreiber (Environmental Studies)

Lecture—Discussion—Seminar. Prerequisite: Environmental Studies 107 or 108, or an equivalent course in policy analysis or resource economics. An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on ecological and methodological issues. Offered in odd-numbered years. (Same course as Environmental Studies 212B.)

213. Advanced Demography (4) III. Cramer (Sociology)

Lecture—Discussion—Seminar. Prerequisite: Environmental Studies 178, Sociology 170, and Ecology 210, or consent of instructor; graduate standing. An analysis of the social and economic determinants of mortality, fertility, and population size of the United States, and the impact of demographic trends; and of how demography is related to human ecology. Special emphasis on methods of analysis and on contem-
porary social changes. Offered in even-numbered years.

220. Transport Processes in the Biosphere (3) J. Myrup (Lanc, Air and Water Resources)

Lecture—Discussion—Seminar. Prerequisite: Undergraduate course in integral and differential calculus, college physics and general biology, Atmospheric Science 158, and graduate standing; consent of instructor. A unified approach to the study of transport processes in biological systems; conservation laws and their mathematical represen-
tation; similarity principles, the phenomenon of turbu-

tence, role of turbulent and molecular transport in specific systems. Offered in even-numbered years.

221. Chemical Aspects of Ecology (3) I. Corby (Environmental Studies)

Lecture—Discussion—Seminar. Prerequisite: Chemistry 1A-1B-1C and 8B or 128C (or the equivalent); a course in biological ecology; graduate standing; consent of instructor. A week will be spent on environmental processes including chemical ecology of reproduction, nutrition, defense, communication, adaptation, chemical structure and function. Offered in odd-numbered years.

230. Analysis of a Selected Ecosystem (4) I. Whiting (Land, Air and Water Resources, Van Riper (Zoology)

Lecture—Discussion—Seminar. Field trip. Prereq-
quisite: graduate standing. Application of basic ecological principles to the interpretation of biotic and abiotic interrela-
tionships of a particular ecosystem (Yosemite National Park). Recent advances in theory, technique, and basic information are emphasized. Lectures will be given by spe-
cialists from several fields. May be repeated for credit.

231. Models in Ecological Research (4) I, Foin (Lanc, Air and Water Resources)

Lecture—Discussion—Seminar. Prerequisite: Environmental Studies 128; a course in ecology recommended. Evaluation of the role of models in ecological research. May be repeated for credit through course 298 with S/U grading only. Offered in odd-numbered years.

290. Seminar in Ecology (1-3) I, II, III. The Staff (Chairperson in charge)

Seminar—Discussion. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of general topics under consideration. (S/U grading only.)

296. Group Study (1-5) I, II. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. Perception, definition, and attack on a selected ecological problem, drawing on the expertise of faculty from different departments in the university. (S/U grading only; all other sections, S/U grading only.)

Economics

Economics (College of Letters and Science)

Victor P. Goldberg, Ph.D., Chairperson of the Department

Department Office, 380 Kerr Hall

Faculty

Moshel Adler, M.A., Acting Assistant Professor

Andrew Zrzeski, Ph.D., Professor

Frank C. Child, Ph.D., Professor

Robert A. Driskill, Ph.D., Assistant Professor

Mark Dynsarns, Ph.D., Assistant Professor

Bruce Glassburner, Ph.D., Professor

Victor P. Goldberg, Ph.D., Professor

W. Eric Gluston, Ph.D., Senior Lecturer

Timothy D. Hau, Ph.D., Assistant Professor

L. Jay Helms, Ph.D., Assistant Professor

Hiromitsu Kaneda, Ph.D., Professor

Kenneth M. Metzer, M.S., Acting Assistant Professor

Religious M. Kroop, Ph.D., Assistant Professor

Peter H. Linde, Ph.D., Professor

Thomas Mayer, Ph.D., Professor

Martin P. Oettinger, Ph.D., Associate Professor

Alan L. Olmstead, Ph.D., Professor

John E. Roemer, Ph.D., Professor

Linda Stauffer, Ph.D., Assistant Professor

Steven Sheffer, Ph.D., Associate Professor

T. S. Shen, Ph.D., Professor

Arthur M. Sullivan, Ph.D., Assistant Professor (Economics, Administration)

Elias H. Tuma, Ph.D., Professor

Gary M. Walton, Ph.D., Professor (Economics, Administration)

Leon L. Wegge, Ph.D., Professor

The Major Program

Economics is the study of human social arrange-
ments and institutions used in mankind's efforts to satis-
fy material wants. The economic problem is to
maximize satisfaction of society's material wants
within the limits established by the availability of re-
sources and the state of technology, with due allowance for
noneconomic values. To maximize the economy's welfare, a society must
utilize scarce resources fully and efficiently in the provision of goods of highest social priority and
then distribute that output equitably among its members.

A major in economics will assist the student to learn how economists examine these questions, and is an appropriate major for undergraduate contemplating graduate study in business administration, law, regional planning or public affairs.

Economics

A.B. Major Requirements:

Preparatory Subject Matter ........................................ 10-19

Economics 1A-1B .................................................. 10

At least a C average in the above courses. ........................................ 5

Mathematics 16A or 21A ........................................... 3-4

Depth Subject Matter ........................................ 10-19

Economics 100 or 101 ........................................... 10

One course from Economics 110A, 110B, 111AB, 114 ........................................... 5

One course sequence from Economics 110A-


Additional economics courses to achieve a minimum of 40 upper division units ........................................ 8-10

A minimum of 36 upper division units required for students who declared an Economics major prior to Fall Quarter 1969.

Total Units for the Major ........................................ 55

Recommended

Students considering graduate study in economics or business administration are strongly urged to take Mathematics 168 in addition to 16A. It is highly recommended, but not required, that students take Economics 100 prior to 101; and the Department also suggests that these courses be taken as soon as possible after the introductory courses. The Department also suggests that students take at least one upper division course in statistics and one upper division course in policy analysis or resource economics. The Department also suggests that students take at least one upper division course in policy analysis or resource economics. The Department also suggests that students take at least one upper division course in policy analysis or resource economics.
Courses in Economics

Lower Division Courses

1A. Principles of Microeconomics (5) I, II, III. The Staff
Lecture—4 hours; discussion—2 hours. Course 1A and 1B may be taken in either order. Analysis of the allocation of resources, and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems.

1B. Principles of Macroeconomics (5) I, II, III. The Staff
Lecture—4 hours; discussion—2 hours. Course 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment, and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy.

11A. Elementary Accounting (4) O. Oettinger
Lecture—3 hours; laboratory—2 hours. The history and basic concepts of accounting: the ledger, journals, income statement, and the balance sheet; inventory valuation: deprecation; introduction to cost accounting: analysis of financial statements: social accounting. (Deferred grading only, pending completion of 11A-11B sequence.)

11B. Elementary Accounting (4) O. Oettinger
Lecture—2 hours; laboratory—2 hours. Prerequisite: completion of course 1A. (Deferred grading only, pending completion of 11A-11B sequence.)

13. Introduction to Quantitative Methods in Economics (5) I, III. Gustafson
Lecture—4 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Methods of analyzing quantitative economic data including descriptive statistics: sampling and analysis: inferential 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 46A-46B.

118. Lower Division Seminar (1-3) I, II, III. The Staff (Chairperson in charge)
Seminar—1-3 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

92. Internship and Field Work (1-12) I, II, III. Oettinger Laboratories—1-36 hours; term paper. Prerequisite: junior or senior standing; availability of internship position or approved field work program; stockbrokerage intern must have relevant experience: course 118A-11B; consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.)

98. Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Particularly for lower division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Intermediate Micro Theory (5) I, II, III. The Staff (Chairperson in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B or equivalent. Mathematics 16A or 21A or consent of instructor. Price and distribution theory under conditions of perfect and imperfect competition; welfare economics. Not open to students who have received credit for course 100M or Agricultural Economics 100A or 100B.

100M. Intermediate Micro Theory (5) I, II. The Staff (Chairperson in charge)
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B; Mathematics 16A, 16B. Price and distribution theory under conditions of perfect and imperfect competition. Welfare economics and the calculus. Not open to students who have completed course 100. Agricultural Economics 100A or 100B.

101. Intermediate Macro Theory (5) I, II, III. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Theory of income, employment and prices under static and dynamic conditions.

105. History of Economic Thought (4) I. The Staff
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Historical survey of economic thought. Classical School and its antecedents. Neoclassical thought, criticism of classical thought, emergence of modern economic thought.

110A. Economic History (4) I. Tuma
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe prior to the year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

110B. Economic History (4) II. The Staff
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

111A. Economic History (4) III. Clift
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the international times to 1860; reference to other regions in the Western Hemisphere.

111B. Economic History (4) III. Lindert
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, or consent of instructor. Survey of economic change in the United States from 1865 to the post World War II era.

113A-115B. Economic Development (4) I-II. Keneda
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Theories of economic development and underdevelopment, economic policy for growth and development. Contemporary and historical case studies.

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Critical examination of major economic systems; their goals and institutions: capitalism, fascism, and varieties of socialism; problems of economic planning: M/P, India, China, and other industrializing economies.

117. The Soviet Economy (4) II. Brzaski
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of Soviet economic development: economic organization, methods of planning, and performance.

118. Political Economy of Agrarian Reform (4) II. Tuma
Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B. Critical examination of major economic systems; their goals and institutions; capitalism, fascism, and varieties of socialism; problems of economic planning: M/P, India, China, and other industrializing economies.

121B. Industrial Organization (4) II. Shaffer
Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 or 100M, or consent of instructor. An appraisal of the role of competition and monopoly in the American economy: market structure, conduct, and economic performance of a variety of industries.
Education

230B. Public Finance (4) II. Hau
Lecture—2 hours; seminar—2 hours. Taxation and stabilization, personal equity, shifting and incidence, theory of optimal taxation, analysis of personal income tax, corporation income tax and other taxes, tax reform, revenue sharing, monetary and fiscal policy, debt management, burden of debt.

235A-235B. Monetary Theory (3-3-4) II, III. Mayer
Lecture—3 hours. Prerequisite: course 200D (may be taken concurrently) or the equivalent. The theory of money, presents Keynesian monetary theory, the portfolio approach. The main focus is on the conflict between monetarism and Keynesianism.

235C. Monetary Policy (3) III, Mayer
Lecture—3 hours. Goals and problems of implementation of monetary policy. Impact of monetary changes on income, national accounts, price level, inflation and real output. The problem of rules vs. discretion; monetary aspects of the Great Depression.

240A. Econometric Methods (3) III. Oettinger
Lecture—4 hours; term paper. Prerequisite: Statistics 130B and course in linear algebra. Statistical models and their use in estimation of economic relationships; simple and multiple equation systems. (Same course as Agricultural Economics 240A.)

240B. Advanced Econometrics: Theory (4) I, II. Wigg
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A; Statistics 131A, 131B, 131C recommended. Multivariate analysis of the classical econometric models, identification, estimating methods, small sample properties. (Same course as Agricultural Economics 240B.)

240C. Advanced Econometrics: Applications (4) I. The Staff Lectures—4 hours; discussion—1 hour. Prerequisite: course 240A. Time series analysis and distributional bags, pooling of time series and cross-section data, Bayesian analysis, application for prediction and policy. (Same course as Agricultural Economics 240C.)

250A. Labor Economics (4) III. Oettinger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A, 103B or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues.

250B. Labor Economics (4) II. Shaffer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A, 103B or the equivalent. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis.

250A. International Economics (4) I, Keneda
Lecture—3 hours discussion—1 hour. Theory of trade determined; trade under different terms; trade among countries; tariffs and effective protection; economic unions.

250B. International Economics (4) II. Dinkel
Lecture—3 hours; discussion—1 hour. Balance of payments; adjustment mechanisms; foreign exchange markets; theory of balance of payments and international monetary mechanisms.

250C. International Economics (4) III. Wigg
Seminar—4 hours. Prerequisite: courses 200C, 200D, 240A, and 240D. Survey of current literature in international trade theory.

280. Orientation to Economic Research (2) III. Mayer
Discussion—2 hours. Course studies techniques for research, including readings and research papers. Field method of investigation; rules of evidence. (S/U grading only.)

289. Group Study (1-5-2) I, II, III. The Staff (Chairperson in charge)
Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (S/U grading only.)

Professional Course

297. Teaching of Economics (2) I, II, III. The Staff (Child in charge)
Lecture—discussion—2 hours. Prerequisite: graduate standing and consent of instructor. Teaching of economics: methods of instruction, organization of courses, examination and evaluation procedures. (S/U grading only.)

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, 174 Kerr Hall

Faculty
Donald G. Antime, Ph.D., Professor
Helen G. Bacon, Ed.D., Lecturer in and
Supervisor of Teacher Education
Hugh C. Black, Ph.D., Professor
Vincent A. Crockenborg, Ph.D., Associate Professor
W. Augustus Davis, Ph.D., Lecturer in and
Supervisor of Teacher Education
James C. Eti, Ph.D., Professor
Richard A. Figueras, Associate Professor
Jane Garriston, M.A., Lecturer in Teacher Education
Maryann Gatheral, B.A., Lecturer in and
Supervisor of Teacher Education
Jack E. Lowry, M.A.T., Lecturer in and
Supervisor of Teacher Education
Barbara J. Merino, Ph.D., Assistant Professor
Douglas L. Minish, 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 M. Sassenrath, Ph.D., Professor
S. Joan Skinner, M.A., Lecturer in and
Supervisor of Teacher Education
Carrton J. Spring, Jr., Ph.D., Professor
Leon F. Trouther, Ph.D., Associate Professor
David R. Wampler, Ph.D., Lecturer in and
Supervisor of Teacher Education
George D. Young, Ph.D., Professor

Teacher Education Curriculum

For a statement of complete requirements and appointments with credential advisers, contact the departmental Student Advising Office, 174 Kerr Hall. Applicants for the credential program should consult the department early in the Fall Quarter of the senior year. (See also page 103.)

CREDENTIAL COUNSELORS: Multiple Subject

CREDENTIAL COUNSELORS: Single Subject
W. A. Davis, J. E. Lowry, V. A. Perkes.

(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. degree in education, (5) enter a profession that focuses on work with people, (6) seek employment in governmental or industrial training programs, or (7) obtain a better understanding of the issues and concerns of public and private education.

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. (Primary for lower division students. (S/U grading only.)

Upper Division Courses

100. Introduction to Teaching (2) I, II, III. Minnis, Crocken- burg, Lowry
Lecture—1 hour; seminar—1 hour, field work—3 hours. Study of the classroom as an environment for democratic interaction and work site. Skills for observing classroom activities. Observing and tutoring in public schools.

110. Educational Psychology: General (4) I, II, III. Eti, Figuer- as, Sandoval, Sassenrath
Lecture—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, intellectual development, individual differences and testing.

144. Quantitative Methods in Educational Research (4) I. Yonge
Lecture—4 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers.

Lecture—4 hours. Prerequisite: upper division standing. Educational processes and skills required for teaching handicapped children who are integrated into regular classrooms.

Lecture—4 hours. Prerequisite: course 110. Examination of psycho-educational literature on Chicano children within the framework of Erik Erikson’s theories towards development of an assessment-intervention capability.

117A. Psychology of Reading (3) I. Spring
Lecture—4 hours. Prerequisite: upper division standing. Application of verbal learning and motivational principles to the design of a curriculum for the word-identification stage of beginning reading.

117B. Psychology of Reading (4) II. Eti
Lecture—2 hours: discussion—2 hours. Prerequisite: upper division standing. Psychology of reading, the equivalent of one or the equivalent and upper division standing. Application of verbal learning and motivational principles to the design of a curriculum for the word-identification stage of beginning reading.

120. Philosophical and Social Foundations of Education (4) I, II, III. Antime, Black, Trouther
Lecture—4 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society.

122. The Politics of the School (4) I. Crockenborg
Discussion—4 hours. Prerequisite: upper division standing. The school as a social and political institution: the structure of school government, the role of teachers’ organizations, the civil rights and responsibilities of teachers and students, and the processes of institutional change.

123. John Dewey and the Foundations of Education (4) I. Antime
Lecture—discourse—4 hours. Prerequisite: upper division standing. The philosophical and social foundations of education as interpreted by Dewey. While focusing on his critique of American education and his systematic proposals for reform, attention will also be given to criticisms of Dewey.

130. Issues in Higher Education (4) II. Crockenborg, Am- stine, Mill (Mathematics)
Discussion—3 hours; field work—3 hours. Prerequisite: upper division standing or consent of instructor. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university.
204. Existentiel Thought and Education (4). I. Trontier Lecture—1 hour; discussion—1 hour; seminar—2 hours. A study of Kierkegaard's existentialism of the implications of existencial thought for education.

205. The Concept of Mind in Teaching (4). I. Amstyn Seminar—4 hours. A philosophical analysis of the problems of educational psychology, psychology of cognition, and motivation, and sometimes solved by varying conceptions of mind and thinking.

207. Concept of the Curriculum (3). I. Amstyn, Crookenberg Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis in the examination of curriculum theory and practice, including the conceptual analyses of purposes, of the organization of subject matters, and the methods of instruction.

208. Education and the Law (4). II. Crookenberg Seminar—4 hours. Prerequisite: graduate standing. An analysis of how selected areas of school law have developed, criticism of the present state of that law, and an understanding of needed legal reforms.

209. Pedagogics (4). III. Yonge, Trontier Lecture—2 hours; seminar—2 hours. Prerequisite: upper division standing. Assessment, analyzing, and seeking solutions to urban educational problems. Emphasis will be on learning, development, and coping with problems in the urban classroom and school.

150. Tutoring Children and Youth (2). I, III. Davis Lecture—1 hour; tutoring or teacher aide—3 hours. Prerequisite: upper division standing. Tutoring, choosing and implementing strategies for tutoring or working as a teacher's aide in schools. An analysis of factors that affect pupil performance. Modern research has shed twice for credit when tutoring is done in different major area.

151. Language Development in the Chicano Child (3). II. Merino Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first, second and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom.

152. Communication Skills for Bilingual Teachers (3). III. The Staff (Merino in charge) Lecture-discussion—2 hours; field work—2 hours. Prerequisites: English 61; Spanish 2A, 2B; consent of instructor. The development of communication skills of prospective educators with an emphasis on the study and use of standard Spanish and Southwest Spanish dialects in teaching science, mathematics, social science, music, art, and language arts to bilingual elementary school pupils.

153. Guidance and Counseling (4). II, III. Figueroa, Sandoval Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). The role of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on education and guidance of pupils.

154. Practicum and Seminar in Counseling (2). I, II. Seminar—2 hours. Prerequisite: course 163 and consent of instructor. Practicum and seminar in counseling youth and adults. May be repeated twice for credit. (P/NP grading only.)

156. Teaching in Learning Centers (3). I. Turner Lecture—1 hour; discussion—1 hour; fieldwork—3 hours. Methods and materials used by instructors in college learning centers, with particular emphasis on improving reading and study skills of college students.

160. Directed Group Study (1-5). I, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

165. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge) Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

200. Educational Research (2). II. Yonge Lecture—1 hour; seminar—1 hour. Prerequisite: course 114 or the equivalent, or consent of instructor. A study of how to design, conduct, and evaluate educational research.

203. Twentieth Century Issues Over the Schools (4). II. Black Lecture—2 hours; discussion—2 hours. A study of John Dewey and contrasting theories of education in relation to contemporary events, the organization, curriculum, and instructional practices in schools.

NOTE: For key to footnote symbols, see page 128.

252. Bilingual/Multi-Cultural Instructional Strategies and Curriculum (3). III. Merino Seminar—2 hours; field work—3 hours. Prerequisite: proficiency in Spanish; courses 151, 152. Methods and techniques for developing, implementing, and evaluating bilingual/multi-cultural content areas and instructional strategies. Topics include use of cross-cultural strategies in classroom; recent cross-cultural research on motivation and instruction; development of multi-media bilingual cross-cultural curriculum.

253. Language Arts in Bilingual Education (3). I. Merino Seminar—2 hours; field work—3 hours. Prerequisite: course 261. Importance of the equivalent; proficiency in Spanish. Analysis and development of language arts curriculum for bilingual/cross-cultural classroom. Topics include: language assessment, methods of teaching reading in Spanish, use of dialect varieties in the teaching of reading, and methods of teaching English and Spanish as a first and second language.

270. Reading Diagnosis and Prescription (3). III. I. Gather Lecture—2 hours; discussion—1 hour. Prerequisite: course 300 or the equivalent. The diagnosis and treatment of reading disabilities, with recognition of reading abilities. Analysis of clinical techniques, testing, use of material and teaching procedures.

270C. Research in Reading Instruction (3). III. Bacon Seminar—2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Development and application of diagnostic and prescriptive techniques in a reading clinic. (C) Center grading only, pending completion of two-quarter sequence.

271. Recent Developments in Social Studies Education (3). III. Lowry, Wampum Lecture—2 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rationales, goals, objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

273. Recent Developments in Science Education (3). II. Perkes Lecture—2 hours. Prerequisite: consent of instructor. Analysis of contemporary science programs with special emphasis upon philosophical, psychological and pedagogical attributes of their design, trends, issues, and research in science curriculum and instruction.


278. Effective Teaching (4). II. Minnis Seminar—4 hours. Review of research on the relationship of effective teacher behavior and student learning. Use of research on teacher effectiveness to develop teaching strategies. Ways to decide on teaching activities and instructional strategies in specific teaching situations.

279. Design of Staff Development Programs (3). III. Minnis Seminar—4 hours. Use of research, best professional practices, and legislative guidelines to design staff development programs for public school personnel. Emphasis on school change and teacher initiated staff development programs. Consideration of political perspectives and the views of teacher organizations.


285. Group Study (1-5). I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate student standing; consent of instructor. Small group study of topics of interest to related students and faculty. (SU grading only)

289. Research (1-6). I, II. The Staff (Chairperson in charge) Individual research for graduate students. (SU grading only.)

Professional Courses

300. Reading in the Elementary School (4). I, Bacon, Gather Lecture—2 hours; field work—3 hours. Prerequisite: graduate student standing. Principles, procedures, and curricular materials for teaching reading. Involves decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.
Education Abroad Program

301. Reading in the Secondary School (4) I, III. Gatheral
Discussion—4 hours. Prerequisite: must be teaching or stu-
dent teaching. Participation, procedures, materials, and tech-
iques to help send students improve the reading com-
petence of their students. The teaching of phonics, struc-
tural analysis, and affective methods of coping with the
problem reader in the classroom.

302. Language Arts in the Elementary School (2) I, Ii. Bacon,
Gatheral, Skinner
Lecture—2 hours. Prerequisite: graduate standing. Prin-
ciples, procedures, and materials for the teaching of oral
and written expression, listening skills, drama, and children's
literature in elementary schools.

303. Art Education (3) I, II. Garrison
Lecture—1 hour; discussion—1 hour; laboratory—2 hours.
Prerequisite: admission to multiple subject credential pro-
gram. Fundamentals of the principles of education in the
arts through participation. Development of concepts, intro-
duction to media, and techniques suitable for the elementary
school curriculum. Credit toward cross-disciplinary experi-
ence.

304A. Teaching in the Elementary Schools (3-6) I. Garrison
Lecture—2 hours; seminar—2 hours; student teaching—
15-30 hours. Prerequisite: acceptance into a teacher edu-
cation program. Supervised teaching in regular or spe-
cial education classrooms in preschool or elementary
school. Selection and organization of teaching methods,
introduction to techniques of diagnosing school achieve-
ment of children.

304B. Teaching in the Elementary Schools (3-6) II. Garrison
Lecture—2 hours; seminar—2 hours; student teaching—
15-30 hours. Prerequisite: course 304A; acceptance into a
teacher education program. Supervised teaching in regu-
lar or special education classrooms in preschool or elementary
schools. Current concepts of elementary school curricu-
um, interdisciplinary approaches from social, biological,
and physical sciences. Emphasis on effective teaching
methods.

304C. Teaching in the Elementary Schools (3-6) III. Garrison
Lecture—2 hours; seminar—2 hours; student teaching—
15-30 hours. Prerequisite: acceptance into a teacher edu-
cation program. Supervised teaching in regular or spe-
cial education classrooms in intermediate grades. Selection,
organization, and evaluation of teaching mate-
rials including audio-visual aids. Effective teaching
methods in grades 4-6.

305B. Teaching in the Middle Grades (5-8) II. Garrison
Lecture—2 hours; seminar—2 hours; student teaching—
15-30 hours. Prerequisite: acceptance into a teacher edu-
cation program. Supervised teaching in regular or spe-
cial education classrooms in intermediate grades. Current
concepts of the middle-grades curriculum with emphasis on
social, biological, and physical sciences. Effective teaching
methods.

305C. Teaching in the Middle Grades (6-8) III. Garrison
Lecture—2 hours; seminar—2 hours; student teaching—
15-30 hours. Prerequisite: course 305B; acceptance into a
teacher education program. Supervised teaching in regular
or special education classrooms in junior high school. Cur-
rent concepts of the junior high school with emphasis on
effective teaching methods, and selection of curriculum
materials. Alternative programs.

306A-306B-306C. Teaching in Secondary Schools (5-9) I, II,
III. Garrison
Seminar—2 hours; student teaching—10-21 hours. Prereq-
usite: acceptance into teacher education program. Super-
vised teaching in regular or special education secondary
school classrooms. Techniques for classroom communica-
tions; constructing goals and objectives; assessment of
learning; teaching strategies in adolescents; audio-visual
techniques. Must be repeated by undergraduates for a total
of 15 units; 21 units by graduates in Physical Education
and 24 units by all other graduate students.

306. Early Childhood and Kindergarten Education (3) Iii. Skinner
Lecture—3 hours. Prerequisite: upper division or profes-
sional level of education majors. Methods, materials, and
teaching educational programs for the preschool through
grade 2. Development of curriculum methods and materials
which stress integration of appropriate subject areas with
emotional, social, creative, physical, and cognitive de-
velopment.

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
education specialization, or consent of instructor. Current
readings and discussion of contemporary art and teaching.
Formation of curriculum and practice of techniques used
in secondary art education. Observation and evaluation of
several
art secondary art programs.

322. Methods in Secondary Social Studies (4) I. Lowry
Lecture—4 hours. Prerequisite: acceptance into credential
program or consent of instructor. Methods and materials of
teaching concepts and thinking skills. Recent develop-
ments in applying basic skills to the teaching of social
studies.

323. Secondary School Curriculum: Science (4) I. Parkes
Lecture—4 hours. Conceptions of science curriculum and
instruction. Scientific knowledge and methods as applied
to course design and teaching; rationale and objectives of
science programs; laboratory as an environment for learn-
ging. Lecture, laboratory, observation, and participation in
public schools.

324A-324B. Teaching Methods in Mathematics (2-1) I-II.
Ostergard
Lecture—3 hours. Prerequisite: acceptance into a teacher
education program (concurrently), a mathematics background
or consent of instructor. Methods and curriculum for teaching mathematics at the secondary level (grades 4-12).
Advanced mathematics programs in the State. (Deferred grading only, pending comple-
tion of sequence.)

351 Advanced Fieldwork in Bilingual Education: Teaching
(3-6) I. Garrison
Seminar—2 hours; field work—3-9 hours. Prerequisite:
acceptance into a bilingual education specialist program.
Discussion, analysis and implementation of methods, tech-
iques and materials in the bilingual/cross-cultural class-
room, including team teaching with paraprofessionals, im-
plementation of language-use models in the classroom,
lesson planning, selection and use of bilingual/cross-
cultural materials.

352. Advanced Fieldwork in Bilingual Education: Evaluation
and Supervision (3-6) II. Merino, Alvarado
Seminar—2 hours; field work—3-9 hours. Prerequisite: up-
per division standing; acceptance into a bilingual/cross-
cultural specialist credential program. Provides oppor-
tunity to acquire evaluation and supervisory skills in
the field under the supervision of University staff and an experi-
enced program evaluator/supervisor in bilingual/cross-
cultural education.

38A-38B-B1C. School Psychology: Introduction (2-2-2)
I-II-III. Gatheral and Douglass
Seminar—2 hours; field work—1/2 school day per week.
Prerequisite: admission to school psychology credential
program. School psychology, learning and developmen-
tal theory, institutional organizational psychology, theoretical
and curriculum development, psychology of excep-
tional children, and school. Field work in the school and
other institutions serving children. (SU grading only.)

382A-382B-382C. School Psychology: Advanced (2-2-2)
I-II-III. Alvarado, Figueroa
Seminar—2 hours; field work—1/2 school day per week.
Prerequisite: course 381C and admission to school psychology credential program. Theories and techniques
in school-based consultation, advanced individual and
group counseling, crisis counseling, educational program
evaluation, legal issues in school psychology. (SU grading
only.)

383. School Psychology: Internship (4-8) I, II, III. Gatheral,
Alvarado
Seminar—2 hours; internship—6-18 hours per week. Pre-
requisite: school psychology credential program. Individ-
al assessment and program evaluation, mental
health consultation, intervention strategies to promote
the school learning and adjustment of children. Selected
topics in school psychology. (SU grading only.)

370. Advanced Fieldwork in Reading (2-6) I, II, III. Bacon,
Gatheral
Seminar—1 hour; field work—3-15 hours. Prerequisite:
acceptance into a teacher education program. Fieldwork
as elementary/secondary levels, using diagnostic/paraprofes-
sive techniques, and studying district in service programs.
May be repeated for credit up to a total of 6 units. (SU
grading only.)

398. Group Study (1-5) I, II, III. Garrison (Chairperson in
charge)
Prerequisite: admission into a credential program; consent
of instructor. Group study for students enrolled in a creden-
tial program. (SU grading only.)

399. Individual Study (1-5) I, II, III. Garrison (Chairperson in
charge)
Prerequisite: admission into a credential program; consent
of instructor. Individual study for students enrolled in a credential program. (SU grading only.)

Education Abroad Program

Hendrik J. Ketelapper, Ph.D., Campus
Coordinator
Campus Coordinator’s Office, 150 Mrak Hall
(752-0392)

Program Office, 323 South Hall (752-3014)

Programs of Study

The Education Abroad Program (EAP) of the Uni-
versity of California offers upper division students
who meet the minimal admission requirements (see
page 21) the opportunity to experience a different
culture while making progress toward degree
objectives. Students interested in the language, litera-
ture, 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 experi-
ence. 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—debts and credits of par-
ticipation in the EAP should be weighed carefully
prior to departure, however.

Application

Normally, students participate in the program dur-
ing their junior year, but a limited number of stu-
dents may be selected for participation as seniors.
A few programs are open to graduate students as
well. Students considering study abroad with the
EAP should consult with the EAP Office or the Coordina-
tor’s Office early in the fall quarter concerning ap-
plication and filing deadlines. This is important,
as deadlines for some centers, including the United
Kingdom, are in early November.

Application forms are available from the EAP
Office. A provisional academic plan forming, pre-
pared in consultation with the coordinator or
academic counselor and the major adviser, must be
submitted along with the completed application to
the EAP Office prior to the appropriate deadline.
Applications received after the official deadline
cannot be considered.

Students who do not meet the minimal require-
ments for acceptance (page 21) must consult the
Campus Coordinator. Students who will have
accumulated more than 145 units prior to the be-
inning of their planned year of study abroad must
also consult the Campus Coordinator before sub-
mitting an application; the probability of such stu-
dents’ being accepted is rather low.

Selection

The Academic Senate Committee on the Educa-
ation Abroad Program is intimately involved in the selec-
tion of EAP participants on the Davis campus. This
committee strongly encourages that prospective
dparticipants take appropriate courses dealing with
the country of their interest in preparation for the
year abroad. Applicants who are taking or have com-
pleted such courses at the time of the campus
selection process tend to have an increased prob-
ability of receiving the endorsement of the Commit-
must be completed after returning from EAP participation. With this option, no more than 55 units taken abroad may be applied toward the unit requirement for graduation. The applicant’s College or School Dean is the source for information on the University residence requirement and additional residence requirements that may be imposed.

Participants who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive the degree in September. Unfortunately, transcripts from abroad take a long time to get to the home campus and are not received in time for EAP returns to be included on the June degree list. Such returning students may participate in the June commencement ceremony, however.

Study Centers
At any one center, the courses and fields of study open to UC students may be limited. Moreover, each of the host institutions has special areas of excellence and strength. The listing of centers below incorporates selected information concerning these points. More detailed information is available in the flyers describing each of the centers and from the academic counselor in the Coordinator’s Office.

In addition to the programs listed below, Davis students have access to 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 specialized interest in a limited number of highly qualified students. A compulsory intensive language course at Georg-August University in Goettingen, Germany, precedes the beginning of the academic year. All courses are taught in German.

University of Vienna. Eastern European studies (Balkans, Soviet Union), fine arts (history of art, music, theatre arts), folklore, history. (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 Marseilles. Biological sciences and environmental marine biology. The Marseilles program is open only to students in the biological sciences. Students who have completed only one year of French are eligible for participation, but they must take part in the two-month summer Intensive Scientific French program at the University of Montpellier, followed by a formal, 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 University, Goettingen. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics. Space in laboratory courses in biology and psychology may be limited.

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 are eligible for participation in the EAP in Italy, but they must take part in a special two-month summer language program at the Università degli Studi di Perugia, followed by a 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. Colored 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 Notre Dame.)

University of Madrid. Humanities and 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 dur-
Education Abroad Program

ing 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 be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in that department only. Participating institutions are: England: University of Birmingham, University of Exeter, University of Kent, University of Leeds, University of Sussex, Westminster College (of 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 available. Polytechnic of Central 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 firm prerequisite. The program is primarily in the 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 program in Underwater Archaeology. Courses are taught in Hebrew. The Department of Study Programs for Overseas Students offers a core curriculum in Jewish, Middle East and Israeli studies, social sciences, and history of modern Israel in English.

Hebrew University, Jerusalem. Broad curriculum, emphasis on Israel and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English. The program offers courses in Judaica, Islam, and in Swedish, but a few courses in the general social sciences and humanities. In addition, the School for Overseas Students in cooperation with the mathematics and science faculty offers a 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 for acceptance, but students are required to include 18 units of Mandarin or Cantonese in their annual program. A compulsory intensive Cantonese program precedes the beginning of the academic year.

Chinese University of Hong Kong. Humanities and social sciences, with emphasis on Chinese studies. Art and design courses are available. Information about courses to be offered in English is announced only one week before instruction begins.

Japan. Completion of one year of Japanese at the university level or the equivalent is required for acceptance. (A compulsory intensive language course precedes the academic year.) Students are expected to complete an additional 18 units of Japanese language during their year in Japan. A limited number of courses taught in English are available.

International Christian University, Mitaka (Tokyo). Humanities and social sciences; emphasis on Japanese language and problems of the Orient.

University of Tsukuba. Open to graduate students only. Admission 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. Open to undergraduate and graduate students. As in the British system, students take a year-long program of study in their major or area of specialization. Examinations are given once, at the end of the academic year, and are mandatory for receiving credit.

University of Nairobi. Humanities and social sciences, with emphasis in African studies. Limited opportunities in the sciences and in veterinary science. Graduate students in history, political science, sociology, architecture, and design may associate with the Institute for Developmental Studies, Institute for African Studies, or the Housing and Research Development Unit.

West Africa. The West-African Study Center includes three universities in three different countries: The University of Ghana (Ghana), Fourah Bay College (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, Lagon-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 Ethnomusicology.

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 the program of year-long courses in a single area. End-of-year examinations are given only once and are mandatory for receiving credit. Extensive course offerings on Africa-related topics, social sciences, 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 or the equivalent of college-level French are required and participants must attend a compulsory intensive language program with the EAP in France prior to the beginning of the academic year.

Students with one year (three quarters) of college-level French or the equivalent from a French program in the Bordeaux-Togo program which involves a semester of intensive language study in France followed by a semester at the University of Benin.

The School of Letters offers programs in African literature, history, 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 and one year of college Portuguese; or two years of college Spanish and completion of an intensive course in Portuguese prior to departure. Since courses are taught in Portuguese, the equivalent of one year of college-level Portuguese is the absolute minimum. An intensive foreign language course precedes the beginning of regular course work.

University of São Paulo. Brazilian literature, Portuguese language, arts, humanities, social sciences. (This is a cooperative program 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 have access to the full curricular offerings of the host university.

Universidad Nacional Autonoma de Mexico (UNAM), Mexico City. Humanities, social sciences, arts, art practice. The School for Foreign Students offers Latin American art, literature, and history; Mexican 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 Catolica, Lima. Humanities, social sciences. Anthropology, sociology, and ethnography are of special interest. (This is a program of the UC Consortium, which is composed of the University of Indiana and a number of California universities.)

Australia

The Australian program includes 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 universities 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 1983 for February 1984 departure.
Engineering
(College of Engineering)
John D. Kemper, Ph.D., Dean of the College
Roy Bainer, M.S., LL.D., Dean Emeritus of the College
Don O. Brush, Ph.D., Associate Dean—Undergraduate Study
Zuhair A. Muntir, Ph.D., Associate Dean—Graduate Study
Ray B. Krone, Ph.D., Associate Dean—Research
College Office, 2132 Bainer Hall

Faculty
Worden 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 Computer and Mechanical Engineering curricula are five programs which have been accredited by the Accreditation Board for Engineering and Technology, Inc., the nationally recognized accrediting body for engineering curricula.

Major Advisers. For adviser assignment or change of adviser, contact the College Undergraduate Office.

Graduate Study. See pages 83 and 97. 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 two common Lower Division Programs outlined below. One program is for students who plan to major in either Chemical Engineering or the double major, Chemical Engineering and Materials Science and Engineering. The other program is for students planning study in the other Engineering majors. The Lower Division Program for students who enter the College of Engineering with 64 or more quarter units of credit is listed under "Admission to Advanced Undergraduate Standing" on page 77.

Engineering — Lower Division Program
Requirements common to all Engineering majors except Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus—Mathematics 21A-B1 21C</td>
<td>3</td>
</tr>
<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
</tr>
<tr>
<td>Differential equations—</td>
<td></td>
</tr>
<tr>
<td>Mathematics 22B</td>
<td>3</td>
</tr>
<tr>
<td>Vector analysis—Mathematics 22C</td>
<td>3</td>
</tr>
</tbody>
</table>

NOTE: For key to footnote symbols, see page 126.

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: 180.
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 in Aeronautical Engineering degree is designed to provide a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare the student for immediate employment in government or industry, while simultaneously establishing an excellent basis for graduate studies.

Aeronautical engineering is usually intended to indicate confinement of the subject matter to atmospheric studies. This is the situation regarding the undergraduate curriculum at UC. The fundamental engineering disciplines are supplemented with courses in aircraft propulsion, 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 fields of science 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:
- Engineering 102L, 105L, 106, 116, 122, 123, 140, 142, 160, 190
- Mechanical Engineering 110, 124, 150A, 161, 172
- Electrical and Computer Engineering 150
- Applied Science 115, Civil Engineering 131A

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Engineering  

Subject Areas and Courses  

Electrical circuits—Engineering 100  

Applied mechanics—Engineering 102A, 102B, 104A, 104B  

Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 165  

Fluid mechanics—Engineering 109A, 109B, 110L, 110L  

Aeronautical engineering fundamentals—  

Aerodynamics—Mechanical Engineering 125  

Aeronautical—Mechanical Engineering 126  

Aircraft performance, stability and control—Mechanical Engineering 128, 129, 162  

Aircraft—Mechanical Engineering 130  

Aerodynamics—Civil Engineering 131B, 133  

Measurement systems—Mechanical Engineering 176  

Control systems—Mechanical Engineering 171  

Applied mathematics—Engineering 180  

Technical electives (see above)  

Humanities-social sciences electives (see page 81)  

Total Units for Upper Division Program 98  

Agricultural Engineering  

Agricultural engineers apply engineering principles to problems of food and fiber production, storage and processing; animal and plant environments; agricultural wastes 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. 

The curriculum includes a substantial number of technical electives that make it possible for you to develop a broad program of study or specialize 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 and mathematics such as Biological Sciences 1, Bacteriology 2, Botany 2, Physiology 2, and Chemistry 8A and 8B. 

Electrical and Chemical Engineering 8B are prerequisite 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 handling, size reduction, storage, refrigeration, drying, freezing, food manufacturing, and others are studied. 

Suggested technical electives:  

Agricultural Engineering 133, 134  

Applied Science 115  

Biochemistry and Biophysics 101A, 101B  

Chemistry 5, 8A, 8B, 107A, 107B  

Chemical Engineering 115  

Civil Engineering 165  

Civil Engineering 161  

Electrical and Computer Engineering 150  

Engineering 103B, 105B, 111, 122, 140  

Food Science and Technology 104, 108, 111, 131, 150  

Mechanical Engineering 152, 155, 165, 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 hydraulic systems. 

Suggested technical electives:  

Agricultural Engineering 140, 141  

Atmospheric Science 105C, 133  

Civil Engineering 141, 142, 143  

Engineering 111  

Water Science 103, 104, 110A, 141, 142, 150, 156, 160  

Power and Machinery involves the design, development, and application of field machines and power units for crop production. The economic 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, 118, 119, 157  

Agricultural Engineering Technology 133  

Civil Engineering 131A, 132A  

Engineering 102B, 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 space and labor utilization, and economic value to an overall enterprise. The structure is considered as a means of providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses. Environment modification, microclimate, and agricultural wastes management are studied. 

Suggested technical electives:  

Agricultural Engineering 125  

Atmospheric Science 20, 105, 124, 125, 131, 133  


Mechanical Engineering 165  

Physics 110, 149  

Agricultural Engineering (Except Forest Engineering Option)  

(Accredited by the Accreditation Board for Engineering and Technology, Inc.)  

Minimum units required for major: 180.  

Subject Areas and Courses  

Applied mechanics and thermodynamics—Engineering 102A, 102A, 104A, 105A, and two courses from Engineering 102B, 103B (or Civil Engineering 141), 104B, 105B  

Electronic circuits—Engineering 100  

Design—Agricultural Engineering 150 plus one of the following courses: Civil Engineering 132A or 145 or Mechanical Engineering 150A  

Engineering economics—Engineering 106  

Professional responsibilities—Engineering 180  

Total Units for Upper Division Program 185  

Agricultural Engineering/ Materials Science and Engineering  

Minimum units required for major: 180.  

Subject Areas and Courses  

Applied mechanics—Engineering 103A, 103A, 104A, 104B; Engineering 102B or 103B or Civil Engineering 141  

Applied thermodynamics—Engineering 105A  

Electronic circuits—Engineering 100  

Design—Agricultural Engineering 160 plus one of the following courses: Civil Engineering 132A or 145 or Mechanical Engineering 150A  

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Preparation for careers in chemical engineering requires an understanding of both chemical principles and 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 competencies with 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 12 units of restricted technical electives and 10 units of additional 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 an Industrial 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 159, and 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 and meet undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and their application to fluid mechanics, mass transfer, heat transfer, thermodynamics, reaction kinetics, and process dynamics, you are well prepared to understand similar problems in living systems. Many biological phenomena such as blood flow, passive solute 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, 128B, 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. Coursed 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
- 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.

### Electrical and Computer Engineering

Suggested technical electives:

- Bacteriology 2, 102
- Biochemistry and Biophysics 101A, 101B, 101L, 123, 123A
- Chemical Engineering 161
- Food Science and Technology 106

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 of microcircuits 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 151, 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:

- Atmospheric Science 121A, 121B, 131, 158
- Chemical Engineering 161
- Civil Engineering 143A, 143B, 149L, 242B, 264
- Environmental Toxicology 131
- Water Environment
- Bacteriology 2
- Biochemistry and Biophysics 101A, 101B
- Civil Engineering 147, 148A, 148B, 240, 243A, 243B, 246A, 246B
- Food Science 41

### Food Processing 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, 119AT, 131, 150, 150L

Prebiomedical 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 1.

Suggested technical electives:

- Four to six courses from Anatomy 100, Biochemistry and Biophysics 101A, 101B, Biological Sciences 1; Phycological Sciences 101A, 101B; Physiology 110, 111A, 111B, 112, 113, 114

Preamedical: Inclusion of both organic and physical chemistry in the curriculum allows you to complete the premedical requirements while satisfying any general education requirements
Areas of specialization within civil engineering include: (1) Civil Engineering Planning, (2) Environmental Engineering, (3) Structural 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 majors are encouraged to include courses such as Economics 125A and 125B, Environmental Studies 160, 166, and 178; Political Science 108, 109, and 186; and Sociology 143 among their technical electives. Other technical electives of possible interest to majors in 12 of the areas of specialization include Applied Science 115, Engineering 160 and 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, 137, 145, 152, 153, 160, 161, 162
- Economics 125A, 125B, 130, 131
- Engineering 106, 118
- Environmental Studies 160, 161, 166, 168A, 168B, 172, 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 sciences 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, 158
- Bacteriology 102, 130A
- Biochemistry and Biophysics 101A 101B
- Chemical Engineering 154A, 154B, 156A, 156B
- Chemistry 8A, 107A, 107B, 110A
- Civil Engineering 143, 145, 146, 147, 148B, 149A, 149B, 152
- Engineering 118, 160
- Environmental Studies 150A, 150B, 150C, 151, 162, 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 loads. 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
- Art 121A, 121B, 121C
- Civil Engineering 131B, 132A, 132C, 134, 135, 137, 138, 162, 173, 175, 177
- Engineering 122, 123, 138, 180
- Mathematics 126A, 126B, 128C

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, 172, 173, 179

Water Resources Engineering: This area includes hydrology, hydraulics, and water resources systems planning and design. Hydraulics is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures. Water resources systems planning and design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:
- Agricultural Economics 148, 176
- Atmospheric Science 120, 121B
- Civil Engineering 143, 144, 145, 146, 148B, 152, 153
- Electrical and Computer Engineering 112, 150
- Environmental Studies 128, 150A, 151
- Geography 182
- Political Science 172
- Water Science 103, 110A, 150, 160

Civil Engineering

(Credit for the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180

Subject Areas and Courses

Electronic circuits—Engineering 100 or 111 31
Applied mechanics—Engineering 102A, 102B, 104A
Applied thermodynamics—Engineering 105A or Chemistry 110A 3

One unit of Engineering 100 will be applied toward the Technical electives.
The Department of Electrical and Computer Engineering offers five broad major programs: (1) General Electrical and Computer Engineering, (2) Electrical and Computer Engineering with emphasis on Computer Science and Engineering, (3) Electrical and Computer Engineering with emphasis on Computer Organizational Engineering, (4) Electrical and Computer Engineering with emphasis on Electronics, Circuits and Signal Processing, and (5) Electrical and Computer Engineering with emphasis on Solid-State Microwaves 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, or 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 of these three general areas. However, students who elect courses from these three curricula still have considerable flexibility in the choice of upper-division technical electives. As in the General Electrical and Computer Engineering curriculum, this flexibility can be used to obtain either depth or breadth 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 correlation 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).

Electrical and Computer Engineering (General): All upper-division, required courses for the General Electrical 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
- 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 an introduction in electromagnetics, physical electronics, electrical and electronic circuits, and computer structure and language.
Engineering

Computer Science and Engineering

Minimum units required for major: 180.

Subject Areas and Courses

| Mathematics, upper division mathematics or statistics course (except Mathematics 101 and Statistics 102) | 3 |
| Professional responsibilities—Engineering 190 | 3 |
| Engineering sciences—Engineering 102A, 105A | 6 |
| Circuits, systems, and electronics—Engineering 100, Electrical and Computer Engineering 110, 111, 112 | 15 |
| Computer organization, architecture, and four courses from Electrical and Computer Engineering 144A, 144B, 145A, 145B, 145C, 145D | 45 |
| Design and synthesis—Electrical and Computer Engineering 110, 111, 112 | 9 |
| Additional technical electives | 12 |
| Humanities-soc ial sciences electives (see page 81) | 15 |
| Unrestricted electives | 1 |

Total Units for Upper Division Program 90

Electrical and Computer Engineering:

General

Minimum units required for major: 130.

Subject Areas and Courses

| Mathematics, upper division mathematics or statistics course (except Mathematics 101 and Statistics 102) | 3 |
| Professional responsibilities—Engineering 190 | 3 |
| Engineering sciences—Engineering 102A, 105A | 6 |
| Circuits, systems and electronics—Engineering 100, Electrical and Computer Engineering 110, 111, 112 | 15 |
| Computer—Electrical and Computer Engineering 110 | 4 |
| Electromagnetic fields and physical electronics—Electrical and Computer Engineering 130A, 130B, 140 | 10 |
| Laboratory—Electrical and Computer Engineering course with laboratory (except Engineering 100, Electrical and Computer Engineering 111) but may include Electrical and Computer Engineering 110, 111, 112 | 15 |
| Design and synthesis—Electrical and Computer Engineering 110, 111, 112 | 9 |
| Additional technical electives | 12 |
| Humanities-soc ial sciences electives (see page 81) | 15 |
| Unrestricted electives | 1 |

Total Units for Upper Division Program 90

Electrical and Computer Engineering:

Computers

Minimum units required for major: 180.

Subject Areas and Courses

| Mathematics, upper division mathematics or statistics course (except Mathematics 101 and Statistics 102) | 3 |
| Professional responsibilities—Engineering 190 | 3 |
| Engineering sciences—Engineering 102A, 105A | 6 |

Electrical and Computer Engineering:

Electronics, Circuits and Signal Processing

Minimum units required for major: 180.

Subject Areas and Courses

| Mathematics, upper division mathematics or statistics course (except Mathematics 101 and Statistics 102) | 3 |
| Professional responsibilities—Engineering 190 | 3 |
| Engineering sciences—Engineering 102A, 105A | 6 |
| Circuits, systems and electronics—Engineering 100, Electrical and Computer Engineering 110, 111, 112 | 21 |
| Computer—Electrical and Computer Engineering 170 | 4 |
| Electromagnetic fields and physical electronics—Electrical and Computer Engineering 130A, 130B, 140 | 10 |
| Laboratory—Electrical and Computer Engineering course with laboratory (except Engineering 100, Electrical and Computer Engineering 111) but may include Electrical and Computer Engineering 110, 111, 112 | 9 |
| Additional technical electives | 15 |
| Humanities-soc ial sciences electives (see page 81) | 15 |
| Unrestricted electives | 1 |

Total Units for Upper Division Program 90

Electrical and Computer Engineering:

Solid State, Microwave and Quantum Electronics

Minimum units required for major: 180.

Subject Areas and Courses

| Mathematics, upper division mathematics or statistics course (except Mathematics 101 and Statistics 102) | 3 |
| Professional responsibilities—Engineering 190 | 3 |
| Engineering sciences—Engineering 102A, 105A | 6 |

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 communications 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 programs in materials science and engineering provides the foundation for careers in these fields and the undergradaute degrees in materials science and engineering are designed to provide a broad foundation in the materials sciences and to prepare students for careers in industry or for further education in science, engineering, or materials science.
sion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants, and from fabrication of steel to design of semiconduc-

tors.

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 ready for the "applied sciences" 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 program to suit your interests and career objectives. Examples include production and development, applied research, basic research, teaching, and management.

Upper-division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives.

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
Engineering 147
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
Engineering 147

Computers:

Applied Science 115
Electrical and Computer Engineering 171, 172, 175, 176, 177, 180, 181, 182A, 182B

Electronic Materials:

Physics 121
Geology 190

Environmental Engineering:

Engineering 147, 160
Atmospheric Science 120, 125
Biochemistry and Biophysics 101A, 101B
Water Science 41
Chemistry 8A, 8B
Civil Engineering 149A, 149B

Heat Transfer:

Engineering 105B
Chemical Engineering 165
Chemical Engineering 150A, 150B
Materials Design and Processing:

Engineering 104B, 106, 123, 147
Civil Engineering 150A, 150B, 151, 152, 155
Civil Engineering 137

Physics of Solids:

Physics 115A, 115B, 140A, 140B
Electrical and Computer Engineering 145A, 145B, 145C, 148
Engineering 147

Geology 180

Suggested advisers:

D.G. Howitt, A.K. Mukherjee, Z.A. Munir, J.F. Shackelford

Materials Science and Engineering

Minimum units required for major: 180

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits—Engineering 100</td>
<td>4</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 102A, 104A</td>
<td>6</td>
</tr>
<tr>
<td>Fluid mechanics—Engineering 103A</td>
<td>3</td>
</tr>
<tr>
<td>Applied thermodynamics—Engineering 105A, 105B</td>
<td>6</td>
</tr>
<tr>
<td>Materials in design—Engineering 140</td>
<td>6</td>
</tr>
<tr>
<td>Measurements and laboratory—Engineering 146, Mechanical Engineering 124, 178</td>
<td>8</td>
</tr>
<tr>
<td>Materials science—Engineering 132, 134, 136, 142, 144</td>
<td>15</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 180</td>
<td>3</td>
</tr>
<tr>
<td>Technical electives</td>
<td>27</td>
</tr>
<tr>
<td>Humanities-soc ial sciences electives (see page 81)</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 an understanding of physical and mechanical principles 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, 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 idea and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:

Mechanical Engineering 124, 130, 150B, 151, 152, 155, 162, 172
Applied Science 115
Civil Engineering 131A, 132A
Agricultural Engineering 118, 119, 133, 134
Engineering 111, 118, 122, 123, 140, 142, 160

Suggested advisers:

C. W. Beadle, J. M. Henderson, M. L. Hull, A. T. Yang

Energy Systems: This area is specifically designed for those who would like to work in the fields of power generation, propulsion for transportation, and energy conversion. It is in these fields that the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to such diverse topics as combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators, solar energy systems, and others.

Suggested technical electives:

Mechanical Engineering 110, 161, 162, 166

Suggested advisers:

J. W. Baughn, H. Brandt, H. A. Dwyer, W. H. Giedt, M. A. Hoffman, W. Kollmann, A. A. McKillop

Systems Dynamics and Control: Modern engineers are increasingly concerned with the performance of integrated dynamic systems in which it is not possible to optimize component parts without considering the overall system.

Systems Dynamics and Control is concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply equally well to social, economic, and other dynamic systems.

Suggested technical electives:

Mechanical Engineering 124, 134, 152, 172
Electrical and Computer Engineering 112, 151
Engineering 122, 140, 160

Suggested Advisers:

J. W. Brewer, M. Hubbard, D. C. Karnopp, D. L. Margolis

Transportation Systems: An important aspect of Mechanical Engineering has traditionally involved the planning, design, and operation of transportation systems. As society recognizes the increasing

NOTE: For key to footnote symbols, see page 128.
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

1. Plans Surveying (3) I. Goss
   Lecture—2 hours; laboratory—3 hours. Prerequisite: plane trigonometry. Course 21 recommended. Not open to students in Engineering. Principles of measurement of horizontal distances, horizontal and vertical angles, elevations and differential levels, including stadia method. Field problems with special reference to agricultural, forestry and landscape applications.

2. Introduction to Engineering Systems (3) I, II. Schroeder
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A recommended (may be taken concurrently). Introduction to the engineering profession. A general view of the view of the engineering process as obtained by participation in laboratory experiments illustrating the solution of representative, but greatly simplified, engineering problems. (P/NP grading only.)

3. Engineering Graphics in Design (3) III, II. The Staff (Beadle in charge)

4. Applications of Computers (3) III, II. The Staff (Dorf in charge)
   Laboratory—3 hours; lecture—2 hours. Prerequisite: Mathematics 16A or 21A. Introduction to digital computation and computer programming with an algebraic language (FORTRAN) in solving simple numerical and nonnumerical problems. Students who plan to enroll in computer courses may receive only 2 units if credit is received for Electrical and Computer Engineering 8; those who have had Mathematics 25A may not receive credit for course 5.

5. Circuits (3) I, II, III. The Staff (Ford in charge)
   Lecture—3 hours. Prerequisite: student in Engineering; Mathematics 22B (may be taken concurrently); Physics 6B. Basic electric circuit analysis techniques, including: electrical quantities and units, resistive circuits, transistors, and steady-state response of RLC circuits, sinusoidal excitation and phasors, complex frequency and network functions.

6. Statics (3) I, II, III. The Staff (Romsted in charge)
   Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore student in Engineering. Introductory course on the properties of engineering materials and their relation to the internal structure of materials.

Upper Division Courses

100. Electronic Circuits and Systems (4) I, II, III. The Staff (Dorf in charge)
   Lecture—3 hours; laboratory—3 hours. Prerequisite: course 17. Introduction to theory and application of analog and digital electronic systems and control systems recommended that students enroll in this course as soon as possible after completing Engineering 17.

102A. Dynamics (3) I, II, III. The Staff (Beadle in charge)
   Lecture—3 hours. Prerequisite: course 35, 228C, 229C. Kinetics and kinetics 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 102A. Topics in rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.
bearings, rings and arches. Torsion of non-circular shafts and thin-walled sections. Elastic and inelastic behavior of thick-walled cylinders.

130. Thermodynamics of Materials Processes (3 I) Mukherjee Lecture—3 hours. Prerequisite: courses 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials, including the fundamentals associated with materials processes, e.g., alloying, phase stability, surface properties, semiconduction, thermoelectric power and thermoelectric energy conversion.

132. Structure of Engineering Materials (3 I) Shackleford Lecture—3 hours. Prerequisite: course 45, upper division standing. Structure of engineering materials on the atomic scale, including density, bonding by studying the fundamentals of crystallography. The importance of this structure to materials’ properties will be emphasized. Experimental determination of structure will be described using x-ray diffraction techniques.

134. Fundamentals of Rate Processes in Materials Science (3 III) Howitt Lecture—3 hours. Prerequisite: courses 45 and 105A or 105B.


138. Mechanical Behavior of Materials (3 III) Mukherjee Lecture—3 hours. Prerequisite: courses 45 and 105A (or the equivalent); upper division standing in Engineering. Microscopic aspects of the mechanical behavior of engineering materials are discussed with emphasis on recent developments in materials science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined.

140. Materials in Engineering Design (3 III) Shackleford Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Descriptive treatment of common engineering materials. Design of specific parameters for typical materials including metals, ceramics, glass, polymers, and composites. Principles of heat treat ment and fabrication as they affect design parameters and applications. Engineering in design will be emphasized.

142. Principles of Nondestructive Testing (3 I) Shackleford Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing, including x-rays, ultrasonic, electrical, magnetic, penetrant methods, etc. are discussed. Typical results expected from these tests and their application in material characterization, flaw detection, crystallographic information, chemical inhomogeneity, residual stress analysis, etc., are emphasized.

144. Corrosion and Oxidation of Engineering Materials (3 I) Munn Lecture—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and testing criteria for the prevention and control of corrosion.

145. Materials Laboratory (3 II) Howitt Laboratory—4 hours. Prerequisite: enrollment open only to majors or double majors in Materials Science and Engineering; course 45 recommended. Investigation of materials behavior and understanding of this in relation to fundamental principles of materials science will be emphasized.

147. Principles of Polymer Materials Science (3 III) Needles and Zerahn (Textiles and Clothing) Lecture—3 hours. Prerequisite: chemistry through organic or course 45; introductory physics sequence. Basic principles of polymer science, including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Textiles and Clothing 100.)

150. Energy, Society, and the Environment (4 I, Craig Lecture—3 hours; discussion—1 hour. Overview of energy, uses and effects. Emphasis on energy conversion, technology and environmental problems. Interactions of society with technology, politics and economics are considered. Current and future energy systems are studied: nuclear, fossil, coal, geothermal, solar and others. For engineering and nonengineering students. (Lower division students are referred to Environmental Studies 20.)

152. Advanced Energy Technology (4 III) Craig Lecture—3 hours; discussion—1 hour. Prerequisite: course 105A or consent of instructor. Technical overview of energy technologies. Emphasis on semiquantitative understanding.

NOTE: For key to footnote symbols, see page 128.

Engineering: Agricultural

2. Introduction to Forest Engineering (1 III) Garrett Discussion—3 hours. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, log transport, milling and reforestation. (PnP grading only.)

92. Internship in Agricultural Engineering (1-5 I, II, III. The Staff Garrett in charge.) Work experience. Prerequisite: lower division standing; approval of project prior to participation given. Super vised work-study experienced in agricultural engineering. May be repeated for credit. (PnP grading only.)

90. Special Study for Lower Division Students (1-5 I, II, III. The Staff Garrett in charge.) (PnP grading only.)

Upper Division Courses

117. Engine for Agriculture, Industry and Transportation (3 III) Howitt Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 105A. Operational and performance characteristics of internal combustion engines with emphasis on combustion and emission control. Engineering comparison of alternative power units with conventional engines. Design criteria for engines used in agriculture, industry, and transportation.

113. Principles of Field Machinery Design (3 III) Yates Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102A. Functional requirements and current design principles of field machines; elements of field machinery design; use of instrumentation and computer techniques for analysis of specific machinery problems.

115. Forest Engineering (2 I, II) Garrett Lecture—2 hours. Prerequisite: Civil Engineering 10, Engineering 102A and 104A; Forestry 100A, 100B, 100C; Berkeley campus strongly recommended. Applications of engineering principles to problems in the forest industry, including consideration of nursery operations, reforestation, harvesting, road layout, log transport and milling operations.

116. Forest Engineering Problems (2 III) Garrett Lecture—1 hour: three weekend field trips to Blodgett Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

117. Stability and Traction of Off-Road Vehicles (2 I) Chanceller Lecture—2 hours. Prerequisite: Engineering 102A and 104A. Mechanics of interactions between paved or soil surfaces and tires or tracks. Vehicle response to external and internal forces during full and partial traction. Effects of design parameters and component characteristics on vehicle performance and safety.


125. Agricultural Structures: Environmental Aspects (3 I, Morrison Lecture—4 hours. Prerequisite: Engineering 105A. Environmental and functional design of agricultural storage and production facilities; plans and systems; ventilating, heating, insulating, pressure control, balance, temperature, solar control, air-conditioning; methods of waste management.

139. Mechanical Unit Operations and Processes (3 III) Garrett Lecture—2 hours; laboratory—2 hours. Prerequisite: Engineering 103A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials, materials handling, storage, plant layout, self-feeding, etc.
Engineering: Applied Science

134. Thermal Unit Operations and Processes (3) III. Singh Lecturer—5 hours. Prerequisite: Engineering 105A. Thermal unit operations related to drying, refrigeration, freezing, cold storage, evaporation, boiling, distillation, etc.

140. Sewage and Drainage (3) III. Lecture—3 hours. Prerequisites: Engineering 103A or Water Science 142. Flow through porous media, measurement of hydraulic conductivity, sewage under hydraulic structures, anaerobic flow nets, drainage design for water table and salt control. (Same course as Water Science 140.)

141. Sprinkler and Drip Irrigation System Design (3) II. Wattenbarger Lecturer—2 hours. Laboratory—discussion—3 hours. Prerequisite: Engineering 103A. Water Science 110B or 162. Civil Engineering 111 recommended. Design and evaluation of sprinkler and drip irrigation systems.

150. Engineering Design Projects for Agriculture and Forestry (2) II. Garrett Laboratory discussion—two 2-hour sessions. Prerequisite: any two of the following (one may be taken concurrently): courses 114, 115, 125, 133; Civil Engineering 145; Mechanical Engineering 150A. Water Science 110A, 110B, 160. Individual or group projects involving the design of devices, structures, or systems to solve specific problems in agriculture or forestry. Students may select their projects, subject to approval of the instructor.

157. Human Factors in Engineering and Design (3) II. Kamihaka Lecture—2 hours. Laboratory—3 hours. Principles of human factors, applications of human factors data to engineering design.

160. Introduction to Microcomputer Applications in Agriculture (3) III. Kamihaka Lecture—2 hours. Laboratory—3 hours. Prerequisite: Engineering 17, 60, consent of instructor. Introduction to applications of microcomputers. Computer organization, programming and interfacing a single board computer. Sensing inputs from the outside world. Control of external devices such as relays and DC motors.

168. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Gannon in charge) Prerequisite: work experience. Credit not more than 2 terms credit. May be repeated for credit. (PINP grading only.)

180. Directed Group Study (1-5) I, II, III. The Staff (Gannon in charge) Prerequisite: consent of instructor. (PINP grading only.)

185. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Gannon in charge) (PINP grading only.)

Graduate Courses

215. Soil-Machine Relations in Tillage and Traction (3) C. Choate Lecture—3 hours. Prerequisite: course 114 or 117. Mechanics of interactions between agricultural soils and tillage and traction equipment. Determination of relevant physical properties of soil; analyses of stress and strain in soil due to machine applied loads; experimental and analytical methods for synthesizing characteristics of overall systems.

235. Advanced Unit Operations in Process and Food Engineering (3) III. Rumsey Lecture—3 hours. Prerequisite: an upper division course in process or food engineering. Basic procedures applicable to process and food engineering. Heat and mass transfer applications to drying, dehydration and freezing; flow of food and semi-fluid materials; size reduction; separation of bio-materials.

242. Hydrodynamics of Surface Irrigation (3) III. The Staff (Garrett in charge) Lecture—3 hours. Prerequisite: a course in experimental and integral calculus, a course in hydraulics or fluid mechanics including some open-channel flow, a course in irrigation principles or Mathematics 133. Measurements and experiments for prediction of the ultimate distribution of water flowing over a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and inflow rates.

245. Agricultural Waste Management (3) II, III. Hills Lecture—2 hours. Discussion—laboratory—1 hour. Prerequisites: consent of instructor. Animal, crop and food processing wastes: pesticides, fertilizers, odors, dust and smoke in relation to environmental protection. Disposal needs, present and future. Legislation, economics and public concern; coordination with municipal and industrial waste management.

250. Design of Mechanical Systems (2) II. Goss Lecture—2 hours. Prerequisites: mechanics of design and economics recommended. Experience with design; evaluation designing concepts and establishing design criteria; analysis and synthesis in design; optimization techniques; human factors in design.

255. Environmental Engineering in Agriculture (3) I. Morison Lecture—3 hours. Prerequisite: Mechanical Engineering 165. The description, methods of measurement and effect on man, animals and plants of physical environmental factors, and the design of systems for their control. Offered in odd-numbered years.

257. Design and Analysis of Engineering Experiments (4) II. Studer Lecture—3 hours; laboratory—3 hours. Prerequisite: at least one undergraduate course in statistics or consent of instructor. Design, management, and analysis of engineering experiments with emphasis on criteria for the selection and utilization of statistical methods. Problems necessitating the use of campus and departmental computing facilities will be assigned.

275. Physical Properties of Agricultural Materials (4) Chen Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties, such as mechanics, optical, mechanical, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of agricultural materials.

291A-D. Selected Topics in Agricultural Engineering (1-5) I, II, III. The Staff (Garrett 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) Process Design; (C) Crop Science and Management; (D) Alternating Energy Systems.

290. Senior Project (1) III. The Staff (Goss in charge) Seminar—1 hour. (SU grading only.)

297. Advances in Food Engineering (1) I, II, III. Singh Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in food engineering. Presentations by individual students. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Garrett in charge) (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Studer in charge) (SU grading only.)

Engineering: Applied Science

(College of Engineering)

Frederick D. Wooten, Ph.D., Chairperson of the Department

Department Office, 228 Walker Hall (752-0360)

Faculty

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Arthur H. Biermann, Ph.D., Lecturer
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Stewart D. Bloom, Ph.D., Professor
David C. Camp, Ph.D., Lecturer
Paul P. Craig, Ph.D., Professor
John S. DeGroot, Ph.D., Professor
William B. Durham, Ph.D., Lecturer
John G. Fletcher, Ph.D., Lecturer
John C. Garrison, Ph.D., Lecturer
Abraham Gersberg, Ph.D., Adjunct Professor
Michael W. Guinan, Ph.D., Lecturer
Roger Haas, Ph.D., Lecturer
William G. Hoover, Ph.D., Adjunct Professor
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John Kildea, Ph.D., Professor
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Stephan Levine, Ph.D., Lecturer

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Garry Rudnike, Ph.D., Lecturer
Mondial Rose, Ph.D., Lecturer
Stephen K. Skedzielewski, Ph.D., Lecturer
Gary R. Smith, Ph.D., Lecturer
Gordon L. Stubble, Ph.D., Lecturer
Abraham Szoke, Ph.D., Lecturer
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Donald L. Vickers, Ph.D., Lecturer
John J. Walton, Ph.D., Lecturer
Richard W. Watson, Ph.D., Lecturer
Frederick O. Winter, Ph.D., Professor
Jeffrey W. Yeh, Ph.D., Lecturer
Yin Yeh, Ph.D., Professor
Mary E. Zosel, Ph.D., Lecturer

Courses in Engineering: Applied Science

Davis

Lower Division Courses

96. Directed Group Study (1-5) I, II, III. The Staff (Wooten 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 (Wooten in charge) Prerequisite: consent of instructor; lower division standing. (PINP grading only.)

Upper Division Courses


165A. Introductory Nuclear Science and Technology (3) I, II. Craig Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductionary aspects of nuclear phenomena, nuclear fission, nuclear energy, nuclear decay modes, interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurements; neutron technology. Nuclear chemistry.


165B. Quantum Optics II (3) III, II. Y. Yeh Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter; polarization and electro-optic statistics. Photon distributions in scattering processes and in nonlinear optical processes.

186. 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. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Wooten in charge) Prerequisite: consent of instructor. (PINP grading only.)

Graduate Courses


154A. Mass Transfer (3) (I, III) II. Scott Lecture—3 hours. Prerequisite: course 150B. Fundamentals of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

154B. Applications of Mass Transfer (3) (I, III) III. Scott Lecture—3 hours. Prerequisite: course 150A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation and other separation processes.

155A. Chemical Engineering Laboratory (4) (I, III) II. Haynes Laboratory—12 hours. Prerequisite: course 150A. Laboratory experiments in heat, mass, and momentum transfer and in chemical engineering processes.

155B. Chemical Engineering Laboratory (4) (I, III) II. Haynes Laboratory—12 hours. Prerequisite: course 154B or 154C. Continuation of 156A.

155A. Chemical Engineering Kinetics (3) (I) III. Stirling Lecture—3 hours. Prerequisite: course 150B or 154A, and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

155B. Chemical Engineering Kinetics (3) (I) III. Stirling Lecture—3 hours. Prerequisite: course 156A. Continuation of course 156A.

157. Process Dynamics and Control (4) (I, III) II. Lewis Lecture—3 hours. Laboratory—3 hours. Prerequisite: courses 152B, 154A, and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

157B. Process Dynamics and Control (4) (I, III) II. Lewis Lecture—3 hours. Laboratory—3 hours. Prerequisite: courses 152B, 154A, and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

159. Design of Piping Systems and Heat Exchangers (3) (I, III) II. Jackman Lecture—3 hours. Prerequisite: courses 150B and 152C (or the equivalent). Design of piping systems including pumps, compressors, valves, and nozzles. Short cut methods for approximating pressure drop in piping. Design of shell and tube heat exchangers.

161. Biochemical Engineering Fundamentals (3) (I, III) II. Ryer Lecture—3 hours. Prerequisite: Chemistry 128A and Mathematics 222B. 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 biochemical production, sewage treatment, biological waste treatment, and environmental modelling.

190C. Research Group Conferences (1) (I, II, III) The Staff (McCoy in charge) Discussion—1 hour. Prerequisite: upper division standing in Chemical Engineering, consent of instructor. Research group conferences may be repeated for credit. (P/NP grading only.)

198G. Group Study (1) (I, II, III) The Staff (McCoy in charge) Discussion—1 hour. Prerequisite: consent of instructor. Group study of selected topics. Students may be organized in investigator groups or joint groups. Students may enroll in one or more separate subjects. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-4) (I, II, III) The Staff (McCoy in charge) Discussion—1 hour. Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

252. Advanced Thermodynamics (3) (I, III) II. Whaley Lecture—3 hours. Prerequisite: course 150B or Engineering 150B. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

253A. Advanced Fluid Mechanics (3) (I) III. Carbeline Lecture—3 hours. Prerequisite: courses 150A, 150B, and 259 (may be taken concurrently) or the equivalent. Kinemat- NOTE: For key to footnote symbols, see page 125.


240. Colloid and Surface Phenomena (3) (II, III) Stroohe Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Colloid and surface phenomena occur in a wide spectrum of problems encountered in engineering and science. Introduction to the behavior of surfaces and dispersion systems. Fundamentals will be applied to the solution of practical problems.

255. Catalysis in Chemical Engineering (3) (I, III) II. Whaley Lecture—3 hours. Prerequisite: 154B or equivalent. 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 (amination synthesis, methanol synthesis) synthetic fuel production, cracking, reforming, hydrogenation, hydrodesulfurization, distillation, heat exchanger, polymerization, partial oxidation, auto exhaust catalysis and fuel cell operations.

258. Applied Kinetics and Reactor Design (3) (II, III) Whaley Lecture—3 hours. Prerequisite: courses 233B, 253C. Application of kinetics and molecular transport rates to the design of chemical reactors with emphasis on heterogeneous systems.

259. Reactor Design (3) (II, III) Whaley Lecture—3 hours. Prerequisite: course 156B. Application of concepts of chemical reaction engineering to the two-steps process of reactor design: (1) interpretation of laboratory-level data, and (2) utilization of the interpretation for the design of commercial-scale reactors for real chemical systems.


269. Seminar (1) (I, II, III) The Staff (McCoy in charge) Seminar—1 hour. (SU grading only.)

290C. Graduate Research Group Conferences (1) (I, II, III) The Staff Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (SU grading only.)

291. Seminar in Multiphase Transport Phenomena (1, I, II) (II) II. Whaley Lecture—2 hours. Seminar—1 hour. Prerequisite: graduate or senior standing. Seminar devoted to the theoretical and practical applications of multiphase transport phenomena. Subjects will include flow in porous media, dispersion with absorption and reaction heat transfer in multiphase systems with chemical reaction.

292. Kinetics of Catalytic Systems Seminar (1, II) I. II. Seminar—1 hour. Prerequisite: graduate standing in Chemical Engineering and consent of instructor. Theoreti- Welcome, this is Dr. Zhe. I am a student here at the University of California, Los Angeles, and I am currently working on my PhD in Civil Engineering. My research focuses on the development of novel materials for sustainable construction. I am particularly interested in the use of recycled materials and the incorporation of renewable energy in building design. I am excited to share my knowledge and insights with you today.

Engineering: Civil

(College of Engineering)

Karl M. Romstad, Ph.D., Chairperson of the Department

Department Office, 206 Walker Hall (752-0586)

Faculty

Jaime Amororo, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Kantilal Arulandran, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Don O. Brosh, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Robert H. Burgy, M.S., Professor (Civil Engineering; Land, Air and Water Resources)

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Miguel A. Marfo, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Gerard I. Orlob, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

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Melvin R. Ranney, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Karl M. Romstad, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Edward D. Schrock, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Karl M. Romstad, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Karl M. Romstad, Ph.D., Professor (Civil Engineering; Land, Air and Water Resources)

Chinh-Kang Shen, Ph.D., Professor (Civil Engineering; Environmental Studies)

Michael A. Taylor, Ph.D., Associate Professor (Civil Engineering; Environmental Studies)

George Tchobanoglous, Ph.D., Professor

Courses in Engineering: Civil

Lower Division Courses

1. The Civil Engineer in Society (1) (I) The Staff (Romstad in charge) Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

10. Introduction to Surveying (3) (III) Tchobanoglous Lecture—2 hours, laboratory—3 hours. Prerequisite: lower division standing in the College. Theory and practice of measurements for distances, elevations, and angles. Line and traverse computations, horizontal and vertical curve computations, and calculations for latitude, longitude, azimuth, and time.

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Upper Division Courses

131A. Structural Analysis: Elastic (1) I. I. R. Romstad Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Elastic structural analysis of determinate and indeterminate trusses, beams, and frames. Solution of displacements. Methods of virtual work, moment area, slope-deflection, and other methods. (P/NP grading only.)

131B. Matrix Structural Analysis and Introduction to Finite Element Method (1) I. Romstad Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 101B. Computer simulation and computer analysis of statically indeterminate structures. Introduction to finite element methods for elasticity and bending problems.

132A. Structural Design: Metallic Structures (3) I. I. Romstad Lecture—4 hours. Prerequisite: Engineering 101B. Design of structural members, plastic analysis of beams and columns, strength of materials, and fatigue. (P/NP grading only.)

132B. Structural Design: Concrete Structures (3) I. I. Romstad Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 101B. Computer simulation and computer analysis of structural concrete. Design of concrete members, plastic analysis of beams and columns, and the design of reinforced concrete structures. (P/NP grading only.)

135. Aerospace Structures (3) II. I. I. Romstad Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Analysis of skin stringer construction for aircraft structures and tubing. Stress analysis in circular and rectangular members. (P/NP grading only.)

137. Construction Principles (3) III. The Staff (Romstad 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; foundation construction practices, economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

138. Earthquake Loads on Structures (3) I. I. Romstad Lecture—3 hours. Prerequisite: course 131A; Engineering 102A. Determination of loads on structures due to basic mechanisms of lateral forces, approximate dynamic analysis (response spectrum), and time history. Concepts of mass, damping, and stiffness for different structures. Optimization for realistic behavior. Consideration of wind and blast loading.

139. Prestressed Concrete (3) II. Taylor Lecture—3 hours. Prerequisite course 126B, Principles and design of sections for buildings, interactive computer analysis, ultimate strength of sections. Loss of prestress, shear design. Applications to bridges, buildings, and tanks. Special materials properties needed for effective prestressing.


141L. Engineering Hydraulics Laboratory Laboratory—2 hours. Prerequisite: course 141 (may be taken concurrently). Laboratory experiments and demonstrations on open channel flow, uniform flow, and channel flow.


143. Water Resources Engineering and Management (3) II. Scott Lecture—3 hours. Prerequisite: course 142. Introduction to the design and management concepts affecting the planning, development, design, and operation of multipurpose projects. Concepts include: water supply, data, quality uses; policies, legislation; institutions; laws; economics; environmental concerns; and public participation.


145. Hydraulic Systems Design (3) III. A. Orochko Lecture—3 hours. Prerequisite: courses 141, 141L, 142. Principles of analysis of hydraulic design of storage systems; diversion structures; conveyance and regulating systems; structures for irrigation, pumping, and power development projects; water network systems; water connection systems.

146. Water Resources Systems Engineering (3) III. Helweg Lecture—3 hours. Prerequisite: course 142; course 153 and either 144 and 142 or 141; 141L recommended. Introduction to system analysis. Application of systems analysis techniques in the design of large-scale water systems. Use of computer simulation and optimization in system design applications.

147. Solid-Waste Management (3) III. J. Tschopanoglou Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems; introduction to waste disposal processes and treatment of treated wastes to the environment.

148. Water Quality Management Systems Design (3) III. J. Tschopanoglou Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introduction to the design of water and wastewater treatment processes.

149. Introduction to Air Pollution Control (3) I. I. I. Chang Lecture—3 hours. Prerequisite: Engineering 102A; course 148A (or the equivalent). Introduction to the design and operation of air pollution control and related systems.

149L. Air Pollution Measurements: Fundamentals and Applications (2) II. Chang Lecture—1 hour; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introduction to the principles and methods employed in ambient air quality measurements and source sampling.

152. Introduction to Civil Engineering Planning (3) I. I. I. Chang Lecture—3 hours. Prerequisite: consent of instruction for non-engineering students. Basic planning concepts: role of engineering, economic, environmental and social information; institutional constraints. Case studies will illustrate planning of water regulation and distribution systems, waste treatment and disposal systems, land and water transportation systems.

153. Analytical Methods in Planning (3) II. I. Lam Lecture—3 hours. Prerequisite: Mathematics 22B. Introduction to operations research. Optimization techniques such as linear programming, dynamic programming, and network analysis. Introduction to water resources planning, transportation planning, systems engineering, and other civil engineering disciplines.

154. Introduction to Transportation Planning (3) I. I. I. Chang Lecture—3 hours. Prerequisite: course 149L. Introduction to transportation planning. Topics include the nature and history of transportation problems, transportation information systems, models, and evaluation methods. Alternative solutions to transportation problems are considered.


159. Transportation Facilities Design (3) III. Lam Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 10, 102A. Design of transportation facilities. Alignment design of travelsways. Capacity and functional design of travelsways and terminals. Pavement design and construction. Economic and other design considerations.

171. Soil Mechanics (3) III. I. I. Anlanadur Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). Soil formations, mass-volume relationships, principles of effective stress, soil characteristics (classification and identification), compaction, capillarity and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

172. Soil Properties, Soil Behavior, and Engineering Applications (2) III. I. Shen Lecture—2 hours; laboratory—2 hours. Prerequisite: course 171 (may be taken concurrently). Laboratory studies of physical, mechanical and hydraulic properties of soils and the effects of these properties on the soil behavior in engineering investigation of geotechnical problems.

173. Foundation Design (4) II. Shen Lecture—4 hours. Prerequisite: courses 132P and 171. Theory of consolidation and its application to foundation design; methods of minimizing settlements and effect of settlement on structures. Bearing capacity and safety factors; footing design and structural pressures: retaining-wall design; pile and pile foundation.

175. Introduction to Geotechnical Engineering (3) III. Shen Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in civil engineering. Design of earthwork projects with consent of instructor. Introduction to the principles of geology, and the study of geologic features affecting engineering structures. Discussion of geologic aspects of engineering construction problems by means of case history examples. (Same course as Geology 175.)

177. Soil-Water Dynamics Laboratory (2) III. Shen Lecture—2 hours. Prerequisite: course 171. Laboratory experiments in current research areas in soil dynamics. Topics to vary from year to year. Examples: excavation by water, impact on related fields with consent of instructor. Introduction to geotechnical measurement and soils, simulated earthquakes in centrifuge models, seepage erosion in soil.

189-A. Selected Topics in Civil Engineering (1-5) I. I. I. The Staff (Romstad in charge) Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directly group studied topics with emphasis on a specific field or approach. (C) Engineering Hydrology; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Water Resources Engineering; (J) Water Resource Planning.

192. Internship in Engineering (1-5) I. I. I. The Staff (Romstad in charge) Lecture, laboratory, or combination. Prerequisite: upper division standing; approval of project prior to the period of the internship. Supervised work-study experience in civil engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I. I. I. The Staff (Romstad in charge) Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I. I. I. The Staff (Romstad in charge) Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

Graduate Courses

201. Introduction to Theory of Elasticity (3) I. I. L. Hutchinson Lecture—3 hours. Prerequisite: Engineering 104F. Fundamental equations of elasticity in three dimensions; plane stress; plane strain; plane strain in various shapes. Introduction to variational and approximate methods.
222. Buckling of Columns and Plates (3) I. Brush Lecture—hours. Prerequisite: course 201 and course 221 (may be taken concurrently). Analysis of the buckling behavior of structural members: buckling of columns, lateral buckling of beams, nonlinear bending and stability problems involving elastic-plastic buckling of beam-columns, stability of structural frames, buckling strength and ultimate strength of plates.


224. Viscoelastic Behavior of Solids (3) III. Dafalias Lecture—3 hours. Prerequisites: course 203 or 204. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear elasticity and viscoelasticity. Solution of three-dimensional problems. Offered in even-numbered years.

225. Continuum Mechanics (3) I. Dafalias Lecture—3 hours. Prerequisite: course 203 or 204. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear elasticity and viscoelasticity. Solution of three-dimensional problems. Offered in even-numbered years.

226. Advanced Matrix Structural Analysis (3) II. Rorstad Lecture—2 hours; laboratory—3 hours. Prerequisite: course 314A-313B or consent of instructor. Computer analysis of complex frameworks by the displacement method; treatment of tapered, curved and beam on elastic foundations; and computer-aided deformation and stability analysis; introduction to structural optimization.


228. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems (3) III. Hermann Lecture—2 hours; laboratory—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and nonlinear one-, two-, and three-dimensional problems in continuum mechanics, soil mechanics, and to plate and shell theories.

229. Finite Elements: Application to Fluid Problems (2) III. Landau Lecture—2 hours. Prerequisite: courses 141, 212A, or the equivalent. Application of the finite element method to two- and three-dimensional flows, including viscous and inviscid and viscous flow, convection-diffusion problems, the shallow water equations and flow through porous media.

230. Analysis of Structures Subjected to Dynamic Loads (3) III. Rorstad Lecture—3 hours. Prerequisite: courses 136, 211. Analysis of structures subjected to earthquake wind and blast loading: distributed, concentrated and lumped mass tech- niques; development of a computer program for complex structures; nonlinear response spectrum analysis; frequency and time domain analysis.

231. Theory of Plates (3) I. Hermann Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of plane bending theory including orthotropic behavior; application to transversely loaded, circular, and rectangular plates. Equivalent orthotropic properties for composite plates. Classical and finite element analysis procedures. Thick and non-linear plate theories.


233. Advanced Topics in Concrete Structures (3) I. Taylor Lecture—3 hours. Prerequisite: course 132B. Ductility of reinforced concrete; design for torsion of structural concrete; yield line theory for the design of concrete slabs; analysis and design of deep reinforced concrete beams.

234. Advanced Design of Steel and Concrete Structures (3) II. Raridy Lecture—3 hours. Prerequisite: courses 132A, 132B, 202. Design considerations for columns and frame building; design for combined loading; concrete compression members; steel-concrete composite design; steel plate girder design.

235. Water Quality (3) I. Orb Lecture—3 hours. Prerequisite: course 141. Water quality requirements for domestic, industrial, and recreational and wildlife water uses; properties of natural surface and groundwater; threats and fates of waterborne pollutants; methods of analysis.

236. Land Quality (3) I. Krones Lecture—3 hours. Prerequisite: instructor. Factors determining the quality of agricultural lands; modification for temperature control; out-of-doors noise and its control; interrelations of land and vegetation on qualities of air and water pollutants.

237. Air Quality (3) III. Chang Lecture—3 hours. Prerequisite: Engineering 105A and courses 141 and 149A or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling.

238. Airborne Particles and Scavenging Mechanisms (3) I. Raabe Lecture—3 hours. Prerequisite: Engineering 105A, 103A, courses 141, 149A; or consent of instructor. Generation, characterization, and scavenging of small particles and droplets suspended in gases in inclusions and scavenging of atmospheric particles in the earth's atmosphere.

239. Airborne Particles Laboratory (1) I. Raabe Laboratory—3 hours. Prerequisite: Engineering 105A (may be taken concurrently). Laboratory exercises designed to familiarize the student with methods generation and characterization of airborne particles.

240. Water and Waste Treatment (3) II. Schroeder Lecture—3 hours. Prerequisite: course 148A. Characteristics of water- and wastewater; treatment processes and process kinetics. Offered in odd-numbered years.

241. Water and Waste Treatment (3) II. Schroeder Lecture—3 hours. Prerequisite: course 242A; consent of instructor. Continuation of course 243A.

242. Environmental Quality Management (2) II. Orb, Krones Lecture—2 hours. Prerequisites: courses 240, 241, 242 (may be taken concurrently). Fates of pollutants in the soil environment; requirements for environmental quality; monitoring methods; environmental quality control methods.

243. Applied Aqueous-Solution Chemistry Laboratory (3) I. Chang Laboratory—3 hours. Prerequisite: Engineering 105A; Chemistry 1A, 1B or the equivalent; Chemistry 104A. Introduction to laboratory practice in the examination of water and wastewater. "Wet chemical" and instrumental techniques.

244. Pilot Plant Laboratory: Physical and Chemical Processes (2) I. Tchobanoglous Laboratory—6 hours. Prerequisite: course 243A or consent of instructor. Laboratory investigation of physical and chemical processes for water and wastewater treatment.

245. Pilot Plant Laboratory: Biological Processes (2) I. Tchobanoglous Laboratory—6 hours. Prerequisite: course 243B or consent of instructor. Study of selected biological systems used in wastewater management.

246. Transportation Policy Planning (3) III. Sperling Lecture—3 hours. Prerequisites: courses 152, 160 (may be taken concurrently). Socio-technical nature of the transportation. Societal, technical, and system bases for planning transportation developments. Policy framework of transportation developments and characteristics of planning process. Development of objectives, policy alternatives, and program decisions. Considerations involved in evaluations and decisions. Offered in odd-numbered years.

247. Transportation Planning Models (3) III. Kitanura Lecture—3 hours. Prerequisite: course 150. Detailed study and discussion of quantitative models of urban passenger transportation taking into account generation, modal split, trip distribution, network processes, and demand; and direct demand model. Brief discussions of land-use models and freight transportation. Offered in even-numbered years.

248. Transportation Impact Assessment (3) III. Kitanura Lecture—3 hours. Prerequisite: course 160. Study of individual and household travel decisions. Emphasis on models and principles influencing transport behavior. Objective and attitudinal evaluations of travel behavior are considered. Planning applications are offered. Offered in odd-numbered years.

249. Characteristics of Transportation Systems (3) III. Lam Lecture—3 hours. Prerequisite: course 161 or consent of instructor. Technical, socio-technical, service quality, and operational characteristics of transportation systems. Definition and quantification of variables important to planning and systems operations. Characteristics of the various modes and principles influencing system characteristics. Introduction to methods of analyzing transportation systems. Offered in even-numbered years.

250. Transportation Assessment Impact (3) III. Kitanura Lecture—3 hours. Prerequisites: course 160. Discussions, readings, and quantitative analysis of the impacts of transportation systems on society. Topics include urban land use, regional development, energy and energy consumption. Offered in even-numbered years.

251. Operations of Transportation Systems (3) III. Lam Lecture—3 hours. Prerequisite: course 161. Stochastic modeling of transportation systems. Simulation of transportation operations. Detailed study of system components including vehicle movements, terminals, and control subsystems. Application of mathematical tools to the efficient system operations for various modes of transportation. Offered in odd-numbered years.


253. Cohesive Sediment Transportation (3) II. Krones Lecture—3 hours. Prerequisite: course 161. Sediment material. Particle suspension by currents, waves, and winds. Modes of transport. Sediment relations and suspended load relations. Calculation of total loads in streams. Similarity criteria for movable bed models. Stable channel design. Offered in odd-numbered years.

254. Hydroelectric Power and Water Supply Planning (3) II. Helweg Lecture—3 hours. Prerequisite: courses 142, 152, 270 (concurrently). Hydrodynamis and power and water supply planning. Design, and operating hydro plants. Estimation of water demand determination; surface and ground water yield and reliability; water balances; water conservation. Offered in odd-numbered years.

255. Economics of Water Resources Planning (3) III. Helweg Lecture—3 hours. Prerequisites: course 160. Agricultural Economics 106 or Agricultural Economics 141. Economic analysis of hydro projects. The value of water and evaluation of project alternatives. The uniqueness of water resources. The relation of traditional methods such as benefit cost analysis to multivariate optimization and utility theory in evaluating non-commercial objectives.

256. Hydroelectric Power and Water Supply Planning (3) II. Helweg Lecture—3 hours. Prerequisite: courses 142, 152, 270 (concurrently). Hydrodynamis and energy determina- tion; currency analysis; load patterns; power genera- tion simulation; estimating economic value-market analysis; institutional and regulatory considerations; water demand determination; surface and ground water yield and reliability; water balances; water conservation. Offered in odd-numbered years.

257. Advanced Water Resources Planning (3) II. Helweg Lecture—3 hours. Prerequisites: course 160. Application of hydrology, hydraulics, economics, systems analysis and decision-making to planning of water resources planning for water supply, water recreation, flood control, water quality and urban renewal. Lecture, laboratory, and computer assignments. Advanced water supply models and advanced planning techniques for class project.
Courses in Engineering: Electrical and Computer

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (1-3) I, III. The Staff (Dorf 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 professional ethics and the examination of some case studies. (P/NP grading only)

2. Introduction to Computer Programming (In PASCAL) (3) I, III. Martel, Matloff 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 languages; debugging, testing of well structured programs. Program language PASCAL will be used to solve simple problems. Students may have had Mathematics 16 in high school; only two units of credit for course 8, and students who have had Mathematics 29A or Engineering 5 may not receive credit for course 8.

3. Introduction to Software Development (3) I, III. Martel, Matloff Lecture—3 hours. Prerequisite: course 8. Elements of program design, programming languages, documentation, efficiency, debugging, verification; advanced features of PASCAL, and introduction to FORTRAN. Students who enroll for Engineering 5 and computer programming such as 8 and 80 may receive only 7 units of credit total, and students who have had Mathematics 29B may not receive credit for course 8.

4. Computer Programming (In PASCAL) (3) I, III. Computer workshop—two hour recitation, documentation, efficiency, debugging, verification; advanced features of PASCAL, and introduction to FORTRAN. Students who enroll for Engineering 5 and computer programming such as 8 and 80 may receive only 7 units of credit total, and students who have had Mathematics 29B may not receive credit for course 8.

5. Internship in Electrical and Computer Engineering (1-5) I, II, III. The Staff (Dorf in charge) Prerequisite: consent of instructor; restricted to lower division students. Group study of selected topics. (P/NP grading only)

6. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Dorf in charge) Prerequisite: consent of instructor; restricted to lower division students. Group study of selected topics. (P/NP grading only)

Upper Division Courses

110. Electronic Circuits (4) III. Churchill, Current, Forbes Lecture—4 hours. Prerequisite: course 111 (concurrent), 112, and Engineering 100. Large and small signal device models: analysis and design of linear circuits, both discrete and integrated; operational amplifiers and design of non-linear, digital and pulse circuits.

111. Electronics Circuits Laboratory (3) III. Forbes, Churchill Laboratory—4 hours. Prerequisite: courses 110 (concurrent), 112 and 100. Projects on the design, analysis and evaluation of elementary transistor circuits, amplifiers, operational amplifiers, feedback circuits and digital circuits.

Engineering: Mechanical

(College of Engineering)

Charles W. Beadle, Ph.D., Chairperson of the Department

Department Office, 2020 Bailer Hall (752-0580)

286. Database Systems (3) III, Kou
Lecture—3 hours. Prerequisite: course 185. Survey and discussion of major issues in current database systems. Topics include: data models, storage management and access methods, query languages and query optimizations, database integrity and security, encryption and decryption techniques, transaction and concurrency control.

282. Operating System Models (3) III, Ruschitzka
Lecture—3 hours. Prerequisite: course 182B. Introduction to computer architecture. Survey of formal models that are used in study of operating systems. Modeling of parallel processes and their synchronization in terms of partial orders and Petri nets. Deterministic and probabilistic models for the evaluation of system performance measures.

283. Random Signals and Noise (4) II, Gardner, Aligaz
Lecture—3 hours. Prerequisite: course 283A or 282B or 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.

Lecture—3 hours. Prerequisite: Engineering 118B. Application of probabilistic and statistical methods and models to detection and estimation of signals in noise. Classical parametric methods, maximum-likelihood estimation. Extension of classical techniques for finite variables to continuous parameter processes. Application to estimation of signal parameters, detection of signals.

Lecture—3 hours. Prerequisite: Engineering 118B or equivalent. Information theory and coding. Measure of information. Redundancy reduction encoding and decoding. Introduction to information source. Capacity of a communication channel, error-free communication. Linear block and convolutional codes.

286. Random Signals and Noise, II (4) II, Gardner
Lecture—3 hours. Prerequisite: course 283B. Continuation of 283B with application to modeling, recursive filtering, and spectral estimation. Analysis of Gaussian processes and filtering. Use of recursive least squares algorithms for autoregressive modeling. Spectral estimation.

286-A. Special Topics in Electrical and Computer Engineering
(1-2-5) I, II, III. The Staff (Dorf 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 Electronic Hybrids; (J) Systems; (K) Circuits; (L) Computer Software; (M) Computer Hardware; (N) Microprocessing; (O) Electronics.

290. Seminar (1-5) I, II, III. The Staff (Dorf in charge)
Seminars on specific issues in current research and development. (SU grading only.)

299. Group Study (1-5) I, II, III. The Staff (Dorf in charge)
Prerequisite: consent of instructor. (SU grading only.)

399. Research (1-12) I, II, III. The Staff (Dorf in charge)
(SU grading only.)

Faculty

J. William Baugh, Ph.D., Associate Professor
Charles W. Beadle, Ph.D., Professor
Harry Brandt, Ph.D., Professor
Bert S. Bornstein, Ph.D., Professor
D. W. Brown, Ph.D., Professor
Stanley A. Brown, D.Eng., Associate Professor
(Mechanical Engineering, Orthopaedics)
Harry A. Dwyer, Ph.D., Professor
Clyve F. Garland, M.S., Professor Emeritus
Warren H. Giedt, Ph.D., Professor
John F. Gislar, J.D., Adjunct Lecturer
William A. Hancock, Ph.D., Visiting Lecturer
Jerald M. Hendertson, D.Eng., Professor
(Mechanical Engineering, Food Science and Technology)
Ronald A. Hess, Ph.D., Associate Professor
Myron A. Hillyer, So. D., Professor
Pont Hubbard, Ph.D., Assistant Professor
Maury F. Hurl, Ph.D., Assistant Professor
Dean C. Karapp, Ph.D., Professor
John D. Kemper, Ph.D., Professor
Wolfgang Kollmann, Dr-ing, Associate Professor
Donald F. Lang, Ph.D., Assistant Professor
Allan A. McKillop, Ph.D., Professor
Paul G. Migliore, Ph.D., Assistant Professor
John B. Skel, Ph.D., Visiting Lecturer
Bruce R. White, Ph.D., Associate Professor
An Tzu Yang, D.E.Sc., Professor

Division of Materials Science and Engineering

Faculty

David G. Howitt, Ph.D., Assistant Professor
Amy K. Mukherjee, D. Phil., Professor
Zulah R. Munir, Ph.D., Professor
James F. Shackelford, Ph.D., Associate Professor

Courses in Mechanical Engineering

Lower Division Courses

1. Mechanical Engineering (1-5) I, II, III. 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. Three hours laboratory and two hours discussion. (P&N grading only.)

92. Internship in Mechanical Engineering (1-5) I, II, III. The Staff (Beadle in charge)
Work-learning experience. Prerequisite: lower division standing; approval of program director; supervised work-study experience in engineering. May be repeated for credit. (P&N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Beadle in charge)
Prerequisite: consent of instructor; lower division standing. (P&N 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 flow; turbulence; simple mixing theories of turbulence. Applications to turbomachinery and aeronautics.

124. Mechanical Engineering Projects (3) I, II, III. The Staff (Beadle in charge)
Laboratory—8 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 for credit only.

125. Aeronautical Engineering Fundamentals (3) I, Migliore
Lecture—3 hours. Prerequisite: Engineering 103A may be taken concurrently. History and structure of the air industry; aircraft subsystems and nomenclature; design and development cycle; fundamentals of aircraft propulsion, structures, aerodynamics, performance, stability and control; wind tunnel testing, flight simulators and flight testing.

126. Theoretical Aerodynamics (3) II, White
Lecture—4 hours. Prerequisite: Engineering 103B. Development of general equations of fluid motion; study of flow field kinematics and dynamics; flow about a body; thin airfoil theory; finite wing theory.

127. Applied Aircraft Aerodynamics (4) I, Migliore
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 125, 126. Experimental characteristics of wing sections- high-lift devices, drag, and separation. To aircraft drag estimation. Lift and drag at high Mach number.

128. Aircraft Performance (3) II, Migliore
Lecture—3 hours. Prerequisite: course 127. Aircraft propulsion systems and their performance characteristics. Methods for computing and presenting aircraft performance data. Modern techniques of numerical analysis and engineering methods.

129. Aircraft Stability and Control (3) III, White
Lecture—3 hours. Prerequisite: Engineering 102B. Aircraft static stability and control. Derivation and linearization of equations of motion for aircraft. Longitudinal dynamic stability analysis including Laplace transform methods. Introduction to lateral-directional dynamic stability.

130. Aircraft Preliminary Design (4) III, Migliore
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 124, 125. Civil Engineering 135. Aircraft preliminary design practice including estimation of weight and volume, aerodynamics, performance, stability and control. Design specification and trade of studies. (P&N grading only.)

134. Vehicle Stability (4) III, Hubbard
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Introduction to the static and dynamic stability and performance characteristics of transportation vehicles and machines. Emphasis drawn from aircraft, high-performance automobiles and waterborne vehicles including hovercraft. Laboratory exercises illustrate responses to various inputs such as gusts, surface roughness, and control deflections.

150A. Mechanical Design and Manufacturing Processes (4) I, III. The Staff (Beadle in charge)
Lecture—3 hours; discussion—1 hour. Laboratory—3 hours. Prerequisite: Engineering 104B may be taken concurrently. The principles of mechanical engineering applied to the fundamentals of mechanical design, materials for static and fatigue failure of metals. Design projects emphasizing reduction of conceptual design to hardware. Manufacturing processes laboratory.

150B. Mechanical Design and Manufacturing Processes (3) I, II. The Staff (Beadle in charge)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 150A. Principles of engineering mechanics, failure theories and fatigue theory applied to the design and selection of mechanical components. Design projects which concentrate on conceptual design, mechanical engineering design, engineering drawing, methods of manufacture, material selection and cost.

151. Statistical Methods in Design (3) II, Hul
Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.

152. Mechanism Design (3) I, Yang
Lecture—3 hours. Prerequisite: Engineering 102A. Application of complex-number method to kinematic, static and dynamic analyses of plane mechanism and dynamic balancing of mechanisms. Design of epicyclic gear trains and intermittent mechanisms. Introduction to kinematic synthesis of mechanisms for function generation, curve tracing and body guidance.

155. Engineering Systems Design (3) III, Henderson
Lecture—2 hours; discussion—1 hour. The engineering design process and its use; design projects; engineering case studies.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102B and 105B. Development of the basic methods needed to describe the compressible gas flow occurring in rockets, engines and power generation systems. Theoretical and practical applications of the conservation of mass principle occurring in various energy conversion processes with emphasis on chemical equilibrium and flame temperature.
Engineering: Mechanical

165. Fundamentals of Heat Transfer (3) I, II. Baughn
Lecture—3 hours. Enrollment: Engineering 103B and 105B. Fundamentals of conduction, convection and radiation heat transfer; applications to engineering and design of thermal systems. Prerequisite: Mechanical Engineering 102B and 102D. Prerequisite: course 165. Application of thermodynamics, fluid flow and heat transfer to the design of thermal systems; heat exchanger characteristics and selection; design problems specified by instructor involving solar heating, cooling and power generation, steam power cycles, cogeneration of building heating or cooling.

171. Analysis, Simulation, and Design of Dynamic Systems (4) I, II. Hubbard, Margolis
Lecture—3 hours; discussion—1 hour. Pre-require: course 171. Phenomenological models for dynamic systems. Control system design using frequency domain methods. Stability of nonlinear control systems. Introduction to state space techniques.

176. Measurements Systems (3) II, III. The Staff (Beadle in charge)
Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Pre-require: Engineering 100 and 102A, Theory of measurement; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

192. Internship in Engineering (1-5) I, II. The Staff (Beadle in charge)
Work-experience program. Pre-require: upper division standing; approval of project prior to period of internship. Supervised work experience in engineering in industry. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Lecture—1 hour. Pre-require: consent of instructor. Group study of selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Beadle in charge)
Pre-require: consent of instructor. (P/NP grading only.)

Graduate Courses

205. Thermal Radiation (3) I I. Baughn
Lecture—3 hours. Pre- require course 165 or consent of instructor. Basic theory of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems.

206. Experimental Methods in Fluid Mechanics and Heat Transfer (2) I. Baughn
Lecture—2 hours; laboratory—3 hours. Pre-require: course 165 or equivalent. Uncertainty analysis; steady state and transient temperature measurement; steady-state flow and pressure measurements.

208. Measurements of Turbulent Flow Properties (2) II. Baughn
Lecture—1 hour; laboratory—3 hours. Pre-require: course 206A. 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. Kolmann
Lecture—4 hours. Pre-require: graduate student standing or consent of instructor. Study of the governing equations and their solution. Solution methods for incompressible flow; high and low Reynolds number laminar flow, and heat transport with combustion. Analysis Reynolds stresses.

210B. Advanced Fluid Mechanics and Heat Transfer (4) II. Kolmann
Lecture—4 hours. Pre-require: course 210A. Analytical and numerical analysis of the Navier-Stokes and energy equations for steady, two dimensional flows. Numerical techniques for steady and unsteady flow problems; turbulent boundary layer modeling; boundary layers and flow stability. Other selected topics.

211. Fluid Flow and Heat Transfer Design (4) III. Baughn
Lecture—1 hour. Pre-require: course 210A or consent of instructor. Design aspects of selected topics from heat conduction, thermal stresses, fins, heat transfer and fluid flow. Boundary layers and separated flow impingement and film cooling; heat exchangers; 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. Pre-require: course 165. Study of complex phenomena occurring in two-phase flow, thin film deposition, development of fundamental relations. Use of these relations with experimental data to develop semi-empirical working relationships; application to two-dimensional and three-dimensional transient and power-plant problems. Offered in odd-numbered years.

213. Advanced Turbulence Modeling (4) II. Kolmann
Lecture—4 hours. Pre-require: course 210G. Methods of analysis applied to complex, turbulent flows. Focus on applied aspects of turbulence in real systems. Prerequisite: course 102D and 102B, and prior knowledge of fluid mechanics.

214. Advanced Numerical Fluid Mechanics (3) III. Dwyer
Lecture—3 hours; discussion—1 hour. Pre-require: course 212A. Development and solution of basic and advanced finite difference schemes for the Navier-Stokes equations, laminar and turbulent boundary layer equations, and the potential flow equations. Analysis of the stability and convergence of the methods with practical examples. Offered in odd-numbered years.

215. Gas Dynamics (3) II. White
Lecture—3 hours. Pre-require: Engineering 102B, 105B. Derivation and analysis of the basic equations of motion of incompressible gases at steady speeds. Prandtl-Meyer flow and the method of characteristics; applications to steady transonic and hypersonic flow, shock theory. Offered in odd-numbered years.

216. Advanced Thermodynamics (4) II. Gledt
Lecture—3 hours; discussion—1 hour. Pre-require: Engineering 102B. Study of topics important to energy convertion processes and plants systems using high temperature gases. Classical thermodynamics and quantum statistical mechanics of nonreacting and chemically reacting gases in reacting and nonreacting processes.

217. Analysis of Reacting Flows (3) II. Dwyer
Lecture—3 hours. Pre-require: course 210A and 216. Derivation and analysis of basic equations for chemically reacting flows. 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) III. Hoffran
Lecture—3 hours; discussion—1 hour. Pre-require: graduate standing. Study of advanced power generation concepts, basic energy balances, component efficiencies and overall power plant efficiencies. Comparison of gas turbines, steam turbines and magnetohydrodynamic generators, as well as power plant concepts based on combustion nuclear fission and controlled thermonuclear fusion.

220A-220B. Mechanical Vibrations (3-3) II. III. Hubbard
Lecture—3 hours. Pre-require: Engineering 122A. Applications of vibrations to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

222. Advanced Dynamics (3) II. Hubbard
Lecture—3 hours. Pre-require: Engineering 122B. Dynamics of particles and rigid bodies with advanced engineering applications, generalized coordinates, Hamilton’s principles, Lagrange-Euler’s, and Hamilton-Jacobi theory.

224. Kinematic Design of Mechanisms (3) II. Yang
Lecture—3 hours. Pre-require: course 152 or consent of instructor. Introduction to Bemer’s theory of the rational design of link mechanisms. Geometric concept of two and three-dimensional rigid-body displacements, instantaneous invariants, higher order path curvature analysis, circle-and-center graph. Graphic and computer methods for kinematic design.

228. Acoustics and Noise Control (3) III. Margolis
Lecture—3 hours. Pre-require: Engineering 122B. Description of sound and its propagation; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; application of point design of mufflers, acoustic enclosures, room acoustics, design of quiet machinery.

Engineering Case Studies (2) I. Henderson
Discussion—2 hours. Studies of selected problems which illustrate various design process and management in advanced mechanical engineering systems.

255. Computer-Aided Mechanical Design (3) II. The Staff (Beadle in charge)
Lecture—2 hours; discussion—1 hour. Pre-require: course 125B. Use of computer-aided numerical methods in design optimization techniques in mechanical design analysis and synthesis. Interactive computer-aided design.

270. Modeling and Simulation of Engineering Systems (3) I, III. Margolis
Lecture—3 hours. Pre-require: course 172 or consent of instructor. Multiscale models of mechanical, electrical, hydraulic and thermal systems and spatial and boundary conditions and state space equations. Hamilton’s principles for complex systems; formulation for analog and digital simulation; identification; approximation, appropriate models of distributed systems.

271. Analysis and Control of Multivariable Systems (3) I, III. Margolis
Lecture—3 hours. Pre-require: course 270 or consent of instructor. Modern methods of state variable feedback applied to control system design, introduction to observers and equivalent dynamic feedback. Stress on practical application of theory to engineering systems in various energy domains.

272A. Mathematical Foundations of System and Control Theory (3) III. Brewer
Lecture—3 hours; computational laboratory—3 hours. Pre-require: course 172 and graduate standing. Equal emphasis on manipulative (algebraic) and conceptual (geometric) skills. The theory of polynomials and matrices. Introduction to linear vector spaces. State space. Integral transforms. Controllability and observability. Multivariable feedback control for pole placement. Direct digital control.

272B. Feedback Control and Estimation Theory (4) II. Brewer
Lecture—3 hours; laboratory—3 hours. Pre-require: courses 270 and 272A. Equal emphasis on digital and analog/multivariable control. The theories of observers and filters. Synthesis of feedback control. Feedback to reduce sensitivity to parameter variation. Finite setting time systems. Introduction to optimum control.

Lecture—3 hours; computational laboratory—3 hours. Pre-require: course 272B. Use of computers in the design of or in the synthesis of multivariable feedback systems. Optimization and optimum control. Frequency domain and graphical methods. Offered in odd-numbered years.

276. Data Acquisition and Analysis (3) II. Hull
Lecture—2 hours; discussion—1 hour. Pre-require: course 276. Principles of data acquisition with emphasis on digital techniques. Use of micro and minicomputers to control data acquisition process. Measurement of data analysis including probability distributions, correlations, regression, and Fourier analysis. Special attention to digital spectral analysis.

280. Advanced Engineering Analysis (3) I, II, III. blonde
Lecture—3 hours. Pre-require: Engineering 180 or the equivalent. Applications in mechanical engineering or advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

290. Seminar (3) I, II. The Staff (Beadle in charge)
Seminar—1 hour. (SU grading only.)

295. Design Seminar (3) I, II, III. The Staff
Seminar—1 hour. Pre-require: consent of instructor. Review and discussion of current and current mechanical engineering design literature and projects with presentations by students and faculty. (SU grading only.)

296. Fluid and Thermal Sciences (1) II, III. Dwyer
Seminar—1 hour. Pre-require: consent of instructor. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. (SU grading only.)

297. Dynamic Systems and Control Theory (1) I, II, III. The Staff (Margolis in charge)
Seminar—1 hour. Pre-require: consent of instructor. A review and discussion of the current literature and developments in system theory and automatic control with presentations by individual students. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Beadle in charge)

299. Research (1-12) I, II, III. The Staff (Beadle in charge)
(SU grading only.)

Courses in Materials Science and Engineering

(Undergraduate courses in Materials Science and Engineering are listed on page 191 under Engineering core courses as Engineering 130 through 147, inclusively.)
Graduate Courses

240. Transport Phenomena in Materials Processes (4) III. Shackelford Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering. Phenomenological and atomistic mechanisms in transport processes in condensed and disordered phases. Application to heat transfer, 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. Mukherjee Lecture—3 hours. Prerequisite: graduate standing in Engineering. Consideration of the principles of dislocation theory. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered in even-numbered years.

242. Advanced Mechanical Properties of Materials (3) III. Mukherjee Lecture—3 hours. Prerequisite: Engineering 138 or consent of instructor. Strength and structure of engineering materials. The dependence of their mechanical properties on time, stress and temperature. Generalized concepts of dislocation theory in plastic deformation, including fracture, and creep. Influence of microstructure in optimizing the mechanical strength properties. Offered in odd-numbered years.

243. Kinetics of Phase Transformation in Engineering Materials (3) III. Mukherjee, howitt Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; Engineering 130 recommended. The thermodynamic and kinetic theory of alloying, kinetics of phase changes, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in even-numbered years.

244. Interaction of Materials and their Environment (4) I. Munir Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 132 and graduate standing in Engineering or consent of instructor. Engineering 140 and 138 recommended. Nature of microstructure in engineering materials will be explored. Crystalline and non-crystalline structures will be studied with emphasis on grain boundary segregation in development of polycrystalline microstructure and the radial distribution function of amorphous materials. Offered in odd-numbered years.

244A. Fundamentals of Transmission Electron Microscopy (3) II. Howitt Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Principles and techniques of transmission electron microscopy used in study of materials will be described. Emphasis upon practical applications and a required laboratory section. Offered in odd-numbered years.

244B. Laboratory for Electron Microscopy (2) I. II. Howitt Laboratory—6 hours. Prerequisite: course 244A (may be taken concurrently), consent of instructor. Practical application of techniques of electron microscopy. Preparation and observation of crystalline specimens, photographic recording techniques, and instrument alignment. Offered in odd-numbered years.

247. Advanced Thermodynamics of Solids (3) I, III. Decker Lecture—3 hours. Prerequisite: Engineering 130 or equivalent. Thermodynamics of gas-solid reactions and solutions; criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EEM cells and application to solid-state electronics. Offered in odd-numbered years.


299. Research (1-12) I, II, III. The Staff (Beadle in charge) (SU grading only.)

NOTE: For key to footnote symbols, see page 128.

English

(College of Letters and Science)

Thomas A. Hanzo, Ph.D., Chairperson of the Department
Karl F. Zender, Ph.D., Vice-Chairperson of the Department
Department Office, 114 Sprout Hall

Faculty

- William E. Baker, Ph.D., Professor
  Max Byrd, Ph.D., Professor
  Everett Carter, Ph.D., Professor
  Peter D. Davis, Ph.D., Associate Professor
  Joanne Feit Diehl, Ph.D., Associate Professor
  Elliot L. Gilbert, Ph.D., Professor
  Sandra M. Gilbert, Ph.D., Professor
  Thomas A. Hanzo, Ph.D., Professor
  Wayne Harsh, Ph.D., Professor (English, Linguistics)
  John O. Haydog, Ph.D., Professor
  Peter L. Hays, Ph.D., Professor
  W. Jack Hicks, Ph.D., Associate Professor
  Michael J. Hoffman, Ph.D., Professor
  Robert H. Hopkins, Ph.D., Professor
  Richard A. Levin, Ph.D., Associate Professor
  Arthur E. McGuinness, Ph.D., Professor
  Linda A. Morris, Ph.D., Lecturer
  Jamee J. Murphy, Ph.D., Professor
  Diane Johnson Murray, Ph.D., Professor
  Gwendolyn B. Needham, Ph.D., Professor
  Emeritus
  Marjorie Osbom, Ph.D., Assistant Professor
  David A. Robertson, Ph.D., Associate Professor
  Winfried Schleifer, Ph.D., Associate Professor
  Gwendolyn Schwabe, M.A., Lecturer
  Karl J. Shapiro, Professor
  Daniel Silver, Ph.D., Associate Professor
  Raymond B. Waddington, Ph.D., Professor
  Bron Weber, Ph.D., Professor of American Literature
  Robert A. Wiggins, Ph.D., Professor
  Alan B. Williamson, Ph.D., Assistant Professor
  James L. Woodress, Ph.D., Professor
  Celeste T. Wright, Ph.D., Professor Emeritus
  Karl F. Zender, Ph.D., Associate Professor

The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect; thus it is a preparation for careers in writing, teaching, and editing, or for any role in which clear communication is important. The program offers its majors several options. A student majoring in English may elect the general study of English and/or American literature or may choose to emphasize (1) Linguistics, (2) Teaching, or (3) Writing.

Faculty-student interaction is encouraged by participation in the English Club, which meets once a quarter, often in a faculty home. Qualified creative writing students may gain valuable experience for academic credit by helping to edit the Department's nationally known California Quarterly.

A.B. Degree Requirements:

Preparatory Subject Matter

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One course from English 1, 2, 3

English 40

English 30A, 30B, 46A, 46B

Total Units (Teaching Emphasis) 64
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. A grade of C or better will satisfy the Subject A requirement.

R. Communications Skills Workshop (no credit) I, II, III. The Staff (Zender in charge)
Lecture—3 hours; discussion—3 hours; laboratory—3 hours. Workshops for students from non-standard-English backgrounds who do not qualify for English for Foreign Students. Course worth 6 units toward minimum subject requirement. ( Deferred grading only, pending passing of course.)

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, dictation, 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 inquiries 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. Introductory study of several genres of English literature, emphasizing both analysis of specific 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-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

5P. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

20. Intermediate Composition (4) I, II, III. The Staff (Zender in charge)
Lecture-discussion—4 hours. Prerequisite: one course from 1, 2, or 3. Emphasis on the grammatical pattern of standard English, sentence revision techniques, development of coherent paragraphs, and the formal properties of the expository essay.

25. English for Foreign Students (5) I, II, III. Schwabe Lecture—2 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.


28. Introduction to Library Research and Bibliography (3) I, II. Library staff (Zender in charge)
Lecture—1 hour, practice—6 hours. Methodology of research in academic libraries including indexes, catalogs and abstracts, bibliographies, specialized sources of information. Emphasis on preparation of detailed bibliographies and term paper research; offered in conjunction with the library.

30A. Survey of American Literature (4) I, 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, III. Diehl, 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, III. Robertson, Diehl 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, III. 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.

45A. Masterpieces of English Literature (4) I, II, III. Silvia, Osborn Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Selected works of principal writers to 1640. The history of literature from pagan and backgrounds in religious thought, intellectual and social history, and related art forms.

45B. Masterpieces of English Literature (4) I, II, III. Schaefer Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Selected works of principal writers from 1640 to 1800. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

46C. Masterpieces of English Literature (4) I, II, III. The Staff (Chairperson in charge)
Lecture-discussion—4 hours. Prerequisite: one course from courses 1, 2, 3. Selected works of principal writers from 1800 to present. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

92. Internship in English (1-12) I, II, III. The Staff (Chairperson in charge)
Fieldwork—3-36 hours. Prerequisite: one course from English 1, 2, 3. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: one course from courses 1, 2, 3. Directed group study of a special topic. Primarily for lower-division students. (P/N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/N grading only.)

Upper Division Courses

100F. Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F of 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.

100P. Creative Writing: Poetry (4) I, II, III. Shapiro Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F of 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

102. Adjunct Writing (2) I, II, III. Campus Writing Center Staff (Chairperson in charge)
Lecture-discussion—4 hours; individual conferences—1 hour. Prerequisite: course from courses 1, 2, 3. Course 20 recommended. Practice in the principles of technical and professional writing, with concentration on specialized materials. (P/N grading only.)

103A-G. Advanced Composition (4) I, II, III. The Staff (Chairperson in charge)
Lecture-discussion—4 hours; individual conferences—1 hour. Prerequisite: course from courses 1, 2, 3, 20 recommended. Practice in the principles of technical and professional writing, with concentration on specialized materials. (P/N grading only.)
260. Romantic Literature (4) II. Hayden Seminar—3 hours; conference—1 hour. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

262. Victorian Literature (4) I, II. Davis Seminar—3 hours; conference—1 hour. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

264. Twentieth-Century British Literature (4) Seminar—3 hours; conference—1 hour. Studies in Twentieth-Century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

266. Early American Literature (4) III. Woodress Seminar—3 hours; conference—1 hour. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

268. American Literature: 1800 to the Civil War (4) Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to the Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

270. American Literature: Civil War to 1914 (4) II. Carter Seminar—3 hours; conference—1 hour. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

272. American Literature after 1914 (4) II. Carter Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

284. Studies in Modern British and American Literature (4) III. Seminar—3 hours; conference—1 hour. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

290. Seminar in Creative Writing of Poetry (4) II, III, III. The Staff (Shapiro in charge) Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poems. Evaluation of written materials and student individual conferences.

290R. Seminar in Creative Writing of Poetry (4) II, III, III. The Staff (Shapiro in charge) Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written materials and individual student conferences. May be repeated for credit.

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

2910. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Courses

300. Problems in Teaching English Language, Literature, and Composition in Secondary Schools (3) III. Harsh Lecture-discussion—2 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. Course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

302. Materials of Teaching English as a Second Language (ESL) (4) II. Schwartz Lecture—3 hours; practice teaching—3 hours. Prerequisite: Linguistics 300. Design and development of classroom curriculum and materials in teaching ESL materials combined with learning strategies in the ESL. Planned practice in teaching English pronunciation, grammar and sentence structure, listening comprehension and composition, discussion, and reading to foreign students.

303. Recent Research and Problems in ESL (4) III. Schwartz Lecture—1 hour; practice teaching—2, 4, or 6 hours. Prerequisite: course 302. Analysis of a particular problem in teaching English as a second language (ESL) and testing possible solutions. Course work will include a review of literature in the area as well as presentation of a paper addressing problems/solution.

306. Teaching English at the College Level (4) I, Morris Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Consideration of the problems and techniques of teaching composition and literature at the college level. (SU grading only.)

322. Teaching Internship in English (2) I, II, III. The Staff (Coordinator of Writing Programs in charge) Supervised internships—4 hours. Prerequisite: graduate standing. In-class internship with English Department faculty member. (SU grading only.)

401. Editing "California Quarterly" (2) II, III, E. Gilbert Seminar—3 hours; conference—1 hour. Prerequisite: participation in Creative Writing Program. Students will read all manuscripts submitted to "California Quarterly" and attend all editorial board meetings, choosing manuscripts for publication. They will also participate in copy-editing, copy-reading, layout, and other aspects of journal production. May be repeated for a total of 6 units. (SU grading only.)

Entomology

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Robert K. Washino, Ph.D., Chairperson of the Department

Department Office, 367 Briggs Hall (752-0475)

Faculty

Oscar G. Bacon, Ph.D., Professor
Richard M. Bohart, Ph.D., Professor Emeritus
James R. Carey, Ph.D., Assistant Professor
Sean S. Duffey, Ph.D., Associate Professor
Lester E. Ehler, Ph.D., Associate Professor
Norman E. Gary, Ph.D., Professor
Jeffrey Grantt, Ph.D., Associate Professor
Albert A. Grigorak, Ph.D., Professor
Bruce D. Hamrick, Ph.D., Associate Professor
(Entomology, Environmental Toxicology)
Charles L. Judson, Ph.D., Professor

Richard Karban, Ph.D., Assistant Professor
Harry K. Kaye, Ph.D., Associate Professor
Harri H. Lekanoff, Jr., Ph.D., Professor Emeritus
W. Harry Lange, Jr., Ph.D., Professor Emeritus
Thomas F. Leigh, Ph.D., Lecturer
Benjamin F. Lownsbury, Ph.D., Professor (Entomology, Agricultural Sciences)
Armand R. Maggitti, Ph.D., Lecturer

G. A. H. McClelland, Ph.D., Professor
Donald C. McLean, Ph.D., Professor Emeritus
Christine Y. S. Peng, Ph.D., Associate Professor
Timothy Prout, Ph.D., Professor (Entomology, Genetics)

Donald J. Rickard, Ph.D., Professor (Nematology)
Richard E. Rice, Ph.D., Lecturer
Francis M. Summers, Ph.D., Professor Emeritus
Robbin W. Thorp, Ph.D., Professor
David R. Vignieri, Ph.D., Lecturer
(Entomology, Environmental Toxicology)

Philip S. Ward, Ph.D., Assistant Professor
Robert K. Washino, Ph.D., Professor
Lloyd T. Wilson, Ph.D., Assistant 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: bioterrorism, 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 matriculate in graduate programs leading to a higher degree in the major.

Entomology

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 .................................................. 83-84
Biology (BIOLOGICAL SCIENCES) ........................................ 5
Botany (BOTANY) .......................................................... 5
Ecology (ECOLOGY) ........................................................ 6
Entomology (ENTOMOLOGY) ............................................... 5
Genetics (GENETICS) ...................................................... 4
Plant or animal pathology, or plant or animal physiology .................. 4

Entomological chemistry (PHYSIOLOGICAL SCIENCES)............... 7
Chemistry (CHEMISTRY) .................................................. 16
Mathematics (MATHEMATICS) .......................................... 3
Statistics ................................................................. 3
Computer science ....................................................... 3
Physics (PHYSICS) .......................................................... 9
Environmental Toxicology (ENVIRONMENTAL TOXICOLOGY) .......... 9
Upper division electives in biological science (exclusive of entomology) including one course in evolution (Genetics 103 or Zoology 148) ................. 12

Depth Subject Matter .................................................... 28

Entomology 101, 101A, 101B, 103, 104, and 109, or 109 and another upper division course in entomology which requires a collection of insects .............................. 28

NOTE: For key to footnote symbols, see page 129.
Entomology

Breadth Subject Matter 39-41
English 4
Rhetoric 4
Economics 5
Philosophy 4
At least one course from the following categories 7-9
(a) Anthropology, biology, psychology, or sociology 3-5
(b) Art or music 4
Electives in sciences and humanities 10-12
At least one course chosen from agrarian studies, geography, or geology 3-5
Unrestricted Electives 27-30
Total Units for the Major 180

Major 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.

Courses in Entomology

Lower Division Courses
10. Natural History of Insects (3) I, II. Bacon Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 100 but students who have taken the course may take course 100 for credit. An introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man.

96. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PRN grading only)

Upper Division Courses
100. General Entomology (3) I, II. Thorp Lecture—3 hours; laboratory—4 hours; optional Saturday field trips to be arranged. Prerequisite: Biological Sciences 101 or 103; 105, 106, 123, 125. At least two additional upper division Entomology courses (except courses 192, 198, 199) 6


101A, 101B, Insect Structure and Function (4-4) A, B; Ill. Judson, Part II Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in zoology or entomology. The principles of animal taxonomy; specialization; introduction to classification and nomenclature.

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. Community structure and dynamics.

155. Insect Classification (3) II, III. Thorp, Grigarick, Ward Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Principles and methods of classification of insects to the family level for identification.

106. Field Entomology (4) 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. Granett Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or 112, Chemistry 6A, 6B. Biocides or Animal Physiology recommended. Study of chemicals used to control insects and mites with respect to mode of action, chemistry, metabolism and applied uses, particularly within an integrated control framework. Chemical-insect and chemical environment interactions. Practical aspects of chemical use.

109. Field Taxonomy and Ecology (7) Extra-semester Wolf. Lecture—2 hours; laboratory—36 hours; five-week course. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats, their identification and ecology. Offered in even-numbered years.

110. Economic Entomology (4) I. Grigarick Lecture—2 hours; laboratory—6 hours. 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, stored, and ornamental pest problems.

112. Agricultural Pest Management (4) II. Wilson Lecture—3 hours; laboratory—upper division standing in one of the biological sciences or consent of instructor. An introduction to the principles of pest management as they apply to agricultural crops with emphasis on the integration of all available control measures in the development of crop protection strategies.

116. Biology of Aquatic Insects (3-5) III. Grigarick Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 106 or consent of instructor. A study of the life history, ecology, and identification of insects associated with wet streams, ponds, and lakes.

118. Crop Resistance to Arthropods (3) III. Leigh Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110 or the equivalent; upper division standing; agricultural entomology, genetics, and plant science courses recommended. An introduction to host plant resistance as a durable and efficient technique applicable to pest management procedures and practices. Designed for students in agricultural entomology and crop production. Offered in odd-numbered years.

119. Agriculture (3) II. Gary Lecture—3 hours. Biology and behavior of honeybees: communication, organization, social organization, foraging activities, honey production, pollination activities.

119L. Agriculture Laboratory (3) II. Gary Discussion—1 hour; laboratory—6 hours; field trips taken primarily during laboratory time. Prerequisite: course 119 or consent of instructor. Biology and behavior of honeybees; management of cultures on the management of cultures for agricultural, recreational, teaching, and research purposes. Field trips to industrial areas.

120. Insect Host-Plant Interactions (4) II. Duffey Lecture—3 hours; discussion—1 hour. Prerequisite: course 101A-101B; Biochemistry 101A-101B or the equivalent; general introductory course in botany and/or plant physiology will be helpful. Morphological, physiological, and biochemical basis of host-plant selection by insects; considerations of host-plant resistance to insects. Emphasis on comparative defense and biochemical interaction between various organisms particularly plants and insects.

121. Insect Behavior (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. Mechanics 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. Lecture—2 hours; laboratory—8 hours. Prerequisite: introductory 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.

155. 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 vector insects and the plant pathogens they transmit. Emphasis is placed on the insect vector interactions with plant disease development and mycotoxins. Offered in odd-numbered years.

130. Biological Control (4) I, II. Ehlir Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Theory and practice of biological control of arthropod pests; biology of entomophagous arthropods, role of insects in weed control, microbial control of insects and mites.

140. Insect Pathology (4) III. Kaye Lecture—3 hours; laboratory—3 hours. Prerequisite: introductory course in entomology and at least one course in a microbiology course. Principles of insect pathology; insect microbiology; noninfectious and infectious diseases of insects; diagnosis, epidemiology, therapy, and microbial control.

153. Medical Entomology (4) I. McClelland Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The world of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the role of arthropod-borne human diseases and principles of their control.

155. Management of Medically Important Arthropods (3) I, II. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 153 or consent of instructor. Lectures and laboratory sessions to consider the management of medically important arthropods in vector control practices within the framework of a human—domestic animal disease management program.
Environmental Planning and Management

Upper Division Courses

105. Taxonomy and Ecology of Environmental Plants (3) I, Leiser
   Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 6 or one course in taxonomy. Taxonomy of the important plants found in the western landscapes. Emphasis will be placed on the identification, nomenclature, characteristics, and uses of woody plants in man's environment.

127. Herbaceous Environmental Plants (3) III, Madison
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 105. An introduction to nomenclature, identification, ecology, and use of herbaceous environmental plants, with emphasis on forrictural and foliage plants, garden annuals, and perennials.

115. Advanced Taxonomy and Ecology of Environmental Plants (4) III, Leiser
   Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 105. Advanced course in nomenclature, identification, nomenclature and classification of plants for man's environment are studied in relation to extensive variations 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) I, Paul
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 100. Appropriate use of sand, mineral soil and amendments to formulate container soils. Management of crops grown in soils emphasizing irrigation, salinity control and fertilizer practices.

125. Flower Crop Production and Marketing (4) II, Kobrin
   Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Plant Science 2. The technology of flower and marketing flower crops, particularly greenhouse crops, as an application of principles. Major flower crops are considered in detail.

128. Nursery Management (2) II, Leiser
   Lecture—2 hours; one day field trip. Prerequisite: Plant Science 106, senior standing in plant science. The management of woody ornamental crops in relation to propagation, other cultural practices and marketing. Emphasis on planting and scheduling nursery production. One Saturday field trip required.

130A. General Turf Culture (2) III, Wu
   Lecture—2 hours and laboratory—3 hours (first two-thirds of the quarter). Prerequisite: Plant Science 2. The technology of turf and marketing lower water crops, particularly turf grasses, as an application of principles. Major turf grasses are considered in detail.

130B. Fine Sporting turf (2) III, Madison
   Lecture—2 hours; one day field trip. Prerequisite: course 130A. Laboratory—3 hours; discussion-testing—4 hours. Prerequisite: Plant Science 2 or Botany 2. Principles and practices of turf care and maintaining low water use grass areas for golf, bowling, lawn tennis, football, etc.

133. Arboriculture (4) II, Harris
   Laboratory—3 hours; discussion-testing—4 hours. Prerequisite: Plant Science 2 or Botany 2. Principles and practices of trees and shrubs and vines in urban and natural landscapes. Course given in Personalized System of Instruction format. Students should enroll when juniors if they wish to assist with the course next year.

155. Plant Selection for Environmental Design (3) II, Dawson
   Lecture—2 hours; laboratory—3 hours. Prerequisite: course 6 and Landscape Architecture 40. Ability, characteristics, and limitations of landscape plants and plantings to modify the environment, control traffic, reduce erosion, create amenity, etc., with emphasis on specific species.

156. Landscape Planting Design (4) III, Leiser
   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.

170. Reproductive Biology of Flowering Plants (3) I, Wu
   Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 100 or 120 or the equivalent. Course emphasizes the genetic and physiological basis of reproduction in flowering plants. Effect of these mechanisms on plant evolution, adaptation, and agricultural practices will be discussed.

175. Biomeas Feedstocks for Fuels (2) I, Sachs
   Lecture—2 hours; field trips. Prerequisite: Plant Science 101 or Agronomy 100 or Botany 111A. Senior or graduate status and consent of instructor. Detailed discussion of the biological and agricultural significance of plants in the development of agricultural and bioenergy resources for fuel production.

192. Internship (1-12) II, III. The Staff (Department Chair
   Lecture—3.66 hours. Prerequisite: completion of 84 units, two upper-division courses in Environmental Horticulture appropriate for the internship and consent of instructor. Work-learning 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. (PrNp grading only.)

197T. Tutoring in Environmental Horticulture (1-4), II, III.
   The Staff (Harris in charge)
   Hours vary with the number of students depending on course tutor.
   Prerequisite: upper division standing, completed course or the equivalent being tutored, consent of instructor. Leading discussion sections, conducting laboratory exercises or proctoring in personalized-system-of-instruction-format classes under faculty guidance. Weekly conferences on subject matter and instructional techniques. May be repeated once for credit if different course is tutored.

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson
   Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. Selected problems in floriculture, nursery management, and landscape horticulture. (PrNp grading only.)

Graduate Courses

241. Analysis of Horticultural Problems (3) III, Paul
   Lecture—1 hour; laboratory—6 hours. Prerequisite: a B.S. degree (or the equivalent) in Plant Science or consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, insects, pathogens, climatic agents, climatic conditions and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods 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) I, II, III. The Staff (Chairperson in charge)
   Seminar—1 hour. Selected topics in floriculture, nursery management, and environmental horticulture.

290C. Research Group Conference (1) I, II, III. The Staff (Wu in charge)
   Discussion—1 hour. Prerequisite: students in a plant science graduate program. Research conference conducted by Departmental faculty to discuss design, philosophy and interpretation of ongoing specific research areas which includes floriculture, greenhouse, landscape, landscape plant ecology, arboriculture, turf culture, post harvest, and plant breeding related to environmental horticulture. (Su grading only.)

295. Group Study (1-5) I, II, III. The Staff (Sachs in charge)
   Group study on advanced topics in floriculture, nursery management, and environmental horticulture.

299. Research (1-12) II, III. The Staff (Sachs in charge)
   Prerequisite: graduate standing. Research in floriculture, nursery management, and environmental horticulture. (Su grading only.)

Environmental Planning and Management

(College of Agricultural and Environmental Sciences)

Program Office, Temporary Building 105
(752-8326)

Environmental Planning and Management

Faculty
See under the Department of Environmental Horticulture.

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 and private parks, recreation, and open spaces. Graduates in the Park Administration and Interpretation option can expect career opportunities such as: directors of park systems, park rangers, park and resort managers, museum directors, park naturalists, outdoor education specialists, recreation supervisors and planners, and environmental planners and consultants with government agencies and private industries.

The Environmental Planning and Management advises recommend career experience through work-learn 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 courses taken to satisfy the requirements are shown in parentheses. Equivalent or more advanced courses may be taken with the adviser's approval. Courses shown without parentheses are required.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS 101 Chemistry (Chemistry 1A or 10)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 102 Physics (Physics 1A, 2A or 10)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 201 Earth sciences (Geology 1, Geology 1, Soil Science 100)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 202 Biology (Biological Science 1 or 10)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 303 Mathematics (Mathematics 16A, 16B, 19, 26A, 36, Statistics 13, or Agricultural Science and Management 150)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 304 Environmental issues (Environmental Studies 10, Environmental Science 10 or Resource Sciences 100)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 305 Landscape architecture, 40, 111</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 306 Economics (Economics 1A or 10)</td>
<td>6.00</td>
</tr>
<tr>
<td>ENVS 307 Other social sciences, introductory courses in at least two of the following subject areas: cultural anthropology (Anthropology 2), human geography (Geography 2, 5), psychology (Psychology 1, 16), sociology (Sociology 1)</td>
<td>1.00</td>
</tr>
<tr>
<td>ENVS 308 Expository writing (English 1)</td>
<td>1.00</td>
</tr>
<tr>
<td>ENVS 309 Public speaking (Rhetoric 1 or 3)</td>
<td>1.00</td>
</tr>
<tr>
<td>ENVS 310 Humanities elective</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Also see the majors in Environmental Policy Analysis and Planning and Landscape Architecture. Both majors were formerly options of the Environmental Planning and Management major.

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 advisering. Additional coursework in any major subject to be used as individual requirements must be approved by an adviser.
Environmental Policy Analysis and Planning

**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, involving both the evaluation of policy alternatives and an understanding of the factors affecting policy formulation and implementation by government 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) preprofessionals who will go on to graduate work in law, planning, public 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 basic substantive knowledge and analytical skills necessary for a quality program in environmental policy analysis and planning. Although certain courses are stipulated for all students involved in the program, the emphasis is on required units within categories of courses. This recognizes the wide variety of students' interests and the changing content and quality of specific courses from year to year. It is very important, however, that students develop a close relationship with their own advisors in order that the preparatory and depth courses selected be appropriate to each student's interests and desired area of specialization.

### Graduate Courses

**222. Recreation Policy**

Lecture—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of the development and application of public policy of recreation resource allocation, development and management. Offered in even-numbered years.

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Department</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>224</td>
<td>Recreation Planning</td>
<td>Environmental Planning</td>
<td>3</td>
</tr>
<tr>
<td>226</td>
<td>Recreation Policy</td>
<td>Environmental Planning</td>
<td>3</td>
</tr>
<tr>
<td>227</td>
<td>Environmental Policy Analysis and Planning</td>
<td>College of Agricultural and Environmental Sciences</td>
<td>3-18 hours (SU grade only)</td>
</tr>
</tbody>
</table>

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**Environmental Policy Analysis and Planning**

(College of Agricultural and Environmental Sciences)

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**Notes:**

- Minimum units are indicated. If more units are taken in order to meet this unit requirement, the extra units may be counted as electives if approved by an advisor. Additional courses in the same subject to be used as individual requirements must be approved by an advisor.
- Courses are selected to complement each student's program in this major. The list of courses to be selected as individual requirements must have the advisor's approval no later than Winter quarter of the junior year.

**Major Adviser:** S.M. Gold (Environmental Horticulture)

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**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, Terenon Buildings 103 and 105.

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Department</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>Directed Group Study</td>
<td>Environmental Planning and Management</td>
<td>3-5</td>
</tr>
<tr>
<td>99</td>
<td>Special Study</td>
<td>Environmental Planning and Management</td>
<td>1-5</td>
</tr>
<tr>
<td>110</td>
<td>Urban and Regional Planning</td>
<td>Environmental Planning and Management</td>
<td>3-6</td>
</tr>
<tr>
<td>111</td>
<td>Park Administration</td>
<td>Environmental Planning and Management</td>
<td>3-5</td>
</tr>
<tr>
<td>112</td>
<td>Environmental Recreation</td>
<td>Environmental Planning and Management</td>
<td>3-5</td>
</tr>
</tbody>
</table>

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**Upper Division Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Department</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>Directed Group Study</td>
<td>Environmental Planning and Management</td>
<td>5-12</td>
</tr>
</tbody>
</table>

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**Graduate Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Department</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>222</td>
<td>Recreation Policy</td>
<td>Environmental Planning</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Course Details:**

- Minimum units are indicated. If more units are taken in order to meet this unit requirement, the extra units may be counted as electives if approved by an advisor. Additional courses in the same subject to be used as individual requirements must be approved by an advisor.
- Courses are selected to complement each student's program in this major. The list of courses to be selected as individual requirements must have the advisor's approval no later than Winter quarter of the junior year.

**Note:** For key to footnote symbols, see page 128.
Environmental Studies

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.)

**Preparatory Subject Matter:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (Mathematics 16A, 21A)</td>
<td>3-4</td>
</tr>
<tr>
<td>Statistics (Statistics 13, 13)</td>
<td>3-4</td>
</tr>
<tr>
<td>Physics (Physics 1A, 2A, 10)</td>
<td>3-4</td>
</tr>
<tr>
<td>Chemistry (Chemistry 1A, 1B)</td>
<td>10</td>
</tr>
<tr>
<td>Biology (Biology 1, 3)</td>
<td>5</td>
</tr>
</tbody>
</table>

**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) | 3-5 |

**American politics (Political Science 1, 5) | 4 |
**Micro- and macro-economics (Economics 1A, 1B) | 4 |
**Introduction to environmental analysis (Environmental Studies 1) | 4 |

**Breadth Subject Matter:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Communication skills (see College requirement)</td>
<td>4</td>
</tr>
<tr>
<td>Human and cultural ecology (Environmental Studies 101 or 141)</td>
<td>4</td>
</tr>
<tr>
<td>Psychology (Psychology 1, 16, 144, 145)</td>
<td>3-4</td>
</tr>
</tbody>
</table>

**Social sciences and humanities electives | 8 |

**Depth Subject Matter:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td>47-48</td>
</tr>
<tr>
<td>Policy analysis (Environmental Studies 160)</td>
<td>4</td>
</tr>
<tr>
<td>Law (Environmental Studies 161 or 173)</td>
<td>4</td>
</tr>
<tr>
<td>Bureaucratic policymaking (Environmental Studies 168)</td>
<td>4</td>
</tr>
<tr>
<td>Policy analysis (Environmental Studies 198A)</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>
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**Research Methods**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethics and normative reasoning (Philosophy 114A, 117)</td>
<td>4</td>
</tr>
<tr>
<td>Research design (Environmental Studies 178; Sociology 103; Environmental Planning and Management 129)</td>
<td>4-5</td>
</tr>
<tr>
<td>Statistics (Sociology 108; Political Science 114; Agricultural Economics 106)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Economic Analysis**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microeconomics (Economics 100)</td>
<td>5</td>
</tr>
<tr>
<td>Urban and regional economics (Economics 125A, 125B or 131)</td>
<td>4</td>
</tr>
<tr>
<td>Resource economics (Agricultural Economics 176)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Areas of Specialization**

<table>
<thead>
<tr>
<th>Area</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture (Art 168, 184, 186)</td>
<td>3-5</td>
</tr>
<tr>
<td>Urban geography (Geography 150, 156)</td>
<td>4</td>
</tr>
<tr>
<td>Transportation and environmental planning (Civil Engineering 152, 160)</td>
<td>3</td>
</tr>
<tr>
<td>Landscape analysis for planning (Environmental Planning and Management 182A)</td>
<td>4</td>
</tr>
<tr>
<td>Aerial photography and cartography (Geography 105, 108)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Water Quality Planning Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental health (Environmental Studies 126)</td>
<td>4</td>
</tr>
<tr>
<td>Soil pollution (Water Science 41, 103, 180)</td>
<td>3-4</td>
</tr>
<tr>
<td>Hydrology (Water Science 141)</td>
<td>3</td>
</tr>
<tr>
<td>Water law (Water Science 150)</td>
<td>3</td>
</tr>
<tr>
<td>Wastewater treatment (Civil Engineering 148A)</td>
<td>3</td>
</tr>
<tr>
<td>Project evaluation (Agricultural Economics 148)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Air Pollution Control Policy Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental health (Environmental Studies 126)</td>
<td>4</td>
</tr>
<tr>
<td>Aerosol toxicology (Environmental Toxicology 121)</td>
<td>3</td>
</tr>
<tr>
<td>Pollution control (Civil Engineering 149A)</td>
<td>3</td>
</tr>
<tr>
<td>Meteorology (Atmospheric Science 131)</td>
<td>3</td>
</tr>
<tr>
<td>Fluid mechanics (Engineering 135A)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Energy Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental energy (Environmental Studies 126; Environmental Toxicology 131)</td>
<td>3-4</td>
</tr>
<tr>
<td>Nuclear hazards (Environmental Studies 115)</td>
<td>3</td>
</tr>
<tr>
<td>Energy policy (Environmental Studies 167)</td>
<td>4</td>
</tr>
<tr>
<td>Economics of energy (Environmental Studies 169)</td>
<td>3</td>
</tr>
<tr>
<td>Energy technology (Engineering 160, 180)</td>
<td>4</td>
</tr>
<tr>
<td>Solar energy (Resource Sciences 103)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Environmental Science Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental health (Environmental Studies 126; Environmental Toxicology 101)</td>
<td>3-4</td>
</tr>
<tr>
<td>Soil and land use (Soil Science 110; Geology 134)</td>
<td>3-4</td>
</tr>
<tr>
<td>Aquatic systems (Environmental Studies 110, 121; Water Science 41, 103, 141, 150)</td>
<td>3-4</td>
</tr>
<tr>
<td>Meteorology and air pollution (Atmospheric Science 131 or Civil Engineering 149A)</td>
<td>3</td>
</tr>
<tr>
<td>Science policy (Environmental Studies 163)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Advanced Policy Analysis Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political institutions (Political Science 102, 105, 108, 150)</td>
<td>4</td>
</tr>
<tr>
<td>Political behavior (Political Science 164, 165, 170)</td>
<td>4</td>
</tr>
<tr>
<td>Science policy (Environmental Studies 165)</td>
<td>4</td>
</tr>
<tr>
<td>Policy evaluation research (Environmental Studies 168)</td>
<td>4</td>
</tr>
<tr>
<td>Policy evaluation (115, 160; Agricultural Economics 148, Economics 130)</td>
<td>3-4</td>
</tr>
</tbody>
</table>

**Unrestricted Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be urged to take courses, when appropriate to their educational needs. Also, computing (Engineering 5; Mathematics 19, 29) will be recommended.</td>
<td>36-49</td>
</tr>
</tbody>
</table>

Total Units for the Major: 180

**Major Advisor:** R. A. Johnston. (Environmental Studies)

**Minor Programs:** See page 213 under Division of Environmental Studies for minor programs offered in this field.

**Faculty**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francisco J. Ayala, Ph.D.</td>
<td>Professor (Genetics)</td>
</tr>
<tr>
<td>Richard Cowen, Ph.D.</td>
<td>Professor (Geology)</td>
</tr>
<tr>
<td>Paul G. Craig, Ph.D.</td>
<td>Professor (Engineering, Applied Sciences)</td>
</tr>
<tr>
<td>James C. Cramer, Ph.D.</td>
<td>Associate Professor (Sociology)</td>
</tr>
<tr>
<td>William G. Davis, Ph.D.</td>
<td>Associate Professor (Anthropology)</td>
</tr>
<tr>
<td>Theodor C. Folin, Ph.D.</td>
<td>Associate Professor (Botany)</td>
</tr>
<tr>
<td>Charles H. Goldberg, Ph.D.</td>
<td>Professor (Radiological Sciences)</td>
</tr>
<tr>
<td>Marvin Goldman, Ph.D.</td>
<td>Professor (Environmental Horticulture)</td>
</tr>
<tr>
<td>William J. Hamilton III, Ph.D.</td>
<td>Professor (Political Science)</td>
</tr>
<tr>
<td>James A. Harding, Ph.D.</td>
<td>Professor (Environmental Biology)</td>
</tr>
<tr>
<td>Robert A. Johnston, M.S.</td>
<td>Associate Professor (Sociology)</td>
</tr>
<tr>
<td>Jere H. Lipsa, Ph.D.</td>
<td>Professor (Geology)</td>
</tr>
<tr>
<td>Benjamin S. Orlove, Ph.D.</td>
<td>Associate Professor (Geography)</td>
</tr>
<tr>
<td>Thomas M. Powell, Ph.D.</td>
<td>Associate Professor (Environmental Studies)</td>
</tr>
<tr>
<td>James F. Quinn, Ph.D.</td>
<td>Assistant Professor (Environmental Studies, Zoology)</td>
</tr>
<tr>
<td>Peter J. Richerson, Ph.D.</td>
<td>Professor (Sociology)</td>
</tr>
<tr>
<td>Paul A. Sabatier, Ph.D.</td>
<td>Professor (Environmental Studies)</td>
</tr>
<tr>
<td>Thomas W. Schoene, Ph.D.</td>
<td>Professor (Environmental Studies, Zoology)</td>
</tr>
<tr>
<td>Seymour I. Schwartz, Ph.D.</td>
<td>Professor (Environmental Studies, Civil Engineering)</td>
</tr>
<tr>
<td>Harry O. Walker, Ed.D.</td>
<td>Senior Lecturer (Land, Air and Water Resources)</td>
</tr>
<tr>
<td>Geoffrey A. Wandesforde-Smith, Ph.D.</td>
<td>Associate Professor (Environmental Studies, Agricultural Economics)</td>
</tr>
</tbody>
</table>

**The Program of Study**

The intercollegiate 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 236).

**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 electives in Environmental Studies. To aid students in identifying coherent groups of courses that build theory and research skills and complement their disciplinary majors, the Division suggests elective programs appropriate for natural scientists, social scientists, and environmental professionals. These programs are listed below. These example programs are merely indicative, in order to increase the attractiveness of your program and to get the most out of your elective units, you should consult with appropriate Environmental Studies faculty before taking courses.

Environmental Studies

(Intercollege Division)

Geoffrey A. Wandesforde-Smith, Ph.D., Acting Chairperson of the Division and Associate Dean of Environmental Studies

Division Office, 2132 Wickson Hall (752-3026)
Ecological Analysis
This study program is intended for natural science students desiring a focus in ecology and its application in environmental analysis. These courses develop theoretical and analytical skills, including laboratory or field work.

Environmental Studies 100 (general ecology)
Environmental Studies 121 (ecology/ecosystem)
Environmental Studies 122 (analysis of ecological communities)
Zoology 149 (evolution of ecological systems)
Environmental Studies 123 (introduction to field and laboratory methods in ecology), 161L (limnology laboratory), or Zoology 228 (experimental animal ecology).

Subspecializations are as follows:
(a) Behavioral Biology
   Environmental Studies 125 (social systems of animals and humans), Psychology 150 (comparative psychology), Anthropology 154A-154B (ecology and sociobiology of primates).
(b) Paleozoology
   Environmental Studies 151 (limnology), Environmental Studies/Geology 116 (oceans), 150A (physical and chemical oceanography), 150B (geological oceanography), 150C (biological oceanography), Water Science 41 (ecology of polluted waters).
(c) Zoology of Taxa
   Botany 117 (plant ecology), Zoology 125 (animal ecology)
(d) Simulation and Modelling
   Environmental Studies 128 (analysis and simulation of complex systems), Wildlife and Fisheries Biology 122 (principles of exploited animal populations).

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 168A and Agricultural Economics 176.

Environmental Studies 160 (environmental decision making), Political Science 107 (environmental politics and administration), 108 (politics 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 public policy).

Environmental Studies 161 (environmental law), 173 (public mechanisms for controlling and use), or Water Science 150 (water law and water institutions).

Environmental Studies 171 (environmental planning), 175 (environmental impact reporting), or Environmental Studies 170 (principles of environmental science).

Agricultural Economics 147 (natural resource economics), or 176 (economic analysis in resource use).

Environmental Studies 168A (methods of environmental policy analysis) 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 is for 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, overseeing environmental management, and graduate work in human ecology, anthropology, importance, or sociology will find this program useful. Several disciplines are synthesized here.

Environmental Studies 100 (general ecology) or Zoology 125 (animal ecology).

Environmental Studies 100 (general ecology) or Anthropology 100 (principles of human ecology).

Environmental Studies 100 (general ecology) or Anthropology 141 (cultural ecology) or Environmental Studies 141 (ecological and cultural methods in cultural ecology).

Economics 100 (introduction to microeconomics) or Environmental Studies 122 (economic anthropology).

Environmental Studies/Community Health 128 (introduction to environmental health).

Environmental Studies 125 (social systems of animals and humans) or Anthropology 154A (ecology and sociobiology of primates).

Environmental Studies 178 (applied social research methods).

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, importation, and energy policy analysis and 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.

Environmental Policy Analysis
Preparation: Economics 1A; basic course in political science.

Environmental Studies 20 or Engineering 160 3-4

Environmental Studies 128 or Environmental Science 110 3-4

Resource Conservation 103 or Environmental Science 115 3-4

Environmental Studies 167 or Political Science 171 3-4

Environmental Policy Analysis 23-24

Preparation: Economics 1A; basic course in political science.

Environmental Studies 110, 160, 161, 186, 188A 3-4

Environmental Studies 171 or 179 3-4


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) H. Pollock, Schwartz; Lecture—3 hours; discussion—1 hour. Prerequisite: sophomores; standing identified courses in biology, chemistry, economics, and political science recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems for human populations, 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 0-15 credits may receive only 3 units of credit for course 1.

10. Introduction to Environmental Studies (4) I, III. The Staff; Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man-environment relations. This course is for students, 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 (4) I. Walker; Lecture—3 hours. A comparison of alternative conversion principles for nuclear, geothermal, hydro, fossil fuels, and solar generating units. Discussion of energy reserves, potential resources, environmental consequences of use, sitting, demand forecasts, transmission, energy-social-GNP relationships. (Upper division students should refer to Engineering 160.)

20. Energy: Options and Issues Laboratory (2) I. Walker; Discussion—1 hour; laboratory—3 hours. Prerequisite: course 20 (may be taken concurrently). On-site study programs and representational types of energy conversion units, including hydroelectric, geothermal, fossil fuel, and nuclear facilities. Saturday trips primarily.

25. Environmental Policy (3) III. Vilen; 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) III. Richerson; Lecture—3 hours. Prerequisite: Biological Sciences 1 or Geology 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 links and opportunities for human use of different natural environments, as well as more general relations of human utilization for the earth's biotic resources.

39. Animal Societies (4) III. Hamilton; Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 or Geology 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 links and opportunities for human use of different natural environments, as well as more general relations of human utilization for the earth's biotic resources.

98. Directed Group Study

100. General Ecology (4) I, Quinn; Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus. Ecological principles of biological systems, emphasizing populations and ecosystems. Principles of growth, regulation, distribution, structure, energetics, and mineral cycles related to the evolution of biological systems and applications to selected human ecological problems.

101. Principles of Human Ecology (4) I. Davis, Richerson; Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1 or 10; Sociology 1 or Anthropology 2 recommended. An examination of the critical variables in the processes that humans manipulate in their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.)

108. Philosophy of the Biological Sciences (4) Ill. Ayala; Lecture-discussion—4 hours. Prerequisite: a major in a biological science or one philosophy course. Scientific method in biology. Nature of biological phenomena and models. Problems of evolutionary theory, ecology, and sociobiology. Bi-engineering and environmental ethics. (Same course as Genetics 108 and Philosophy 108.)

NOTE: For key to footnote symbols, see page 128.
Environmental Studies

110. Principles of Environmental Science (4). L. Powell Lecture—2 hours; laboratory—2 hours; discussion—1 hour. Prerequisite: one course in the biological sciences and one course in the physical sciences. The principles basic to biological ecology, geology, and planning. (Same course as Zoology 110.)

*111. Environmental Chemistry (4). III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1C and 8B, course 10, and Biological Sciences 1, or consent of instructor. The practical application of chemistry provides a basis for understanding and describing the environmental effects of chemical and physical processes and their possible ecological perturbations. Topics will include ecosystem cycling, descriptions of natural chemical processes, and the effects of chemical pollutants. Offered in even-numbered years.

114A-114B. Integrative Environmental Systems Analysis (5-8) I-II. Watt Lecture—3 hours; discussion—1 hour; individual or group environment project—1 hour. Prerequisite: Biological Sciences 1 or Economics 1B; sophomore standing. Explanation of complex environmental issues using models of ecosystems and their relationships. (Same course as Zoology 114A and 114B.)

115. Bioenvironmental Consequences of Nuclear Technology (5). III. M. Goldman Lecture—2 hours; discussion—1 hour; field trip to nuclear power plant. Prerequisite: consent of instructor. Course 2A and Biological Sciences 1, or the equivalent. Discussion of biophysiologic implications of radionucleotide and thermal effluents generated by nuclear technology. Hazards evaluation based on the prediction of the response of the most sensitive physiological systems will be emphasized. (Same course as Radiation Sciences 115.)

118. The Oceans (3). I. Powell, Ward (Geology) Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical-geophysical, chemical, and biological constituents, geological history, and the sea's biosphere: man's utilization of marine resources. (Same course as Geology 118.)

119. Mineral Cycling in Agriculture and Nutrition (2). II. Bureu, Epstein and Rendig (Land, Air and Water Resources) Lecture—2 hours. Prerequisite: Chemistry 1B and one course each in biological sciences and earth science, or consent of instructor. Sources of mineral nutrients, their precession through food chains, and their importance in plants, animals and human life support systems; the effects of man's activities on mineral nutrient cycling and utilization. Glossary of terms on some topics. (Same course as Resource Science 118.)

(b) Ecological Analysis


*122. Analysis of Community Dynamics (4). II. Foin Lecture—3 hours; discussion—1 hour. Prerequisite: one course in elementary ecology (course 100, Zoology 125, Entomology 104, Botany 117, or the equivalent); elementary statistics and calculus strongly recommended. Course emphasizes the community ecology from an analytical point of view. Topics covered include energy and material flows, community homeostasis, 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, course 100 (may be taken concurrently), or the equivalent. Course will introduce students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists are included and emphasis will be placed on experimental design, scientific writing and data analysis.

125. Social Systems of Animals and Humans (4). II. Hamilton Lecture—3 hours; discussion—1 hour. Prerequisite: course 115, 116, or 118 recommended. The nature and interpretation of animal social systems, and their relevance to an understanding of man's social conventions and evolution.

Aggression dominance, communication, sexual behavior, cooperation and competition, and density 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 introductory course in biological science. Problems in environmentally dependent aspects of individual and public health. Diseases associated with pollution of air and water. Toxins such as lead, malaria, plague, rabies, and hazards of certain occupational environments. (Same course as Community Health 126.)

127. Contemporary Problems in Environmental Health (3). III. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: Environmental Studies/Community Health 126 or consent of instructor. Contemporary problems and issues in environmentally dependent aspects of health. Diseases and injuries from environmental carcinogens, teratogens, pesticides, noise, air pollutants, radiation, viruses, and heavy metals are considered. (Same course as Community Health 127.)

128. Analysis and Simulation of Complex Systems (5). I. Foin Lecture—3 hours; discussion—1 hour. 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.

(c) Cultural Ecology

141. Cultural Ecology (4). III. Ottoke Lecture—3 hours; discussion—1 hour. A comparative survey of the interaction between human cultural systems and the environment of the peoples that practice them. Primary emphasis is given to people living in rural and relatively undisturbed areas as a basis for interpreting more complex environments. (Same course as Anthropology 141.)

141L. Laboratory and Field Methods in Cultural Ecology (3). I. Ottoke Discussion—1 hour; laboratory—6 hours; field—1-6 hours. Prerequisite: course 101. Environmental Studies/Anthropology 141 (may be taken concurrently). Collection of field data in human ecology (quantitative measurements and estimates, interviews). Laboratory analysis of statistical data and other field data. Emphasis on energetics and productive systems. Offered in even-numbered years.

142. Culture and Environmental Perception (4). I. The Staff Lecture—3 hours; individual research project. Examination of man's relation to the environment through the study of the culture of culture. The nature of subjective models and their impact upon environmentally oriented behavior. Focuses upon classification and decision making. (Same course as Anthropology 142.)

150A. Physical and Chemical Oceanography (4). I. Powell Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 8C, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geo-chemical cycles. (Same course as Geology 150A.)

150B. Geological Oceanography (3). II. Cowen and Lipp (Geology) Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 150B.)

150C. Biological Oceanography (3). III. The Staff Lecture—3 hours. Prerequisite: Biological Sciences 1 and a course in general ecology, or consent of instructor. Survey of the ecology of the oceanic environment, including intertidal shelf, benthic, and planktonic communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use of impact on the ocean. (Same course as Geology 150C.)

151. Limnology (4). III. C. Goldman Lecture—3 hours; discussion—1 hour; special project, Prerequisite: course 101, 102 recommended. The nature and interpretation of animal and plant communities of natural waters with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3). III. C. Goldman Laboratory—6 hours; two projects. 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

150. Environmental Decision Making (4). I. Sabatier Lecture—3 hours; discussion—1 hour. A survey 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 environmental policies.

161. Environmental Law (4). II. Wandsford-Smith Lecture—4 hours; discussion—1 hour. Introduction for non-Law students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes e.g., NEPA.

162. Planning and Decision Making in Small Urban Communities (4). III. Sokolow (Political Science) Lecture—4 hours. Urban processes in small U.S. communities, with particular attention to how local governments respond in their structures and programs to community growth, or non-growth, and development. The political consequences of excessive subdivision development, overburdened utility plants, and alternative taxation schemes will be examined.

165. Science, Experts and Public Policy (4). II. Sabatier, Craig Lecture—4 hours. Factors affecting the influence of scientists, planners, and other experts in decision making. Several cases and controversies will be examined.

166. Case Studies in Institutional Failure and Reform (4). I. Sabatier Lecture discussion—4 hours. Prerequisite: course 160, Political Science 107, or a course in American politics recommended. Discusses selected cases of alleged failure by administrative agencies and Congress with environmental problems. Examines a number of causes and alternative reforms. Course also explicitly seeks to improve the ability of students to critically analyze environmental materials.

167. Energy Policy (4). I. Johnstone Lecture—4 hours. Prerequisite: 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). I. Schwartz Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 10 or the equivalent. 168B. Methods of Environmental Policy Analysis (4). III. Schwartz Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use and energy policy. Student will apply the methods and concepts by means of a major project.

169. Economics of Energy (3). II. Witten Lecture—3 hours. Prerequisite: Agricultural Economics 100B or Economics 100 or consent of instructor. Course designed to familiarize students with environmental concepts and issues necessary to study energy issues. Topics covered include: petroleum economics, cartel behavior, exploration and development, economic instruments, economic ecosystems, sources, risk and uncertainty, transition to alternative sources, substitutability. (Same course as Agricultural Economics 169.)

(f) Environmental Planning

171. Environmental Planning (4). I. Sperling Lecture—4 hours. Prerequisite: course in each in biology, earth science, economics, social science, and humanities. Laws, institutions, procedures, design and analysis methods, evaluation of government planning for land use, air and water quality and energy are examined. Theoretical and practical readings are used.
256. Directed Group Study (1-5) II, III, III. The Staff (Chairperson in charge)

258. Research (1-12) I, II, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing. (S/U grading only.)

Environmental Toxicology

(College of Agricultural and Environmental Sciences)

James N. Seiber, Ph.D., Chairperson of the Department
Department Office, 109 Environmental Toxicology (762-1142)

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. Hammond, Ph.D., Associate Professor (Environmental Toxicology, Entomology)
Gary L. Henderson, Ph.D., Associate Professor
Dennis P. H. Hsieh, Sc.D., Professor
Wendell W. Kligorski, Ph.D., Professor
James B. Knaak, Ph.D., Visiting Lecturer
Ming-yu Li, Ph.D., Adjunct Lecturer
Terry Mast, M.S., Visiting Lecturer
James N. Seiber, Ph.D., Professor
Takayuki Shimamoto, Ph.D., Assistant Professor
Lee Ray Shull, Ph.D., Assistant Professor
Wray W. Winterlin, M.S., Lecturer
Dorothy E. Woolley, Ph.D., Professor

The Major Program

Environmental Toxicology deals with the properties, fate, biological effects, detection and regulation of natural and man-made toxicants present in the environment. Toxicants studied in the major include pesticides, pollutants, industrial chemicals, and pollutants 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 physical and biological sciences to the study of toxicants as a basis for solving problems occasioned by the presence of toxicants in the environment. Through the appropriate choice of electives, students have the opportunity to specialize in any of several areas of environmental toxicology. Students electing to emphasize the application of the principles of the physical sciences to the study of toxicants would qualify for positions in residue analysis, environmental monitoring 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 advisor 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.)

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Environmental Toxicology

Preparatory Subject Matter.................................................................................................................................................. 59-63
Biological sciences (Biological Sciences 1)................................................................................................................................ 5
Other biological sciences (entomology, zoology, botany, bacteriology, physiology).................................................................................................................. 10-12
General chemistry (Chemistry 1A-1B-1C)........................................................................................................................................ 15
Organic chemistry (Chemistry 8A-8B or 128A-128B)................................................................................................................................. 6
Environmental science (Environmental Toxicology 10 or Environmental Studies 101).......................................................... 3-4
Mathematics (Mathematics 16A-16B or 21A-21B, 19, Statistics 13).................................................................................................................. 13-15
Physics (Physics 1A-1B or 2A-2B)......................................................................................................................................................... 20

Depth Subject Matter.................................................................................................................................... 56
Biochemistry (Biochemistry 101A, 101B)............................................................................................................................................. 6
Organic chemistry (Chemistry 128A, 128B or 129).............................................................................................................................. 3
Electives selected for area of specialization with advisor's approval......................................................... 24

Elective Preparatory Subject Matter......................................................................................................................................... 30
Compensation for equivalent courses......................... 30

Unrestricted Electives................................................................. 3-11-16
Total Units for the Major........................................ 180

Minor Adviser: J. L. Byard.

Advising Center for the major, is in 109 Environmental Toxicology Building.

Minor Program Requirements:

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COURSES IN ENVIRONMENTAL TOXICOLOGY

Lower Division Courses

10. Introduction to Toxicology (3) I. Kligorski
Lecture—3 hours. Prerequisite: open to science and non-science majors. Study of some natural and man-made toxic substances in personal, occupational, community and global environments. Emphasis placed on occurrence, properties and effects of toxic substances. Biological and physical factors which alter fate of substances are discussed.

12. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: lower division standing, consent of instructor, two years of experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

19. Special Study for 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/NP grading only.)

Graduate Courses

212A. Environmental Policy Analysis (4) II. Sabatier
Lecture—3 hours. Discussion—1 hour. Seminar paper. Prerequisite: course in public policy (e.g. Political Science 107 or 108), course in bureaucratic policy making (e.g. course 166 or Political Science 181) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in odd-numbered years. (Same course as Ecology 212A)

212B. Environmental Policy Analysis: Evaluation (4) I. Cramer, Schwartz, Wenz
Lecture—1 hour. Discussion—1 hour. Seminar—2 hours. Independent evaluation project. Prerequisite: Economics 100 (or the equivalent), course 168A (or the equivalent course in policy analysis or resource economics), intermediate level statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs, and plans. Ex ane and ex post evaluation will be studied. Offered in odd-numbered years. (Same course as Ecology 212B.)
Epidemiology and Preventive Medicine

Upper Division Courses

101. Principles of Environmental Toxicology (3) (I, II, III. The Staff (Chairperson in charge)
Laboratory—3 hours. Prerequisite: Chemistry 3B or 128C (or the equivalent); Biochemistry 101A. Recommended. A unified introduction to the use and environmental consequences of pesticides, food additives, and other chemicals; their environmental fates and their health significance.

112A. Toxicants in the Environment (3) (II. Crosby, Seiber Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence their distribution and transformation; action of environmental factors which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants.

112B. Toxicants in the Environment (4) (II. Burau, Shibamoto, Mast Lecture—3 hours; laboratory—3 hours. Prerequisite: course of Instructor. Continuation of 112A. Toxic chemicals—primarily pollutants in the environment; concepts of techniques of sampling, detecting, and analyzing toxicants of current concern; collection, interpretation, and use of analytical data. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

114A. Biological Effects of Toxicants (3) (II. Byard Lecture—3 hours. Prerequisite: Biochemistry 101B (may be taken concurrently); course 101 and Physiology 110 recommended. Introduction to the biokinetics and effects of toxic substances in living organisms. Topics to be covered: fate and mechanism of action of representative toxicants; health effects of toxicants on the human body; and methods of assessing toxicant exposure. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

120. Food Toxicology (3) (II. Shibamoto, Russell and Grunden, Seiber, Food Science and Technology Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B. Chemistry and biochemistry of toxins occurring in foods, including natural toxins, intentional and unintentional food added substances. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 120.)

120A-E. Selected Topics in Environmental Toxicology (3) (I, II, III. The Staff (Chairperson in charge) Lecture-discussion—3 hours. Prerequisite: consent of instructor in consultation with the course 101 coordinator. Selected topics of current interest in environmental toxicology. Topics will vary each time the course is offered, and will emphasize such areas as fate and mechanism of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in foods, and the safe handling of toxic substances.

131. Air Pollutants and Inhalation Toxicology (3) (III. Hislate, Last, Environmental Medicine Lecture—3 hours. Prerequisite: Chemistry 88B (may be taken concurrently) or the equivalent; course 101. Biochemistry of air pollutants and their effects on the respiratory tract. The effects of environmental pollutants in the ambient and occupational environments. Environmental factors, biological effects, air-quality criteria and standards, and pulmonary responses to these pollutants. Offered in even-numbered years.

132. Chromatography for Analytical Toxicology (3) (II. Archer Lecture—discussion—1 hour, laboratory—6 hours. Prerequisite: Chemistry 88B (may be taken concurrently) or the equivalent; consent of instructor. Introduction to the use of chromatographic techniques such as thin-layer, gas-liquid, high-pressure liquid and column chromatography useful for analytical toxicology. Limited enrollment; preference given to Environmental Toxicology majors.

135. Legal Aspects of Environmental Toxicology (3) (I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: consent of instructor; courses 101 and 102 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer protection, and occupational exposure to toxic substances; roles of federal regulatory agencies; alternatives to governmental control.

180. Seminar (I) (I. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Students interested in the seminar are encouraged to take the course. Students, faculty, or others will present current research and instructional activities within environmental toxicology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities. (P/N grading only.)

192. Internship (1-12) (I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience offered in a governmental or industrial laboratory under the supervision of the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/N grading only.)

197T. Tutoring in Environmental Toxicology (1-5) (I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored: Prerequisite: advanced standing in Environmental Toxicology, a recent and relevant undergraduate experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (P/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) (P/N grading only.)

Graduate Courses

200. Mammalian Toxicology (4) (III. Byard Lecture—3 hours. Prerequisite: Chemistry 129C (or the equivalent), Biochemistry 88B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying their detection, toxicity, fate, and ecological importance. Offered in even-numbered years.

201. Mechanisms of Toxic Action (3) (III. Kilgore Lecture—3 hours. Prerequisite: Chemistry 129C (or the equivalent), Biochemistry 88B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying their detection, toxicity, fate, and ecological importance. Offered in even-numbered years.

202. Analysis of Toxicants Laboratory (2) (I, Seiber Laboratory—6 hours. Prerequisite: Chemistry 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and identification of toxicants using chemical and instrumental techniques.

234. Neurophysiological Basis of Neurotoxicology (3) (II. Woolley Lecture—2-3 hours; discussion—1 hour. Prerequisite: Physiology 110 (or the equivalent) and basic understanding of neurophysiology; consent of instructor. Mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides and heavy metals. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. Offered in odd-numbered years. (Same course as Physiology 234.)

290. Seminar (I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.)

290C. Advanced Research Conference (I, II, III. The Staff (Chairperson in charge) Lecture-discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S/U grading only.)

297T. Tutoring in Environmental Toxicology (I, II, III. The Staff (Chairperson in charge) Hours and duties will vary depending upon course being tutored: Prerequisite: advanced standing in Environmental Toxicology, a recent and relevant undergraduate experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (S/U grading only.)

298. Group Study (I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxicants, and new pesticides.

Research (1-12) (I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

Epidemiology and Preventive Medicine

School of Veterinary Medicine

Hans P. Riemann, D.V.M., Ph.D., Chairperson of the Department

Department Office, 112 Surge IV

Faculty

Henry E. Adler, D.V.M., Ph.D., Professor Emeritus
Raymond A. Bankowski, D.V.M., Ph.D., Professor Emeritus
Tim E. Carpenter, Ph.D., Assistant Professor
Thomas B. Farrow, Ph.D., Assistant Professor
Constantin Genigeorgis, D.V.M., Ph.D., Professor
William Goodger, M.P.V.M., Ph.D., Professor
Jack A. Howarth, D.V.M., Ph.D., Professor
Winfred E. Kistler, M.L.S., Lecturer
Kenneth M. Lam, Ph.D., Assistant Professor
Michel J. Lavellepiere, M.B., Ch.B., Professor
R. H. McCapes, D.V.M., Senior Lecturer
Marian Merella, M.S., Ldo., Vet., Lecturer
Margaret E. Meyer, Ph.D., Professor
Marguerite Papaiouannou, D.V.M., Ph.D., Assistant Professor
William A. Priest, D.V.M., M.P.H., Adjunct Professor
Hans P. Riemann, D.V.M., Ph.D., Professor
Arnold S. Rosenwald, D.V.M., D.V.M., Assistant Professor
Roger N. Ruppenthal, D.V.M., M.S.V., M.P.V.M., Associate Professor
Walter W. Sadler, D.V.M., M.P.H., Professor Emeritus
Robert Schneider, D.V.M., M.S., Associate Professor
Calvin W. Schwabe, D.V.M., M.P.H., Sc.D.
Patton L. Smith, D.V.M., M.P.V.M., Lecturer
George B. West, D.V.M., Lecturer
Richard Yarnamotono, Ph.D., Professor
George K. York, Ph.D., Lecturer

Courses in Epidemiology and Preventive Medicine

Upper Divisions

104. History of Veterinary Medicine (3) (III. Schware 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 to twentieth centuries to the creation of modern medicine. Offered in odd-numbered years.

111. Animal Hygiene (3) (II. Howarth Lecture—3 hours. Prerequisite: Biological Sciences 1 or consent of instructor. Causes, prevention, and control of animal diseases in terms of public health and in public health, with emphasis upon animal management factors in disease.

112. Animal Health Management (3) (II. Glenn Lecture—3 hours. Prerequisite: 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.

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222. Epidemiological Modeling (2) II. Carpenter
Lecture—1 hour; discussion—2 hours. Prerequisite: courses 403 and 406 (may be taken concurrently). Techniques of model-building and simulation of infectious diseases will be explored. Epidemiological and statistical techniques, construction and validation will be emphasized.

225. Preventive Avian Medical Practice (3) III. The Staff
Chairperson in charge
Lecture—3 hours. Prerequisite: enrollment in avian medicine option of MPVM program, junior or senior standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic structure of the broiler, commercial egg and turkey industries and the delivery of preventive avian 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) I. Schwabe
Lecture—2 hours; discussion—1 hour; term paper. 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 humane values and mental health. Offered in even-numbered years.

242. Veterinary Medicine and the World Food/Poverty Problem (3) II. Schwabe
Lecture—2 hours; discussion—1 hour; term paper. 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 and world agricultural and plant origin comparisons of important third world and other situations; discussion of current and future food prospects. Offered in odd-numbered years.

246. Public Health Aspects of Meat and Meat Products Technology (2) III. Gergiopoulos
Lecture—2 hours. Prerequisite: consent of instructor. Study of the influences of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

255. Animal Health Economics (3) I. 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, nutrition, and use of economic decision making techniques which may be used in veterinary medicine are also presented.

256. Advanced Food Hygiene Laboratory (2) III. Gergiopoulos
Lecture—1 hour; laboratory—6 hours. Prerequisite: AVM 405 or degree 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.

260. Current Topics in Avian Medicine (1) I, II, III. Lam, McCapes, Yamamoto
Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and presentation.

271. Seminar in Epidemiology (2) I. Rupp, Kapp
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.)

278. Group Study (1-5) I, II, III. The Staff
Chairperson in charge

280. Research (1-12) I, II, III. The Staff
Chairperson in charge (SU grading only.)

221. Epidemiological Approaches Used in Chronic Disease Studies (3) III. Schneider
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 404, 407, or consent of instructor. Emphasis on appropriate chronic disease understanding and prevention in animals. Discussions on disease etiologies, incidence rates, prospective and retrospective study designs, survival vs. analysis of interview schedules. Comparative aspects of select chronic disease experience in various animal species and man.

241. Biomedical Information Resources and Retrieval (3) I. Kadar, Merola
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Use of bibliographic tools for retrieval of information. Sources of epidemiological and statistical data; computerized retrieval of information; preparation of bibliographies.

242. Medical Statistics I (3) I. Faner, Papasolomou
Lecture—2 hours; laboratory—2 hours. Prerequisite: course 403 or 430, or equivalent. Introduction to statistical procedures, descriptive statistics, estimation and hypothesis testing, probability; binomial, normal, t-, F-, and chi-square distributions, multiple regression, categorical data analysis. Nonparametric methods; problems in sampling and surveys; time series analysis; and design applications to biostatistics.

244. Medical Statistics II (3) III. Faner, Papasolomou
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 403 or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; problems in sampling and surveys; time series analysis; and design applications to biostatistics.

405. Principles of Epidemiology (5) I. Rupp, Kapp
Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: course 403 or equivalent. A degree in veterinary medicine, medicine, or biology or consent of instructor. Introduction to epidemiology and study design and disease data analysis, quantifying disease in populations, ecological survey methods, an introduction to epidemiological study design and disease surveillance.

406. Epidemiologic Study Design (5) II. Rupp, Kapp
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 403 and 406 or equivalent. Time series, cross-sectional, case-control, and cohort studies (including controlled clinical trials), with examples pertinent to veterinary epidemiology. Critical review of certain biostatistical studies. Principles of association and causality.

407. Analytical Epidemiology (3) III. Faner, Papasolomou
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 403 and 406. Course may be taken concurrently. Uses of multiple regression, discriminant analysis, factor analysis, path analysis and other multivariate techniques in epidemiology. Approaches for handling the analysis of large data sets.

408. Research Methodology and Research Reports (3) I. May
Lecture—discussion—2 hours. Prerequisite: enrollment in MPVM degree program or consent of instructor. Application of the experimental method to solving specific epidemiological field problems, including data collection and analysis. Students must independently select a topic, complete all work preparatory to the actual field collection of data or research.

409A-409B. Topics in Data Analysis (2-20) I-III. The Staff
Chairperson in charge

Discussion—2 hours. Prerequisite: course 406 (may be taken concurrently) or consent of instructor. Applied methods for solving epidemiological problems and the selection and use of appropriate data analysis and statistical techniques for processing, analyzing and interpreting these data.

410A-410B. Topics in Applied Epidemiology (3-3) I-III. The Staff
Chairperson in charge
Discussion—3 hours. Prerequisite: course 406 (may be taken concurrently) or consent of instructor. Critical review of public health, veterinary and other animal populations. Design and economic analysis of control programs.

Family Practice
See Medicine
Fermentation Science; Food Biochemistry; Food Science

Fermentation Science
(College of Agricultural and Environmental Sciences)

The Major Program
The Fermentation Science major is a program of study of the fundamental and applied sciences related to the use of microorganisms as production and processing agents. A broad interdisciplinary food-related education is offered which may be combined with specializations in enology (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations such as those used in the production of microbial cells, drugs, enzymes, solvents, acids, and vitamins, in the expansion of the food supply, and in waste management and preservation of the environment, are further opportunities for study. Courses are selected in consultation with advisers. Graduates qualify for supervisory, technical, research, sales or executive positions in 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 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.)

Preparatory Subject Matter ........................................ 68
Preparatory Subject Matter ....................................... 68
Biochemistry (Biochemistry 101A, 101B) ......................... 6
Biochemistry (Biochemistry 101A, 101B) ....................... 6
Biology (Biological Sciences 1) ................................. 6
Biology (Biological Sciences 1) ............................. 6
Chemistry (Chemistry 1A, 1B, 1C, 5, 8A, 8B) .............. 25
Chemistry (Chemistry 1A, 1B, 1C, 5, 8A, 8B) ............. 25
Mathematics (Mathematics 16A, 16B) ......................... 5
Mathematics (Mathematics 16A, 16B) ...................... 5
Statistics including analysis of variance ( Agricultural Science and Management 150 or Statistics 160) ................................................................................. 5
Statistics including analysis of variance ( Agricultural Science and Management 150 or Statistics 160) ................................................................................. 5
Microbiology (Microbiology 2, 3) ................................ 4
Microbiology (Microbiology 2, 3) ................................. 4
Physics (Physics 2A-2B-2C plus one unit of laboratory, e.g., Physics 3A) .......................................................... 10
Written or oral expression (see College requirement) ...... 8

Depth Subject Matter ................................................... 40
Choose from: Viticulture and Enology 3, 123, 124, 125, 126, 127, 140, 171, 219, 235; Food Science and Technology 102, 103, 104, 106, 110A, 110B, 111, 110, 150, 150, 210, 215, 235, 250, 251; Biochemistry 101L, 123, 123L; Bacteriology 106, 126A-126B-126C-130L, 130, 150, 150L, 230, 250; Agricultural Engineering 245; Environmental Toxicology 246; Epidemiology and Preventive Medicine 150; Chemistry 107A, 107B, 130; Consumer Science 135.

Restricted Electives ....................................................... 28
Select from: upper division courses in educational goal and upon approval of adviser. (A related series of primarily upper division courses intended)

Breadth Subject Matter ............................................... 24
Social sciences and humanities or others as approved by adviser.

Unrestricted Electives .................................................. 20

Total Units for the Major ............................................. 180

†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 role of and changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their effect on the quality attributes of foods. Through the appropriate choice of both electives and in-depth courses in food science and technology, the major offers broad education to students planning careers in food processing, food research, and other food-related fields.

The major also offers excellent preparation for graduate work in agricultural chemistry, biochemistry, nutrition, medicine, and the life sciences.

Food Biochemistry

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter ........................................... 77-82
Preparatory Subject Matter ......................................... 77-82
Biochemistry (Biochemistry 101A, 101B) ...................... 6
Biochemistry (Biochemistry 101A, 101B) ..................... 6
Biology (Biological Sciences 1) ...................................... 5
Biology (Biological Sciences 1) ................................. 5
Chemistry, one year general and analytical chemistry (Chemistry 1A-1B-1C, 5 or 4A-4B-4C), one year organic chemistry, including at least one laboratory course (Chemistry 126A-126B-126C-126D), and two quarters of physical chemistry (Chemistry 107A-107B or 110A-110B) ................................................................. 32-36
Chemistry, one year general and analytical chemistry (Chemistry 1A-1B-1C, 5 or 4A-4B-4C), one year organic chemistry, including at least one laboratory course (Chemistry 126A-126B-126C-126D), and two quarters of physical chemistry (Chemistry 107A-107B or 110A-110B) ................................................................. 32-36
Mathematics, including one year of calculus (Mathematics 16A-16B-16C or 21A-21B-21C), and one course from Mathematics 29A, 22A, 22B, 22C, 23A, 23B, 31, 32, 33, 46
Mathematics, including one year of calculus (Mathematics 16A-16B-16C or 21A-21B-21C), and one course from Mathematics 29A, 22A, 22B, 22C, 23A, 23B, 31, 32, 33, 46
Physics, any course except Physics 10 and including at least one laboratory course (Physics 2A-2B-2C and 3A or 3B or 3C; or 8A-8B-8C) ................................................................. 10
English (see College requirement) ................................. 8

Depth Subject Matter .................................................. 30
Food Science and Technology, including 102, 104, 104L, 110A or 111 ................................................................. 25
Bacteriology 123, 123L .................................................. 5

Breadth Subject Matter ............................................... 22
Social sciences and humanities, including 4 units of rhetoric† ................................................................. 22

†Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

Restricted Electives ....................................................... 26
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 ................................................................. 26

Unrestricted Electives .................................................... 20-25
Total Units for the Major ............................................. 180

Major Adviser: R.E. Kunkee (Viticulture and Enology)
Graduate Study. See page 97 and the Announcement of the Graduate Division.

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 or the Ph.D. degree in related fields such as agricultural chemistry, biochemistry, microbiology, and nutrition.

Food 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 are acceptable. Courses shown without parentheses are required.)

Preparatory Subject Matter ........................................... 62-87
Preparatory Subject Matter ......................................... 62-87
Biology and microbiology, including 1, Bacteriology 2, 3) ................................. 9
Biology and microbiology, including 1, Bacteriology 2, 3) ................................. 9
Chemistry and biochemistry, including 1A-1B-1C-5 or 4A-4B-4C, 8A-8B; Biochemistry 101A-101B) ................................................................. 27-31
Chemistry and biochemistry, including 1A-1B-1C-5 or 4A-4B-4C, 8A-8B; Biochemistry 101A-101B) ................................................................. 27-31
Mathematics and physics, including two courses in calculus (Agricultural Science and Management 150 or Statistics 13; Mathematics 16A-16B; Physics 2A-2B-2C) ................................................................. 18-19
Mathematics and physics, including two courses in calculus (Agricultural Science and Management 150 or Statistics 13; Mathematics 16A-16B; Physics 2A-2B-2C) ................................................................. 18-19
Written or oral expression (see College requirement) ................................................................. 8

Depth Subject Matter .................................................. 28
Upper division courses in Food Science and Technology, including 100A-100B, 103, 104, 104L, 110A-110B, 190 ................................................................. 28

Major Adviser: M. Mazelis (Food Science and Technology)
Graduate Study. See page 97.
Food Science and Technology

Courses in Food Science and Technology

Lower Division Courses

1. Introduction to Food Science (3) I. Jennings, Bernhard, Schweigert
   Lecture—2 hours; discussion—1 hour. Development and maintenance of an adequate food quality
   and its measurement; specific and technological aspects of converting raw material and plant
   products into a large variety of processed and preserved foods; maintenance and improvement
   of the acceptability and nutritional value of foods. Course not open for credit to students who
   have completed courses 100A, 100B, or 111.

2. Food and Culture: An Introduction to Culture, Diet, and Culture (4) III. Gittei (nutrition)
   Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2 and Nutrition 10 recom-
   mended. 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
   201.)

49. Processing Plant Studies (1) I. Leonard
   Discussion—1 hour: field trips—3 hours. Field trips to observe processing, distribution, quality control and reg-
   ulatory control of foods and related materials.

93. Public Issues in Nutrition and Food Science (1) II. Ferral (nutrition), Schweigert
   Seminar—1 hour.bounce, students will present topics in the area of nutrition and food science
   which are currently subjects of public debate. Intended as an introduction to research and related literature
   for students new to the campus. (PINF grading only.) (Same course as Nutrition
   93.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff
   (Schweigert in charge) (PINF grading only.)

Upper Division Courses

100A. Principles of Food Composition and Properties (3) I. Russell
   Lecture—3 hours. Prerequisites: Chemistry 3A 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. Mazelis
   Lecture—3 hours. Prerequisite: Chemistry 8A-B. 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 (3) I. Shoemaker
   Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100A (may be taken concurrently). Course designed to give
   laboratory experience with the food systems and properties described in course 100A.

101B. Principles of Food Composition and Properties (3) 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. Mailing and Brewing Technology (3) I. Lewis
   Lecture—3 hours; field trips and pilot-scale brewing by arrangement. Prerequisites: preparation in biochemical,
   microbiology and chemistry advised. Technology of the malting, brewing and fermentation processes is integrated
   with the chemistry, biochemistry, and microbiology that determines industrial practices and products quality.

102L. Mailing and Brewing Science Laboratory (3) I. Lewis
   Discussion—1 hour; laboratory—6 hours. Prerequisite: courses 102, 105. Chemistry 101B may be taken concurrently.
   Introduction to the theory and application of physical and chemical methods for determining the con-
   stituents of foods. Modern separation and instrumental analysis techniques are stressed.

104. Food Microbiology (3) I. Collins
   Lecture—3 hours. Prerequisites: Bacteriology 2, Chemistry 5 and 8B. Fundamentals of the relationship between
   bacteria and food. A study of the effects of bacteria on food, spoilage and food poisoning. Critical control
   points in food processing will be stressed.

105L. Food Microbiology Laboratory (3) I, III. Barrett
   Lecture—1 hour; laboratory—3 hours. Prerequisite: Bacteriology 2 and course 104 (may be taken concurrently).
   Demonstration of the effect of microorganisms on food. Analysis of microbiologic quality of foods.

107. Principles of Sensory Analysis of Foods (4) I. Pangborn
   Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agriculture and Management
   120 or the equivalent course in statistics. Nature of sensory responses with emphasis on the psychology of
   food; critical use of analytical laboratory methods; relation of sensory data to chemical and instrumental
   measures; collection and statistical analysis and interpretation of sensory data.

108. Food Processing Plant Sanitation (3) I. Lewis
   Lecture-3 hours. Prerequisite: Chemistry 8A and Bacteriology 2. Discussion of factors relating to sanitary control
   of food processing including water treatment, chemical and physical sanitizing agents, principles of cleaning and hard
   surface detergent, metal corrosion, concepts in the disposal of wastes and the pertinence of government control
   agencies.

109. Principles of Quality Assurance in Food Processing (3) III. Singh
   Lecture—1 hour; discussion—1 hour. Prerequisite: one course in each of food microbiology, food processing, food
   chemistry, and sensory evaluation. General principles underlying Quality Assurance with examples of applications to
   selected processed food products. Rationale 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 used by the food industry.

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 for credit to students enrolled in College of En-
   gineering. Applications of the concepts of matter and energy to food processing. Elements of engineering ther-
   modynamics, fluid mechanics, and problem solving.

110B. Heat and Mass Transfer in Food Processing (3) II. Singh
   Lecture—2 hours; laboratory—2 hours. Prerequisite: course 110A or the equivalent. Rate processes; conduc-
   tion, convection, and radiation heat transfer; refrigeration principles; psychrometrics; mass diffusion and interphase
   mass transfer.

111. Introduction to Food Processing (4) I. Miller
   Lecture—3 hours; discussion—demonstration—2 hours. Prerequisite: Bacteriology 2, Chemistry 8A and 8B, and Physics
   2A and 2B. Principles of food processing from farm to package. Characteristics of raw materials, fresh produce
   handling, overview of food processing and processing unit operations, chemical additives, demonstration and field
   trips.
Food Service Management

113. Structure of Food Materials (3) III. Lecture—3 hours. Anatomical features and structural properties of the tissues of food materials; histochimical and histological tests of food tissues; rheological characteristics; food texture.

117. The Senses, Sensory Measurement, Psychophysics and Food (4) I, O’Malley. Lecture—4 hours. Prerequisite: Biological Sciences 1, Statistics 13 or Agricultural Science and Management 150 (may be taken concurrently). Structure and function of sensory systems; psychophysical and physiological variables affecting sensory responses. Critical examination of modern psychophysical and methods for investigating the mechanics of human sensory systems. Problems of sensory measurement and their relation to food flavor.

119AT. Principles of Dairy Processing (4) III. Dunkney. Personalized system of instruction. Prerequisite: Bacteriology 112 and Bacteriology 2 or the equivalent. Bacterial, physiologically, microbiological, psycho-physical and engineering principles underlying the conversion of milk to meat, milk’s most expensive food. Includes processes, principles of pasteurizing, bottling, creaming and curdling, milk, and cheese.

121. Birds and their Eggs as Food (3) III. Brant. Lecture—3 hours; demonstrations (occasional). Prerequisite: Biochemistry 101B and 101B or the equivalent. Biochemical, physiological, and ecological principles of the nutritional aspects of birds and their eggs as food. The influence of pasteurization, cooking, storage, and handling on the quality of poultry and eggs.

122. Marine Food Science (3) II, I. Brown, Ogdenziak. Lecture—3 hours. Prerequisite: Bacteriology 2: Biochemistry 101B (may be taken concurrently). Biochemical, microbiological, and ecological principles of fish and shellfish as food. Relationships of fish and shellfish to food, fish, and shellfish as food. The influence of pasteurization, cooking, storage, and handling on the quality of poultry and eggs.

125. Corrosion Principles in Food Processing Interactions (3) II. Grunwedel. Lecture—3 hours. Prerequisite: Mathematics 16B; Physics 2C; Chemistry 18B. Course presents thermodynamic and kinetic principles of material science in food processing interactions (interfaces corrosion) and investigates how these interactions affect the wholesomeness of processed, canned and frozen foods. Offered in even-numbered years.

128. Food Toxicology (3) III. Grunwedel, Russell, Shiba- moto (Environmental Toxicology). Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B. Biochemistry and toxicology of foods occurring in foods, including plants and animals, and in human food additives. The assessment of food safety and toxic hazards. (Same course as Environmental Toxicology 128.)

130. Chemistry of Milk and Dairy Products (3) III. L. S. Smith. Lecture—3 hours. Prerequisite: Biochemistry 101A. The chemistry of milk constituents; physical and chemical properties and changes occurring during the processing and storage of dairy products, with emphasis on quality.


140. Food Laws and Regulation (3) I. Silicone (Law). Lecture—3 hours. Prerequisite: upper division standing. Legal and regulatory aspects of food production and distribution. Laws and regulations that govern the processing and distribution of food, the promotion of public health, and the protection of consumers and producers.

150. Thermal Processing of Foods (3) III. Merson, Leonard. Lecture—2 hours, discussion, demonstration, and problem workshops—3 hours. Prerequisite: course 110 or consent of the instructor. Theory and practical considerations of the principles of food processing by canning, pasteurization, and pasteurizing equipment. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutrition, and consumer acceptance. Design and engineering analysis of food processing equipment.

155L. Thermal Processing Laboratory (3) III, Leonard. Laboratory—6 hours. Prerequisite: courses 104 and 110B; course 150 (may be taken concurrently). Laboratory exercises and student participation in the use and application of thermal processing methods and related procedures, and in the interpretation of results, including evaluation of canning, pasteurization of thermal processing equipment, and the development of process control tables.

151. Freezing Preservation of Food (3) III. Reid. Lecture—3 hours. Prerequisite: course 112B, Bacteriology 2, and Chemistry 18B; course 104 recommended. Freezing of model systems and examination of microbial changes on chemical and physical aspects. Consequences of food freezing and thawing. Modeling of freezing for predictive purposes. Visualization and characteristics of freezing of food.

156. Computer Interfacing for Laboratory and Process Control (4) III. Russell, Showmaker. Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Use of microcomputers and minicomputers in food laboratory and process control. Laboratory—36 hours. Prerequisite: consent of instructor. Work experience on an off campus in the practical application of food science technology. (Offered only by arrangement.)

196. Directed Group Study (1-5) I, II, III. The Staff (Schweigert in charge). Prerequisite: consent of instructor. (P/NP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Schweigert in charge). Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses


205. Industrial Microbiology (3) I. Phaff, Ogdenziak. Lecture—3 hours. Prerequisite: Biochemistry 101A-101B and Bacteriology 2. Bacteriology 130A-130B or Genetics 102 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics, and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation processes, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Offered in even-numbered years.

208. Biochemical Engineering (2) II. Lecture—2 hours. Prerequisite: Bacteriology 2, 3, courses 110A, and 110B; course 205 recommended. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems: Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, process recovery, enzyme technology. Offered in odd-numbered years.

227. Advanced Sensory- Instrumental Analysis (3) III. Noble (Texture and Enology). Lecture—2 hours; lab—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of colorimetry and textureometry and chemistry of volatile compounds to perception of food, flavor. Offered in even-numbered years.


250. Isolation and Characterization of Trace Volatiles (3) I. Jennings. Lecture—3 hours. Prerequisite: at least three introductory courses in inorganic chemistry, organic chemistry, physics. Gas chromatographic theory, preparation, evaluation and use of columns; sample preparation and recovery, qualitative and quantitative analysis; ultraviolet, infrared and mass spectrometry.

281. Isolation and Characterization of Trace Volatiles (2) I. Jennings. Discussion—1 hour; laboratory—3 hours. Prerequisite: course 250 (must be taken concurrently). Laboratory demonstrations and discussions of methods for optimizing gas chromatographic performance, treatment of retention data, preparation and evaluation of packed, SCOT and open tubular glass capillary columns, sample preparation and trapping, microconcentration coupled with gas chromatography and mass spectrometry.

292. Seminar (1) I, II, III. The Staff (Schweigert in charge). Seminar—1 hour. (S/U grading only.)

298. Advanced Research Conference (1-5) I, II, III. The Staff (Schweigert in charge). Conference—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.)

299. Advanced Food Science Seminar (1) I. Seminar—1 hour. Prerequisite: at least one quarter of course 299. Oral presentation of original research, discussion and critical evaluation. (S/U grading only.)

298b. Group Study (1-5) I, II, III. The Staff (Schweigert in charge). Directed study on food chemistry, food microbiology, food processing, or sensory evaluation.

299. Research (1-12) I, II, III. The Staff (Schweigert in charge). Prerequisite: graduate standing. (S/U grading only.)

Food Service Management

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Nutrition.

The Major Program and Graduate Study

Food Service Management has been incorporated as an option with 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, 129 Everson Hall.
Foreign Literature in Translation

See Literature in Translation

French

A.B. Major Requirements:

Preparatory Subject Matter (Plan A and Plan B) 16-30
French I, 2, 3, 4 (or the equivalent) 0-23
French 6, 304, 308, 45 16

Plan A: Literature Emphasis

Depth Subject Matter 40
French 104 or 105, 110 8
One course from French 130, 131, 132 8
One course from each of three of the following five literary periods 12
b. 16th Century: French 116A, 116B
c. 17th Century: French 117A, 117B, 117C
(d. 18th Century: French 118A, 118B, 118C
(e. 19th Century: French 119A, 119B, 119C, 119D, 119E
One course in 20th-century literature from French 1203A, 1203B, 121, 122, 123 4
Additional upper division units in French language or literature 8
One additional upper division course in a national literature other than French, or in Comparative Literature 4
Total Units for the Major (Plan A) 56-79

A.B. Minor Program Requirements:

The minor in French may be pursued with emphasis on either literature or language and civilization.

French (Literature emphasis) 24
French 56 4
Five upper division literature courses chosen in consultation with undergraduate adviser, from at least three of the following six areas 20
Middle Ages 16th Century 17th Century 18th Century 19th Century 20th Century
French Language and Civilization emphasis 24
French 104 or 105, 107A, 107B, 110 or 138 16
Two additional courses chosen in consultation with undergraduate adviser, in French language or literature, or in French culture offered outside the department 6

Pre-requisite Credit. Credit will 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 be eligible for an advanced degree. Candidates will be recommended for admission to graduate study in French provided 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 require the use of resources in allied departments and programs such as a 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. Bach (M.A. degree), R.N. Coe (Ph.D. degree).

Teaching Credential Subject Representative. M. R. Kaufman. See page 103 for Teacher Education Program.
French

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

105. Advanced Translation and Composition (4) I. The Staff. Lecture-discussion—3 hours; essays. Prerequisite: course 30B or the equivalent. Preparation of skills and practice in the techniques of writing French.

106. French in Business and the Professions (4). I. Cohn. Lecture—1 hour; discussion—2 hours; frequent written assignments. Prerequisite: course 30B or the equivalent. The French language as used in the commercial sphere. Emphasis on proper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business.

107A. Survey of French Culture and Institutions (4) I. The Staff. Lecture-discussion—4 hours; term paper or oral presentation. Prerequisite: course 6. Introduction to aspects of French culture such as art, architecture, music, literature. Provides a background in history, sociology and institutions from the origins to 1715.

107B. Survey of French Culture and Institutions (4) I. The Staff. Lecture-discussion—4 hours; term paper or oral presentation. Course 6. Introduction to aspects of French culture such as art, architecture, music, literature. Provides a background in history, sociology and institutions from the origins to 1715.

108A. Advanced French Conversation (2) I. III. The Staff. Chairperson in charge. Discussion—3 hours. Prerequisite: course 30A. Intensive conversational practice stressing accurate pronunciation and spoken language fluency. Not open to native speakers. May not be counted toward the French major. May be repeated once for credit. (P/NP grading only.)

108B. Advanced French Conversation (2) I. III. The Staff. Chairperson in charge. Discussion—3 hours. Prerequisite: course 30B. Intensive conversational practice stressing accurate pronunciation and spoken language fluency. Not open to native speakers. May not be counted toward the French major. May be repeated once for credit. (P/NP grading only.)

110. Advanced Problems in Language and Style (4) III. The Staff. Lecture-discussion—3 hours; essays. Prerequisite: course 104 or 105. Analysis of style and practice in composition.

115A. Medieval Literature: Epic and Romance (4) III. Herman. Lecture-discussion—3 hours; term paper. Prerequisite: course 45 or consent of instructor. La Chanson de Roland, Tristan et Iseult, and selected works of Chrétien de Troyes. Texts to be read in modern French.

115B. Medieval Literature: Satiric and Didactic Poetry (4) III. Herman. Lecture-discussion—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Study of the didactic and satiric or popular literature of the twelfth and thirteenth centuries. Readings will include some of the fabliaux, Aubecain et Nicolete, and selections from the Roman de Renart and Roman de la Rose.

118A. Literature of the Sixteenth Century (4) III. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. The works of Ronsard, Montaigne, and Corneille.

118B. Moralist of the Seventeenth Century (4) III. Bloomberg. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Study of works of Pascal, La Rochefoucauld, etc.

117C. Poetry and the Novel in the Seventeenth Century (4) III. Abraham. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Study of representative poets and novelists: La Fontaine, Molière, and La Bruyère.

118A. "Les Philosophes" (4) III. Kusch. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Readings from Montesquieu, Voltaire, Diderot, Rousseau and the Encyclopédie.

118B. The Novel in the Eighteenth Century (4) III. Kusch. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Novels of Lesage, Prevost, Diderot, Rousseau, Le Sage, D'Alembert.

119C. The Theater in the Eighteenth Century (4) III. Cohn. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Plays of Marivaux and Beaumarchais.

119A. The Nineteenth Century (4) I. Coe. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Romanticism in the drama and novel.

119B. The Nineteenth Century (4) III. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Realism and naturalism: Balzac, Flaubert, Maupassant, Zola.

119C. The Nineteenth Century (4) III. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Poetry from the Pre-Romantics to Baudelaire.

119D. The Nineteenth Century (4) III. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Symbolism: the poetry and poetics of Baudelaire, Mallarmé, Verlaine, Rimbaud, Corbière, Laforgue, and Lautréamont.

120A. Twentieth-Century Drama (4) I. York, Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Representative plays from Ibsen to Giraudoux.

120B. Twentieth-Century Drama (4) II. York. Lecture—2 hours; term paper. Prerequisite: course 45 or consent of instructor. Representative plays from Anouilh to Ionesco.

121. Twentieth-Century Novel (4) I. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Gide and Proust.

122. Twentieth-Century Novel (4) I. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. From Malraux to the Nouveau Roman.

123. Twentieth-Century Poetry (4) III. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Selected poetic texts from Apollinaire to the present.

130. Critical Reading of Poetry (4) I. Lindley. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry. Study of poetic conventions and verification.

131. Critical Reading of Fiction (4) I. Blanchard. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Analysis and evaluation of stories and novels representing the main types of French fiction, with emphasis on narrative structure and techniques.

132. Critical Reading of Drama (4) III. Cohn. Lecture—3 hours; term paper. Prerequisite: course 45 or consent of instructor. Analysis and evaluation of plays representing the main types of French drama, with emphasis on dramatic structure and techniques.

138. Advanced Literary Translation (4) III. Bloomberg. Lecture-discussion—3 hours; term paper. Prerequisite: either course 104 or 105, or translation, or approval of a single course. May be repeated for credit with consent of Instructor.

139. Masterpieces of French Literature (4) I. Lindley. Lecture-discussion—3 hours; term paper. Prerequisite: English 1. Reading, lectures, and discussion in English. May not be counted as part of the major in French. Offered in even-numbered years.


196. Structure of the French Language (4) III. Maroukian. Lecture-discussion—3 hours; term paper. Prerequisite: course 6 or consent of instructor; course 159 recommended. Linguistic analysis of modern French.

197T. Tutoring in French (1-2) I.-II. I. Kaufman. Seminars—1 to 2 hours; laboratory—1 to 2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses may be repeated for credit for a total of 6 units. (P/NP grading only.)

197T. Tutoring in the Community (2) I.-II. I. Kaufman. Seminar—1 to 2 hours; laboratory—1 to 2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring
Graduate Courses

**202A. Analyse Critique** (4) I. Lindsay Semester—3 hours, term paper. Prerequisite: graduate standing. Further introduction to methodology and practice of literary criticism. Textual reading and group study of one selected work.

**202B. Analyse Critique** (4) II. Blanchard Semester—3 hours, term paper. Prerequisite: graduate standing. Further introduction to methodology, Theory of literature and philosophy of criticism, writing and reading, in the context of today's controversy. Study of selected critical approaches against specific texts.

**201 History of French: Phonology and Morphosyntax** (4). Manouil-Marena Semester—3 hours, term paper. Prerequisite: courses 159, 160, 250A, or consent of instructor. Presentation of the main changes in phonological and grammatical structures of French, from Latin to contemporary spoken aspects. Offered in odd-numbered years.

**202A. Medieval French Literature: The Epic Tradition** (4) II. Henneman Semester—3 hours, prerequisite: course 201A recommended. Literary and stylistic study of selected chansons de geste. Readings in Old French. May be repeated for credit with consent of instructor when different topics studied.

**202B. Medieval French Literature: The Epic Tradition** (4) III. Blanchard Semester—3 hours, prerequisite: course 201A recommended. Character du Troyes and the doctrine of courtly love. Study and stylistic study of Chretien's major works. Readings in Old French. May be repeated for credit with consent of instructor when different topic is studied.

**201A. Sixteenth-Century Literature: The Humanities** (4) I. Blanchard Semester—3 hours. French humanism in its varied forms. Although at different times Rabelais and Montaigne will be primarily studied, other leading intellectuals and religious writers will also receive attention. May be repeated for credit when different topics is studied.

**201B. Sixteenth-Century Literature: Pre-Renaissance and Renaissance (4) II. Abrahams Semester—3 hours. The poetry of the Ecocr (lyric and d) of the Renaissance. May be repeated for credit when different topic is studied.

**201A. Seventeenth-Century Literature: Theater** (4) II. Abrahams Semester—3 hours. Works of Corneille, Racine, Moliere, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.

**201B. Seventeenth-Century Literature: Prose** (4) I. Blanchard Semester—3 hours, term paper and/or exam. Works of authors such as Fescar, Descartes, Mme de LaFayette. One or more authors may be covered. May be repeated for credit with consent of instructor as different topics are studied from quarter to quarter.

**201A. Seventeenth-Century Literature: Poetry** (4) III. Abrahams Semester—3 hours. Term paper and/or exam. Works of the best of one or more poets of the period. May be repeated for credit with consent of instructor.

**201A. Eighteenth-Century Literature: Philosophy** (4) II. Blanchard Semester—3 hours. Term paper and/or exam. Not a course in philosophy, but an examination of the role of philosophy in the design and content of literary works. Study of one or more authors. May be repeated for credit.

**201A. Eighteenth-Century Literature: Novel** (4) III. Kusch Semester—3 hours. Rise of the novel. A study of narrative experiments in the context of the philosophical climate and new literary values. Course may treat one or more novelists of the period. May be repeated for credit when different topics are studied.

**202A. Nineteenth-Century Literature: Fiction** (4) II. Blanchard Semester—3 hours. Study of the works of one or several novelists and short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied.

**202B. Nineteenth-Century Literature: Theater** (4) II. The Staff Semester—3 hours. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor when different topics are studied.

**201C. Nineteenth-Century Literature: Poetry** (4) II. Lindsay Semester—3 hours. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are studied.

**201A. Twentieth-Century: Prose** (4) III. The Staff Semester—3 hours, term paper and/or exam. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.

**201B. Twentieth-Century: Poetry** (4) I. The Staff Semester—3 hours. Term paper and/or exam. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.

**210 Studies in Narrative Fiction** (4) III. The Staff Semester—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**211 Studies in Criticism** (4) II. Blanchard Semester—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**212 Studies in the Theater** (4) I. Coe Semester—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**213 Studies in Poetry** (4) III. The Staff Semester—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**216 Problems in French Composition and Syntax** (4) I. Blanchard Semester—3 hours. Prerequisite: graduate standing. Problems and solutions of French translation: morphological, syntactical, and stylistic.

**250A. French Linguistics: Morphology** (4) I. Manouil-Marena Semester—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar, with emphasis on morphemics, i.e., a semantic analysis of grammatical categories, as well as of their paradigmatic and syntactic relations. Offered in even-numbered years.

**250B. French Linguistics: Transformational Syntax** (4) I. Manouil-Marena Semester—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectification, passivization, relativization, etc.) focusing on the most recent developments in the field (i.e., case grammar, generative semantics, trace theory, etc.). Offered in odd-numbered years.

**290 Research Methods** (1) I. The Staff Semester—1 hour. Prerequisite: graduate standing. Required of all graduate students in French introduces students to tools of research and to the various critical methods. (SU grading only.)

**297 Individual Research** (1-5) I, II, III. The Staff Semester—1-5 hours. May be repeated for credit with consent of instructor.

**298 Research (1-12) I, II, III. The Staff (Chairperson in charge) Semester—1-12 hours. May be repeated for credit with consent of instructor.

**299 Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge) Semester—1-12 hours. May be repeated for credit with consent of instructor.

**Professional Courses**

**202A. Teaching of a Modern Foreign Language** (3) III. Kaufman Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

**202B. The Teaching of French in College** (3) I. Kaufman Lecture—1 hour; seminar—1 hour. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the University.

**202B. The Teaching of French in College** (3) II. Kaufman Lecture—1 hour. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the University.

**Genetics**

(College of Agricultural and Environmental Sciences)

S. Richard Snow, Ph.D., Chairperson of the Department

Department Office, 357 Briggs Hall (752-0200)

**Faculty**

Robert W. Allard, Ph.D., Professor (Genetics, Agromonomy and Range Science)

Francisco J. Ayala, Ph.D., Professor

James B. Boyd, Ph.D., Professor

Gordon J. Edlin, Ph.D., Professor

John H. Gillispie, Ph.D., Professor

Leslie D. Gottlieb, Ph.D., Professor

Melvin M. Green, Ph.D., Professor Emeritus

Paul E. Hainsche, Ph.D., Professor (Genetics, Pomology)

John A. Kiger, Jr., Ph.D., Professor

Timothy Priot, Ph.D., Professor (Genetics, Entomology)

Raymond L. Rodriguez, Ph.D., Associate Professor

Che-Kun J. Shen, Ph.D., Assistant Professor

S. Richard Snow, Ph.D., Professor

G. Leiday Stebbins, Ph.D., Professor Emeritus

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 major 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 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. Further information can be obtained from the Division of Biological Sciences office, 150 McKib 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. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

**NOTE: For key to footnote symbols, see page 128.**

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Genetics

Preparatory Subject Matter

Bacteriology 102 or 2 (102 recommended) 3-4 5
Biological sciences (Biological Sciences 1) 5
Botany 2 5
Chemistry (Chemistry 1A-1B-1C or 4A-4B-4C) 21A-2B-2C) 9-12
Statistics 13 or 102 (102 recommended) 4
Physical Science 9

Zoology 2; 2 recommended 4-6

Depth Subject Matter

Biochemistry 101A-101B 6
Genetics 100A-100B or 120 (100A-100B recommended) 100 5-7
Four additional courses in genetics 12-16
Include at least one course from Group A: Genetics 101, 102, 104, 106L, and one course from Group B, Genetics 103, 105, 107.

Breadth Subject Matter

36

College of Agricultural and Environmental Sciences students:

English and/or metric (see College requirement) 8
Social sciences and/or humanities 28
Additional requirements as described on page

College of Letters and Science students:

Refer to page 90 for a description of requirements to be completed in addition to the major.

Restricted Electives

18-30

Six upper division courses in biological sciences or other fields relevant to the student's interest chosen in consultation with the adviser. At least two areas to be represented, such as agricultural science, behavioral biology, biochemistry, cell biology, environmental biology, statistics, physiology, and systematics.

Unrestricted Electives

15-42

Total Units for the Major 180

Major Adviser: R. W. Allard

Graduate Study: The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics. For detailed information contact the Chairperson of the Graduate Group (see page 225) and the Announcement of the Graduate Division.

Graduate Advisers: Contact Genetics Graduate Group Office, 357 Briggs Hall.

Applied Genetics: See under Animal Genetics below.

Related Courses: See Agronomy 221, 222, 223, 224, 225, 230; Animal Genetics 107, 108, 204, 206, 207, 208, Anthropology 151, 152, 157; Botany 130A-130B-130L; Biochemistry and Biophysics 204; Genetics Graduate Group Pathology 215; Plant Science 103, 115, 122; Psychology 251; Vegetable Crops 220, Zoology 148, 149, 158.

Courses in Genetics

Upper Division Courses

Courses 100A and 100B form a two-semester, 6-unit sequence of introductory genetics in contrast to the one-semester, 4-unit course 120. The level of the courses is the same.

100A. Principles of Genetics (3) I, Snow

Lecture—3 hours; or autotutorial—2 hours and general assembly—1 hour. Prerequisite: course 100A; a course in statistics. Continuation of course 100A, covering topics of cytogenetics, quantitative population, and evolutionary genetics. Not open for credit to students who have received credit for Genetics 116 or 120.

100B. Principles of Genetics (3) II, Allard

Lecture—3 hours and general assembly—1 hour. Prerequisite: course 100A; a course in statistics. Continuation of course 100A, covering topics of cytogenetics, quantitative population, and evolutionary genetics. Not open for credit to students who have received credit for Genetics 116 or 120.

100L. Principles of Genetics Laboratory (1) I, III, The Staff

Lecture—3 hours, Laboratory—2 hours. Prerequisite: Biologics 1, Biological Sciences 1, and either Botany 2 (especially relevant), Botany 2, or Zoology 2. An introduction to 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.

101L. Principles of Genetics Laboratory (1) II, Allard

Lecture—3 hours. Prerequisite: course 100A, 116, or 120. Laboratory work in basic genetics to supplement courses 100A, 108B, 116, and 120.

101C. Cytogenetics (3) III, Dvorak (Agronomy and Range Science)

Lecture—3 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 polyoids, aneuploids, and structural heterozygotes. Offered in odd-numbered years.

101L. Cytogenetics Laboratory (1) III, Dvorak (Agronomy and Range Science)

Laboratory—6 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—3 hours. Prerequisite: course 100A or 101B, Biochemistry 101B. Study of gene structure, mutation, and the biochemical basis of gene function.

103. Organic Evolution (3) III, Gillespie

Lecture—3 hours. Prerequisite: course 100B, 116 or 120. Evolutionary processes in higher organisms.

104. Developmental Genetics (3) I, Kiger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, 116, or 120; Biochemistry 101B; Zoology 100 recommended. Modern concepts of the course 100A, 116, or 120. Emphasis is placed on genetic and biochemical approaches to the study of control mechanisms operative at the various levels of gene action.

105. Population Genetics (4) I, Ilott

Lecture—4 hours. Prerequisite: course 100A, 116, or 120. A course in statistics and a course in organic chemistry. Mendelian and human population genetics; genotypic frequencies of human chromosomes, molecular aspects of the human genome, 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 or 100B or 120.

120. General Genetics (4) I, Hansche, Shen; II, Hansche, —III, Turell

Lecture—4 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 to upper-division science students in the biological sciences who are specialized in one short course in general genetics. Not open to students who have received credit for Genetics 100A or 100B or 120.

180L. Advanced Molecular Genetics Laboratory (3) II, Rodriguez

Lecture—9 hours. Prerequisite: courses 100A, 102 (may be taken concurrently), Biochemistry 101L, and consent of instructor: Bacteriology 130L recommended. Genetic analysis of gene structure and function using recombinant DNA technology. Experiments will involve the isolation of prokaryotic genes for the purpose of demonstrating the genetic principles of complementation, mutation and suppression.

1977. Tutoring in Genetics (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: upper division standing and consent of instructor. Conducting of discussion groups affiliated with one of the department's regular courses. (P/NP grade only.)

198. Group Study—1 (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Directed group study of special topics in genetics. (P/NP grade only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor based on adequate preparation of the student in allied fields. (P/NP grade only.)

Graduate Courses

202. Plasmodia, Recombinant DNA, and Genetic Engineering (3) II, Edlin

Lecture—3 hours. Prerequisite: course 102 or Bacteriology 130A-130B, or consent of instructor. Presentation of recent experiments in recombinant DNA technology. Description of biochemical and genetic plasmodia. (SU grade only.) Offered in odd-numbered years.

230. Advanced Evolution (3) III, Gottlieb

Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Developmental differentiation, and speciation in plants and animals with emphasis on the appropriateness of different methods of analysis. Offered in odd-numbered years.

250. Theoretical Population Genetics (3) II, Turell

Lecture—3 hours. Prerequisite: course 105; Mathematics 22A, and 130A or 131A, or consent of instructor. Mathematical theory of population genetics with emphasis on the assumptions underlying the standard models and the mathematical techniques used to derive conclusions. (SU grade only.) Offered in odd-numbered years.

267. Genetic Control of Insect Pests (3) I, Prount

Lecture—3 hours. Prerequisite: elementary genetics plus population genetics or evolutionary theory; graduate or upper division standing in biological science; some knowledge of insect ecology and model construction recommended. The application of population genetic theory to ways of altering the genetic constitution of pest populations; including sterile male release, delayed sterility methods, sex ratio distortion, the use of various cytogenetic procedures and meiotic drive to transform populations. Offered in odd-numbered years. Same course as Entomology 207. (SU grade only.)

288. DNA Replication, Recombination, and Repair (3) III, Boyd, Snow

Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 102; Biochemistry 101B. An integration of information from genetic and biochemical studies of DNA replication and recombination, and from studies of recombination, with the aim of forming a framework for understanding these phenomena as aspects of DNA metabolism. Offered in even-numbered years.

288G. Group Study—1 (1-5) I, II, III. The Staff

Prerequisite: consent of instructor. Directed group study of special topics in genetics. (SU grade only.)

299. Research (1-12) I, II, III. The Staff

(SU grade only.)

Professional Course

303. 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 tests and other materials, teaching techniques, preparing for and conducting discussion and laboratory sections, preparing exams. May be repeated for credit. (SU grade only.)
Genetics (A Graduate Group)
S. Richard Snow, Ph.D., Chairperson of the Group
Group 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, 357 Briggs Hall.

Courses in Genetics
Graduate Courses
251. Seminar in History of Genetics (2) II. The Staff Seminar—2 hours. Prerequisite: Genetics 100B, 116, or 120. Development of modern genetic theories beginning with Mendel. (SU grading only.)
252. Seminar in Gene Structure and Action (1-3) III. The Staff Seminar—1-3 hours. 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. (SU grading only.)
253. Seminar in Cytogenetics and Evolution (1-3) I. The Staff Seminar—1-3 hours. Prerequisite: Genetics 101 or consent of instructor. Topics of current interest related to chromosome changes, mutation, and other genetic changes in natural populations, and the application of genetics to the study of organic evolution. Offered in even-numbered years. (SU grading only.)
254. Seminar in Population, Ecological, and Behavioral Genetics (1-3) II. The Staff Seminar—1-3 hours. Prerequisite: Genetics 103 and 105 or consent of instructor. Topics of current interest relating to genetics of populations, ecology, and behavior. Offered in even-numbered years.
255. Group Study (1-6) 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.)
256. Research (1-12) I, II, III. Members of the Group (Chairperson in charge) (SU grading only.)

Geography
(College of Letters and Science)
Marilyn L. Shelton, Ph.D., Chairperson of the Department
Department Office, 280 Kerr Hall
Faculty
Conrad J. Bahre, Ph.D., Assistant Professor
Dennis J. Dingemans, Ph.D., Associate Professor
Deborah L. Elliott-Fisk, Ph.D., Assistant Professor
Howard F. Gregor, Ph.D., Professor
*Louis E. Grivetti, Ph.D., Associate Professor
**Geography, Nutrition
*Stephen C. Jett, Ph.D., Professor
Marilyn L. Shafter, Ph.D., Associate Professor
Frederick J. Simons, Ph.D., Professor
Kenneth Thompson, Ph.D., Professor

The Major Program
Geography is the study of the forms, origins, locations, and distributions of phenomena on the earth's surface. It is concerned with the processes and events involved, over time, in the development of earth's natural and human environment. Geography draws information from many other academic fields in its attempts to describe and explain earth's diverse regional character and spatial patterns. It is, then, a broad, interdisciplinary field, but students are encouraged to develop, in upper division work, a degree of specialization in one of geography's subfields—physical, cultural/historical, or urban/economic—or an interdisciplinary related courses in other departments. Programs are planned in consultation with the major adviser.

Geography's approach is largely academic, but provides background for students interested in careers in teaching, planning, and international affairs.

Geography

B.S. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography 1, 2, 3, and 5</td>
<td>12</td>
</tr>
</tbody>
</table>

Statistics 13 or the equivalent

4

Mathematics 16A, 16B, and 16C or
Mathematics 21A, 21B, and 21C

9-12

Mathematics 19 or 28A

3

Chemistry 1A-1B or 44-48 BC

15

Biological Sciences 1

5

Zoology 2-3, or Botany 2 or Geology 60-60B.

5-6

Geography 1A-1B or 2A-2B

4-5

Total Units for the Major

99-105

Recommended

Geography 4

Geography

Minor Program Requirements:

Letters and Science students who do not major in Geography may satisfy the requirements for a minor in the field by successfully completing the minimum units as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography</td>
<td>20</td>
</tr>
</tbody>
</table>

Upper division units in geography chosen in consultation with major adviser

20

Major Adviser. See Class Schedule and Room Directory.
Teaching Credential Subject Representative. D. U. Dingemans. See page 103 for the Teacher Education Program.
Graduate Study. The department offers programs of study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.
Graduate Adviser. See Class Schedule and Room Directory.

Courses in Geography

Lower Division Courses

1. Physical Geography (4) I, II, III. Eckert-Fisk, III. Jett Lecture—3 hours; laboratory—2 hours. Basic physical elements of the earth's surface; the natural environment; natural and human geographer; economic, regional, and social geography; emphasis on the nonindustrial world.

2. Introduction to Cultural Geography (4) I, II, III. Simons Lecture—4 hours. Traditional systems of human habitation: their characteristics; origin; occurrence, ecology, development of contemporary cultural patterns and problems in man's relationship; emphasis on the nonindustrial world.

3. Climate and Weather (3) I, II, III. Shafii Lecture—3 hours. Basic concepts of climate and weather; energy and moisture exchanges, atmospheric pressure, global circulation, and wind; instrumental for obtaining climate and weather data; world maps of climate and weather; climate change; climate of California.

Recommended

Geography 4.
4. Maps and Map Interpretation (3) I. Bahre

5. Introduction to Urban and Economic Geography (4) I, 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—3 hours, hour. The 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. Simons
Lecture—4 hours. Land use and 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.

The World's Regions (3) I, III. The Staff Chairperson in charge.

The major geographic regions of the world: their origins, physical environments, cultures and economies; their interactions and global roles. Designed for non-majors.

Geography and Environmental and Regional Planning (3) I. Briggs
Lecture—3 hours. Principles of spatial planning for regional change. Policies for environmental, economic, and social modernization, and selected case studies, include: U.S. city planning, USSR industrial and population shifts, European regional plans, Chinese agricultural and environmental programs.

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.)

Individually Study (1-5) I, II, III. The Staff Chairperson in charge.
(P/NP grading only.)

Upper Division Courses

102. Field Course in Physical Geography (4) III. Elliott-Fisk
Lecture and field trip—1 day per week. Research: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural landscape.

103. Field Course in Human Geography (4) III.
Lecture and field trip—1 day per week. Research: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural landscape.

104. Field Course in Urban Geography (4) III. Dingesmans
Lecture—1 hour; full-day field trip. Field analysis of selected urban problems in California. Special attention to regional integrated urban and functional structure, and land use changes as specifically related to the core of the city, changing residential and retail patterns, and urban encroachment of rural lands.

105. Cartography (4) I. Elliott-Fisk
Lecture—1 hour; laboratory—4 hours. Prerequisite: course 4 or consent of instructor. Compilation and generalization of basic maps; cartographic symbols and techniques; map reproduction.

Aerial Photo Interpretation and Remote Sensing (4) II. 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.

Advanced Cartography (4) II. Bahre
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 105 or consent of instructor. Digital cartographic representation of statistical and field data. New and innovative techniques in mapping systems.

Analysis of Landforms (4) II. 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, weathering, soils, deserts, alluvial plains, and coastal features.

Quantitative Spatial Analysis (4) I. Dingesmans
Lecture—3 hours; term paper. Prerequisite: courses 1, 2, and 3. Statistics 130 or 162 recommended. Methods for geographic research and location planning; quantitative summarization and analysis of spatial data patterns; trends and policies; location solutions; calibration, regression, and use of geographical statistics.

111. Rivers and Alluvial Landscapes (4) III. Lecture—3 hours; discussion—1 hour. Prerequisite: course 106, or consent of instructor. Examination of the morphology, evolution, and location of alluvial landscapes. Analyses of fluvial processes and related landforms in channelways, on floodplains and on valley margins. Analysis of factors influencing the development of alluvial stratafication, paleohydrology and dating methods. Offered in odd-numbered years.

112. Coastal Landforms and Landscapes (4) III. Elliott-Fisk
Lecture—3 hours; discussion—1 hour. Prerequisite: course 108 or consent of instructor. Examination of the landforms and geomorphic processes found at coasts. Analyses of processes in a variety of coastal and wave climate settings. Emphasis on the Quaternary history of coastal landscapes. Offered even-numbered years.

115. Mesoclimatology (4) II. Shelnutt
Lecture—3 hours, hour. Term paper. Prerequisite: course 3. Examinations of areal energy and moisture exchanges at the earth-atmosphere interface: physical controls, spatial and temporal variations, measuring and modeling the exchange processes, classification of mesoclimates. Climate and related processes in areal systems. Man's alteration of mesoclimates.

117. Quaternary Environments (3) II. Elliott-Fisk
Lecture—3 hours. Prerequisite: course 1, or Biological Sciences 1 or consent of instructor. Introduction to the Quaternary, timing and morphological changes during the Pleistocene and Holocene. Analysis of processes of landscape evolution. Identification of Quaternary sediments and depositional regions.

119. Arid Lands (4) I, Jett
Lecture—4 hours. Prerequisite: course 1 or consent of instructor. Physical characteristics and human utilization of rainfall-deficient regions.

121. North America (4) I, Gregor
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and wayfaying in the North American Steppes and soil genesis, hisloped processes, and the ways in which physical and human forces have contributed to their variety. Regional stresses within and between the two countries.

122A. Mexico and Central America (4) I. Bahre
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy from Mexico to Panama and in the Caribbean.

122B. South America (4) III. Bahre
Lecture—3 hours; term paper. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy in the South American countries.

123. Western Europe (3) III. Thompson
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social and political problems of the countries of Western Europe.

128. Eastern Europe (4) II. Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social and political problems.

134. The Soviet Union (4) I, Dingesmans
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Physical landscapes and cultural regions of U.S.S.R.

125A. North Africa and the Middle East (4) I. Grivetti
Lecture—4 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geography of the Islamic world of North Africa and Southwest Asia; the fossil-fish rocks of the desert areas, desertification, and the influence of Islam; economic patterns and development.

125B. Sub-Saharan Africa (4) I. Simons
Lecture—4 hours. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara.

128. Southern Asia (4) I. Simons
Lecture—4 hours. Prerequisite: courses 1 and 2 or consent of instructor. Physical, cultural, and historical geography of Southern Asia.

127. Geography of Contemporary China (3) III. Dingesmans
Lecture—3 hours. Prerequisite: course 1 and 2 or consent of instructor. Introduction to contemporary China. Historical background, current environment in China. The location of resources, agriculture, industry, and cities. The contemporary socioeconomic system as it modifies traditional rural 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 geography of California: natural resources, vegetation, and soils: water, agriculture, and the cities. Ecological problems caused by increased population and technological pressures on these environments.

141. Organization of Economic Space (4) II. Gregor
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Survey of the principal economic and social policies contributing to the regionalization of the world's economic activities. Outline of the major regional imbalances resulting from the interplay of these forces and the emphasis will also be on these aspects as they pertain to the problems of regional disparities both 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 area realties of the world's food-producing areas, and the ways physical, social, political, and economic factors have influenced these aspects of agriculture. Current and future trends and associated resource problems.

143. Political Geography (4) III. Thompson
Lecture—3 hours; term paper. Area studies of major natural and cultural phenomena affecting the world's political organization.

151. History of Geographic Thought (4) II, Thompson
Lecture—3 hours. Term paper. 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.

154. Geography of Settlement (4) III. Lecture—hours. Term paper: courses 2 or 5 or consent of instructor. Evolution of settlements: morphological and functional characteristics of rural settlement patterns; theories of settlement systems. Emphasis on rural settlement features and non-western settlements.

155. Urban Geography (4) I, Dingesmans
Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Location and functional interdependence of cities. Relations between city and hinterland, including labor shed, service area, and economic base. Role of urbanization in regional development.

151. Conservation of Resources and Environment (4) I. Jett
Lecture—4 hours. Principles of natural-resource and environmental-quality concepts and practices: location, location and economic, social and political problems of the countries of Western Europe.

128. Geography of Water Resources (4) I. Shelnutt
Lecture—3 hours, discussion—1 hour. Prerequisite: course 1. Geographical survey of water on the land, needs and opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements.

170. Cultural Ecology (4) II. Jett
Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geophysical theories of environment-man relations. Ecological relations of gatherers, fishermen, hunters, cultivators, and urbans; their environmental impacts; the ecological plants and animals. (S, F, Wa, WaP)

171. Cultural Geography (4) I. Simons
Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Consideration of the principal approaches to cultural geography in terms of environmental determinism and possibilism, regional geography, cultural history, cultural ecology, and environmental perception.

172. Animals and Culture History (4) I. Simons
Lecture—4 hours; Prerequisite: Anthropology 2, or consent of instructor. Theories of animal domestication; spread of domesticated animals in Old and New Worlds, considering roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.
173. Man and Vegetation Change (4) I, Bahre
Lecture—3 hours; term paper. Prerequisite: course 1 or 2, or consent of instructor. Environmental and cultural relations of the world’s principal vegetation patterns. Particular emphasis on land-use practices and vegetation change.

175. Geography of Food and Diet (4) II, Grivetti, Simoons
Lecture—4 hours. Prerequisite: course 1 or Anthropology 2. Nutrition, Food Science, and Technology 20 recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Often offered in odd-numbered years.

182. Student Internship in Geography (2-4) II, III, III. The Staff
Internship—5-15 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 geographic problems. The application and evaluation of theoretical concepts in real-world experience with a variety of assignments and work schedules. (P/NP grading only.)

186. Directed Group Study (1-5) I, II, III. The Staff Chairperson (in charge)
(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

200. Research Trends in Geography (1) I. The Staff Chairperson (in charge)
Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.)

201. Sources and General Literature of Geography (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: graduate status in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit on approval. Topics may include: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

250. Theory and Method in Geography (4) III. Lectures—3 hours, discussion—1 hour.

255. Regional Economic Organization (4) II. Seminar—3 hours. Analysis of theories of spatial organization, and definition of the applicability to selected examples of regional economic development.

280. Seminar: Selected Regions (4) II, Bahre Seminar—3 hours. Region to be announced annually.

291. Seminar in Cultural Geography (4) I, Simoons Seminar—3 hours.

292. Seminar in Landform Analysis (4) I. Seminar—3 hours.

293. Seminar in Political Geography (4) III. Thompson Seminar—3 hours.

294. Seminar in Climatology (4) II. Shetton Seminar—3 hours.

295. Seminar in Urban Geography (4) II. Cline Seminars Seminar—3 hours.

296. Seminar in Agricultural Geography (4) II. Gregor Seminar—3 hours.

297. Seminar in Industrial Geography (4) III. Gregor Seminar—3 hours.

298. Group Study (1-5) I, II, III. The Staff Preceptor consent of instructor.

299. Research (1-12) I, II, III. The Staff Chairperson (in charge) (S/U grading only.)

390. Individual Study (1-12) II, III. The Staff Preceptor graduate student status in Geography and consent of instructor. (S/U grading only.)

NOTE: For key to footnote symbols, see page 128.

Geology

(Journal of Letters and Science)
Jere H. Lipp, 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
Gordie Durrell, Ph.D., Professor Emeritus
Anthony Finney, Ph.D., Assistant Professor
Harry W. Green II, Ph.D., Professor
Charles G. Higgins, Ph.D., Professor
Jere H. Lipp, Ph.D., Professor
Robert A. Matthews, A.B., Lecturer
James S. McClain, Ph.D., Assistant Professor
Eldridge M. Moore, Ph.D., Professor
Jeffrey F. Mount, Ph.D., Assistant Professor
Dennis R. O'Keane, Ph.D., Lecturer
Philip W. Signor, Ph.D., Lecturer
Bruce E. Taylor, Ph.D., Assistant Professor
Bernie W. Trexel, M.A., Lecturer
Robert J. Twist, Ph.D., Associate Professor
Kenneth L. Verosub, Ph.D., Associate Professor
Peter W. 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. Students desiring a less intensive program in geology as part of their general education or as preparation for non-professional careers in geology may elect the program leading to the Bachelor of Arts degree. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics. Either program additional courses may be selected for emphasis in physical or environmental geology.

Geology

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
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</thead>
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<td>Preparatory Subject Matter</td>
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<td>Zoology 2 or Geology 3-6</td>
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<tr>
<td>Chemistry 1A-1B, 4A-4B</td>
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<tr>
<td>Geology 50, 50L, 60, 60L</td>
<td>10</td>
</tr>
<tr>
<td>Mathematics 13A-15A, 21A-21B</td>
<td>8-10</td>
</tr>
<tr>
<td>Physics 2A, 2A, 2B, 3B</td>
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<tr>
<td>Depth Subject Matter</td>
<td>36</td>
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<tr>
<td>Additional upper division units in geology and related fields approved by the major</td>
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<tr>
<td>Total Units for the Major</td>
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</tr>
</tbody>
</table>

Note: For key to footnote symbols, see page 128.

Recommended:

Chemistry 1C or 4C, Geology 2, 2L, 3, 3L, Statistics 13.

Geology

B.S. Major Requirements:

<table>
<thead>
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<th>Requirement</th>
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<tr>
<td>Zoology 2 or Geology 3-6</td>
<td>4</td>
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<tr>
<td>Chemistry 1A-1B, 4A-4B</td>
<td>15</td>
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<td>Geology 50, 50L, 60, 60L</td>
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<tr>
<td>Mathematics 21A, 21B, 21C</td>
<td>12</td>
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<tr>
<td>One course from Mathematics 22A-22B, 225</td>
<td>3</td>
</tr>
<tr>
<td>Physics 8A-8B-8C, or 2A-2B-2C and 3A-3B-3C</td>
<td>12</td>
</tr>
</tbody>
</table>

Recommened:

Chemistry 1C or 4C, Geology 2, 2L, 3, 3L, Statistics 13.

Major Advisers: C. G. Higgins (A.B. and B.S. degrees); and R. Cowen, R. A. Matthews (B.S. degrees).

Minor Program Requirements:

Students in other disciplines may elect to complete a minor in one of the geological subjects listed below. Such minors may be posted on transcripts to show competence in the ancillary field chosen.

Environmental Geology

Geology 115, 117A, 117B, 120, 136, 170

One course chosen from Economics 123, Engineering 160, Geology 192, 195, 196

Minor Adviser: B. E. Taylor.

Geology

Geology 115, 117A, 117B, 134, 175

One course chosen from Environmental Studies 180, 171, 175, Geology 154

Minor Adviser: A. Matthews.

Geochemistry

Chemistry 110A, 110C

One course chosen from Chemical Engineering 151, Chemistry 126, Engineering 130, 134, Geology 154, Soil Science 102, Water Science 190

Minor Adviser: A. Matthews.

Geophysics

Geology 117A, 117B, 136, 175

One course chosen from Environmental Studies 180, 171, 175, Geology 154, Soil Science 121

Minor Adviser: C. G. Higgins.

Oceanography

Geology 106, 108, 109, 150B, 150C

One course chosen from Environmental Studies 100, 151, Geology 111A, 111B, 5119, Water Science 180

Minor Adviser: P. D. Ward.
Courses in Geology

1. Evolution of Earth (I) C. Owen; III, Higgin
Lecture—3 hours. For those not majoring in geol,
ogy, geophysics, or oceanography. Origin and physical de
velopment of the Earth through geologic time, and the processes
and materials that formed it.

2. Earth Laboratory (I) C. Owen; III, Higgin
Laboratory—3 hours. Prerequisite: course 1 (concurrent).
Intended for those not majoring in geology or associated sciences
—mainly geophysics, oceanography, and meteorology. Rocks and minerals, structures
(faults and folds), and processes (sea floor spreading and continental drift) that formed the Earth, illustrated by labora
tory specimens.

3. Landforms (II) Higgin
Lecture—3 hours. Prerequisite: course 1 recommended.
Landforms and landscapes—the sculpture of the Earth’s surface by natural processes.

4. Ancient Environments (II) Higgin
Laboratory—3 hours. Prerequisite: courses 1L and 2 (prefer
table taken concurrently). How to study and interpret landforms geologically, an introduction to some of the geomorphol
ogy’s tools—maps, models, aerial photographs, and the landscape around us.

5. History of Life (III) C. Owen
Lecture—2 hours. Lecture—2 hours. Discussion—2 hours. The problem of non-renewable natural resources. Their role in technology and society; their availability, rates of depletion, and the prob
able impact on society of their exhaustion.

6. Earthquakes and other Earth Hazards (II) C. Owen
Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and floods on Man, his structures and his envi
ronment. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.

7. Geology of California (II) C. Owen
Lecture—2 hours; demonstration—1 hour. The geologic history of California, the origin of the rocks and the evolution
ments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral re
sources, and appreciation of the California landscape.

8. Physical Geology (II) C. Owen
Lecture—3 hours. Prerequisite: high school physics and chemistry. A rigorous introduction to physical geology for freshmen and sophomores. Crystalline and igneous rocks: the earth and solar system; geologic time; Earth’s interior; plate tectonics; crustal deformation; rocks and minerals; weathering, erosion, and sedimentation; volcanism, plutonism and metamorphism.

9. Physical Geology Laboratory (II) C. Owen
Laboratory—6 hours; one or two day field trips. Prerequisite:
to have had physical geology concurrently. Laboratory work to illustrate topics in course 5. Emphasis on introduction to classification and recognition of minerals and rocks, and on reading topographic and geologic maps.

10. General Mineralogy (III) C. Owen
Lecture—3 hours. Prerequisite: course 1 or 2A. Petrography of igneous rocks; petrography of metamorphic rocks; petrography of sedimentary rocks. Identification of the common igneous, metamorphic, and sedimentary rocks. Field mapping experience.

11. Geochemistry (III) C. Owen
Lecture—3 hours. Prerequisite: course 10 or 1B. Chemical 1A (may be taken concurrently); course 50. Application of principles of solution, water, structural, and colloidal, and isotopic chemis
try to geologic problems. Formation of carbonate rocks and other chemical sediments, rock weathering, and clay min
eral formation, Magmatic, metamorphic, and hydrothermal processes and radioisotopic dating techniques.

12. Palaeoecology (III) C. Owen
Lecture—2 hours. Prerequisite: course 20 or 23. Application of principles of solution, water, structural, and colloidal, and isotopic chemis
try to geologic problems. Formation of carbonate rocks and other chemical sediments, rock weathering, and clay min
eral formation, Magmatic, metamorphic, and hydrothermal processes and radioisotopic dating techniques.

150. Physical and Chemical Oceanography (4) I. Powell (Environmental Studies) Lecture—3 hours; discussion—1 hour. Prerequisite: course 116 or Environmental Studies 116, Physics BC, Mathematics 22C, Chemistry 1; or upper division standing in a natural science major. Analysis of seawater, physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (Same course as Environmental Studies 150A.)

150B. Geologic Oceanography (3) II. Lips Lecture—3 hours. Prerequisite: course 50 or 116. Introduction to origin of ocean basins. Composition and structure of ocean crust; marine volcanism; and deposition of marine sediments. Interpretation of geophysical and seismic data for the study of ocean floors and sea-floor spreading theory. (Same course as Environmental Studies 150B.)

150C. Biological Oceanography (3) III. Ward, Powell (Environmental Studies) Lecture—3 hours. Prerequisite: Biological Sciences 1 and a course in general ecology of coastal consultant. Survey of the ecology of the ocean ecosystem including the plant and animal life of the near-shore shellfish, deep, and pelagic communities. Experiments and laboratory exercises. Advanced work in this field is also available for graduate students. (Same course as Environmental Studies 150C.)

152. Photogeology and Remote Sensing (4) II. Higgins Lecture—4 hours; discussion—2 hours. Prerequisite: course 1L or 2L; or course 105 recommended. Field use of aerial photographs: types and availability; stereoscopic viewing, and basic geometry of photography. Interpretation of aeronautical photographs and of images obtained by remote sensing.

153. Geomorphology (4) I. Higgins Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 50-50L, or 1L-1L, or courses 2L-2L, or Geography I recommended. Introduction to the study of landforms; development, classification and classification of landforms; development and classification of streams; classification and classification of surface waters; principles and principles and classification of the atmosphere. Alternates with and complements course 154. Offered in even-numbered years.

154. Environmental Geomorphology (3) I. Higgins Lecture—3 hours; laboratory—6 hours. Prerequisite: course 50-50L, or 1L-1L, or courses 2L-2L, or Geography I recommended. Principles of geomorphology that apply to the use of the natural environment. Alternates with and complements course 153. Offered in odd-numbered years.

156. Stress and Deformation (4) I. Green Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21C and Physical Chemistry 22A, 22C, and Physics 88 recommended. Introduction to stress analysis: tensor notation transformation, representation quadratic, Mohr circle construction; stress, strain, strain rates, elasticity, Solution of general, three-dimensional problems with special reference to small disturbances.

160. Geology of Ore Deposits (4) I. Taylor Lecture—3 hours; laboratory—3 hours; four-day field trip (including field data for prerequisite courses 404L and 105L). Examination of major metallic ore types using principles of plate tectonics, structural geology, petrology, and geochemistry. Laboratory study of selected ore deposits.

175. Introduction to Geological Engineering (3) III. Shen (Civil Engineering) Lecture—2 hours; laboratory—3 hours. Prerequisite: junior standing. Introduction to the principles of geological engineering and geological engineering practices. Applications to the principles of geological engineering and geological engineering practices.

180. Instrumental Analysis (5) I. The Staff Lecture—3 hours; laboratory—6 hours. Prerequisite: elementary and elementary physics. Theory of the general principles of instrumental analysis and applications to the determination of crystal structures and the applied chemistry of rocks, minerals, and other compounds. Laboratory sessions will be given on use of the x-ray diffractometer and electron microprobe both as a scanning electron microscope and analytical tool.

181. Geologic Applications of Computers (3) I. Crago and Harrison Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing and one upper division geology course or consent of instructor. Introduction to solution of geological and paleontological problems by computer methods.

185. Advanced Field Geology (3)-I, II, III. The Staff Field work resulting from A written report. Prerequisite: course 118 or graduate standing in geology. Advanced problems and methods in geologic field studies. Preparation of a geologic report.

190. Seminar in Geology (1) I, II, III. The Staff Discussion—1.5 hours; credit—1 hour. Prerequisite: major in Geology. Seminar on selected topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (P/N grading only.)

192. Internship in Geology (1-12) I, II, III, The Staff (Chairperson in charge) Work experience and work experience. Prerequisite: upper division standing; project approval prior to internships. Supervised work experience and work experience for a total of 10 units. (P/N grading only.)

196. Directed Group Study (1-5) I, II, III, The Staff (Chairperson in charge) Senior standing in geology or consent of instructor.

199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses

206. Statistical Analysis (3) I. The Staff Lecture—4 hours. Prerequisite: courses 105L and 106L. Offered in conjunction with Advanced Geology 150. (P/N grading only.)

210. Geologic Mapping (3) I. The Staff Lecture—4 hours. Prerequisite: course 210, or consent of instructor. The use of maps and charts in the study of geology. Offered as a seminar course.

212. Advanced Geology (3) I. The Staff Lecture—3 hours. Prerequisite: course 115 or Geology 102B. Topics selected by students and instructor. Offered as a seminar course.

220. Geology of Metamorphic Rocks (3) I. Day Lecture—3 hours. Prerequisite: courses 125, Chemistry 110A, or consent of instructor. Petrographic analysis of metamorphic rocks to determine the rock types of igneous rocks and their relationship to the development of metamorphic rocks.

225. Genesis of Metamorphic Rocks (3) II. Day Lecture—3 hours. Prerequisite: courses 125, Chemistry 110A, or consent of instructor. Petrographic analysis of metamorphic rocks to determine the rock types of igneous rocks and their relationship to the development of metamorphic rocks.

226. Structural Geology (3) I. Lips Lecture—3 hours; laboratory—6 hours. Prerequisite: course 115A or 111B, or graduate standing in a biological science. Selected problems in structural geology. Subject to be studied is decided at the beginning of the year.

235. Functional Morphology of Fossil Invertebrates (3) I. Cowles Lecture—2 hours; laboratory—4 hours. Prerequisite: course 111A or 111B. Comparative anatomy of the fossil invertebrates and its application to the development of invertebrate paleontology.

240. Paleontology (3) I. Lips, Ward Lecture—3 hours. Prerequisite: course 111A or 111B, or graduate standing in a biological science. Selected problems in paleontology. Subject to be studied is decided at the beginning of the year.

243. Functional Morphology of Fossil Invertebrates (3) I. Cowles Lecture—2 hours; laboratory—4 hours. Prerequisite: course 111A or 111B. Comparative anatomy of the fossil invertebrates and its application to the development of invertebrate paleontology.

249. Evolutionary Biology of Protozoa (3) I. Lips Seminar—3 hours. Prerequisite: course 111A. Analysis and discussion of fossilized topics on the evolution of singlecelled organisms with emphasis on their fossil record and biological interest. Offered in even-numbered years.

270. Advanced Study of Ore Deposits (3) I. Taylor Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 115, 125, 125L, 170, and course 270L (concurrent). Course 124 recommended. Study of the mode of occurrence, geochemistry, petrology, and effects of ore deposits on ore deposits. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate paleontology.

270L. Advanced Ore Deposits Laboratory (3) I. Taylor Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 115, 125, 125L, 170, and consent of instructor. Course 124 recommended. Study of the mode of occurrence, geochemistry, petrology, and effects of ore deposits on ore deposits. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate paleontology.

271. Seminar in Ore Deposits (3) I. Taylor Seminar—3 hours. Prerequisite: course 170. Critical review of topics in ore deposits selected according to participants'
German

A.B. Major Requirements:

Preparatory Subject Matter (for both German Language and Literature) 4-22
German 1-2 or 1AT-2AT (or the equivalent) 0-18
German 4 or 6A-6B 4
Recommended: Linguistics 1.

Depth Subject Matter 40

German Literature Emphasis
German 101, 121A, 121B, 121C 16
German 102, 103 (must be taken in residence) 8
Additional upper division units in literature 8
Include one 4-unit course in comparative literature, another national literature, or in translation.

German Language Emphasis
German 101, 102, 103 12
German 104A-104B 8
Two courses from 105, 106, 107, 108 16
German 120 and one upper division literature course 8
Additional upper division units chosen in consultation with the adviser 4

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, individual minor programs may be designed upon consultation with the undergraduate adviser.

The minor program can be of particular interest to students who wish to round out their training in other fields through a foreign language or literature degree.

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. Henderson Discussion—5 hours; laboratory—two 1-hour sessions. (Students who have successfully completed German 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. Should the student fail, he will receive a letter grade unless a P/NP petition is filed.)

1ATA-1ATB-1ATC. Individualized German (2-2-2) I-II-III.

Henderson: The three segments of course 1AT correspond to course 1. Student-instructor contact consisting of individual tutoring and testing periods. Students may start at any point and complete one or more two-unit segments in any one of the three segments.

2. Elementary German (6) I, II, III. Henderson Discussion—5 hours; laboratory—two 1-hour sessions. Prerequisite: course 1.

2ATA-2ATB-2ATC. Individualized German (2-2-2) I-II-III.

Henderson: The three segments of course 2AT correspond to course 2. Student-instructor contact consisting of individual tutoring and testing periods. Students may start at any point and complete one or more two-unit segments in any given quarter.

3. Intermediate German (6) I, II, III. Henderson Discussion—5 hours; laboratory—two 1-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, III. The Staff Discussion—5 hours; prerequisite: course 3. (Course 4 may be taken concurrently with 6A and/or 6B.) Review of grammatical principles by means of written exercises; expanding vocabulary through reading 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 and everyday vocabulary of modern spoken German. (P/NP grading only.)

6B. Spoken German (2) I, II, III. The Staff Discussion—2 hours. Prerequisite: course 3. (Courses 4 and 6A may be taken concurrently with 6B.) Conversational practice 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 one segment each of 11H, 11N, or 11S and 12H, 12N, or 12S, satisfies Letters and Science College foreign language requirement. Students who successfully completed the second or more advanced year of high school level course work in the 10th or higher grade may receive unit credit for this course on a P/NP grading basis only.

11H, 11N, 11S. Reading German (4) II, Hoermann Lecture—1 hour; discussion—2 hours; translation projects—1 hour. Prerequisite: successful completion of course 11H, 11N, or 11S. Completion of course 11H, 11N, or 11S with specialized focus on one of the Ring of the Nibelungs' cycles. May be counted toward major in German. Offered in odd-numbered years.

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. Completion of course 11H, 11N, or 11S with specialized focus on one of the Ring of the Nibelungs' cycles. May be counted toward major in German. Offered in odd-numbered years.

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 Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism; culminating in Wagner's "total art-work" concept and "Rebirth of the Nibelungen" cycle. May be counted toward major in German. Offered in odd-numbered years.

49. Seminar in German (2) I, Hoermann Discussion—2 hours. Knowledge of German not required. Inquiry into the intellectual roots of problems confronting today's students, participation by such modern German literary figures as Nietzsche, Kafka, Hesse, Brecht, and Günter Grass. Enrollment limited. (P/NP grading only.)
50. Survey of German Culture in English Translation (2) I. Fatzer 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 Arts and Literature.

51. Masterworks of German Literature in English Translation, I (3) I. Hofmann Discussion—2 hours. Knowledge of German not required. Representative masterworks in English translation, beginning with the psychological realism of Büchner’s Woyzeck, progressing through Naturalism and Expressionism, culminating in works by Mann, Kafka, Rilke 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. For lower division students. (PINP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Upper Division Courses

100A. Advanced German Conversation (2) I. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4, intensive conversational practice, accurate pronunciation, and language fluency.

100B. Advanced German Conversation (2) II. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

100C. Advanced German Conversation (2) III. The Staff (Chairperson in charge) Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

101. Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours; written reports. Prerequisite: course 4 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

102. Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours; written reports. Prerequisite: course 101 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

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) II. The Staff (Chairperson in charge) Discussion—3 hours; written reports. Prerequisite: course 104 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

104B. Improved Translation (4) III. The Staff (Chairperson in charge) Discussion—3 hours; written reports. Prerequisite: course 104 or the equivalent. Exercises in German/English translation of literary and non-literary texts.

105. German Phonology—Morphology (4) II. Bernewer Discussion—3 hours; written or oral report. Prerequisite: course 4 or the equivalent. Exercises in German phonetics and the structure of the phonological system. Elementary morphological analysis. Offered in odd-numbered years. (PINP grading only.)

106. History of the German Language (4) III. Bernewer Discussion—3 hours; written reports. Prerequisite: course 105 or Linguistics 1 recommended. Survey of the development of German language and study of its structure in historical perspective. Offered in even-numbered years. (Same course as Linguistics 106.)

107. German Syntax (4) II. Bernewer Discussion—3 hours; written or oral reports; problem sets. Prerequisite: course 4 or the equivalent; Linguistics 1 recommended. Study of major problems in describing Modern German sentence structure; competing theories of syntax as applied to German. Offered in odd-numbered years.

108. Varieties of Modern German (4) II. Bernewer Discussion—3 hours; written or oral reports. Prerequisite: course 4 or consent of instructor. Relationship of standard and high German. Survey of uses of modern German in various fields such as advertising, politics and ideology. Offered in even-numbered years.

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. Analysis of English translations of literature from the Middle Ages through the Reformation (Nibelungenlied, Godfried's Tristan and Isolde and Wolfram's Parzival, lyric poetry, selections from works of Johann von Tepf, Conrad Celtes, Sebastian Brant, Erasmus, Luther). Offered in odd-numbered years.

111. Studies in Major Writers from the Seventeenth to the Twentieth Century (in English) (4) II. Hoermann Discussion—3 hours; written reports. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Course intended for non-majors. Study of principal works in English translation by one or more major authors such as Grimmelshausen, Lessing, Schiller, Goethe, Heine, Hofmannsthal, Thomas Mann, Brecht, and Kafka. Content will alternate from quarter to quarter. Offered in even-numbered years.

112. Special Topics in German Literature (4) I. Schaeffer Discussion—3 hours; written reports. Prerequisite: Knowledge of German not required. Analysis of significant themes in German literature, myths, legends and fairytales, war and social justice as literary themes, and humor in contemporary German literature. Offered in odd-numbered years.

113. Goethe's Faust (4) I. Neres 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 chappel versions, Marlowe’s drama to Goethe’s world classic, Part I and II. Offered in odd-numbered years.

114. Heinrich Heine (4) III. Neres Lecture—3 hours; additional readings and written reports. Knowledge of German not required. Course intended for non-majors. A study of the major ideas and issues of the principal novels, with emphasis on man’s dualism and his search for self-knowledge and self-fulfillment. Discussion of such works as Siddhartha, Steppenwolf, Narcissus and Goldmund. Offered in even-numbered years.

115A. German Literature since 1945 (4) I, Menges Lecture—3 hours; written reports—1 hour. Reading of major works including the post-war generation of Austria, Switzerland and West Germany. Discussion of novels like Böll, Grass, Johnson, Walker, Handke, playwrights such as Frisch, Dürrenmatt and Hochhuth and poets like Celan, Enzensberger and Aichinger. Knowledge of German not required.

115B. German Literature since 1945 (4) II. Schaeffer Lecture—3 hours; written reports—1 hour. Reading and discussion of the literature of the German Democratic Republic (East Germany), the theory of literature in the socialist world, the practice of this literature as exemplified in such authors as Smittmann, Seghers, Wolf, Kast, Hacke. Knowledge of German not required.

116. Intellectual Backgrounds of German Literature (4) III. Menges Discussion—3 hours; written reports. Knowledge of German not required. Course intended for non-majors. Survey of German intellectual history from Lautz to Heidegger with emphasis on literary aspects and influences, including authors such as Kant, Hegel, Schelling, Fichte, Schopenhauer, Nietzsche, Freud and Bloch. Offered in odd-numbered years.

120. Survey of German Culture (4) III. Fetzer Lecture-discussion—3 hours; written reports—3 hours. Prerequisite: course 4 or course 101 may be taken concurrently. Survey of German literature from the Carolingian beginnings around 800 to the period of Baroque. Emphasis on major works representative of the various literary movements.

121B. Survey of German Literature from 1700 to 1948 (4) II. Neres Lecture-discussion—3 hours; written reports—3 hours. Prerequisite: course 101 may be taken concurrently. Survey of German literature from the Enlightenment to 'Biedermeier' with particular emphasis on classical and romantic movements in the nineteenth centuries.

121C. Survey of German Literature from 1850 to Present (4) III. Menges Lecture-discussion—3 hours; written reports—3 hours. Prerequisite: course 101 may be taken concurrently. Survey of German literature from the beginnings of Realism (1850) to present. Particular emphasis on emergence of modern and contemporary (postwar) literary developments.

122. The Medieval Period in German Literature (4) I. McConnell Discussion—3 hours; written reports. Prerequisite: course 101 (may be taken concurrently) or consent of instructor. The literary-philosophical profile of the Mittelhochdeutsche Blutzeit' in terms of the significant county and folk epics and the Minnesang: Readings in modern German. Discussion in German and English. Offered in odd-numbered years.

123. Literature of the Classical Age (4) II. Neres Discussion—3 hours; written or oral reports. Prerequisite: course 101 (may be taken concurrently) or consent of instructor. A critical assessment of principal works of Goethe and Schiller in their development from the Baroque to the Enlightenment, individualism and rebellion to the balanced harmony of the classical period. Offered in even-numbered years.

126. Modern German Literature (4) III. Menges Discussion—3 hours; written reports. Prerequisite: course 101 (may be taken concurrently) or consent of instructor. Selections from the significant works of major twentieth-century authors, such as Heym, Hesse, Kafka, Rilke, Brecht. Discussion in German and English. Offered in even-numbered years.

127. The German "Novelle" (4) III, Bernd Lecture—3 hours, written reports. Prerequisite: course 101 (may be taken concurrently) or consent of instructor. Inquiry into the art of the "Novelle" through analysis of the materials and devices of reports written from Goethe to Kafka. Discussion in German and English.

128. The German Drama (4) II. Fetzer Lecture—3 hours; written reports. Prerequisite: course 101 (may be taken concurrently) or consent of instructor. Study of the significant works and developments in the plays of Germany's leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Hebbel, Hauptmann, Brecht. Discussion in German and English.

134. Special Study for Honors Students (5) I, II, III. The Staff Prerequisite: open only to honors students. Guided research leading to an honors paper.

186. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

189. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Graduate Courses

200. Gothic (4) I. Bernewer Seminar—3 hours. Knowledge of modern German not required. Phonology, grammar and reading of Gothic texts. Special topics including the relationships of Gothic to Indo-European and to the other Germanic languages. Offered in even-numbered years. (Same course as Linguistics 200.)

201. Old High German (4) II. Bernewer Seminar—3 hours. Study of the beginnings of German as a written language through the reading of selected texts from the eighth through the eleventh centuries. Linguistic analysis of the Gesta. Offered in odd-numbered years.

202. Middle High German (4) I, II. McConnell Seminar—3 hours. Outline of grammar; selections from Middle High German epic and lyric poetry.

205. History of the German Language (4) I, II. Bernewer Seminar—3 hours. Development of the German language with emphasis on the early transitional Indo-European to Middle High German. (Same course as Linguistics 205.)

206. Syntax of Modern German (4) I, II. Menges Seminar—3 hours. written reports. An examination of the syntactic structures of the contemporary language using one of the current models of syntactic analysis. Offered in even-numbered years.

210. Techniques of Literary Scholarship (4) I, Menges Seminar—3 hours. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.
240. Forms of German Verse (4). II. Sammern-Frankennegk Seminar—3 hours. The development of German verse from the Middle Ages to Gottfried Benn, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor.

241. The German Drama (4). III. Menges Seminar—3 hours. The major forms of German drama from its origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.

242. The German "Novella" (4). I. Bernd Seminar—3 hours. The major German Novelleisten, with particu-
lar emphasis on the flowering of this genre in the nineteenth century. May be repeated for credit with consent of instructor.

243. Medieval Epic Literature (4). II. McConnell Seminar—3 hours. Prerequisite: course 202 or consent of
instructor. A critical analysis of selected epic poetry of the "Saints" and the "Dietrich," Tristan und Isolde, and the Nibelungenlied. All texts read in Middle High German.

250. Medieval Lyric Literature (4). III. McConnell Seminar—3 hours. Prerequisite: course 202 or consent of
instructor. A critical analysis of selected lyric poetry of medieval Germany, such as Walther von der Vogelweide, Heinrich von Morungen, and Reinmar von Hagenau. All texts read in Middle High German.

251. Seminar in a Major Author (4). III. Bernd Seminar—3 hours. Written report. The course will concern the work of a major German author. May be repeated for credit with consent of instructor; actual content will vary from year to year.


253. Goethe (4). I. Nerjes Seminar—3 hours. Study of the origins of Goethe's thought in German Pietism, and his principal artistic autobiographi-
cal, scientific, and philosophical works.

254. Schiller (4) III. Nerjes Seminar—3 hours. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries.

255. Heinrich von Kleist (4). III. Bernd Seminar—3 hours. A critical analysis of Kleist's major dramatic and prose works; special attention will be given to the peculiar hermeneutic problems in modern German, French and Anglo-Amerikan Kleist criticism.

256. The Novels of Thomas Mann (4). II. Menges Seminar—3 hours. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany.

257. Studies in Kafka (4). I. Hoemann Seminar—3 hours. Study of Kafka's narrative techniques with special emphasis on the shorter works on the existential development from its roots in expressionism. Offered in even-numbered years.

258. The Poetry of Rilke (4). I. Menges Seminar—3 hours. Study of the principal motifs, myths, images and problems in the poetry of Rainer Maria Rilke.

259. Brecht and the Epic Theater (4). III. Menges Seminar—3 hours. Study of the major works with emphasis on the ideas which impelled the development of new literary forms and concepts.


261. Survey of Nineteenth-Century German Literature (4). II. Sammern-Frankennegk Seminar—3 hours; written reports—1 hour. A survey of the main trends and topical elements in nineteenth-century German literature from 1815 until the rise of naturalism with special emphasis on the development of concept of realism and its reflection in the major works by authors from Germany, Austria and Switzerland.

262. Survey of Twentieth-Century German Literature (4). III. Menges 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 (Hauptmann), through Symbolism (Rilke, Hofmannsthal), Neue Stahlschleife to literary developments after 1945 in East Germany, Switzerland, Austria and West Germany.

265. Middle High German Literature (4). III. McConnell Seminar—3 hours. Prerequisite: course 202 or consent of
instructor. An extensive reading of Middle High German texts in the original language. Examines linguistic and literary problems.

266. The Renaissance and Reformation in German Literature (4). I. Schaefer Seminar—3 hours. The parodic and didactic style in Ger-
man's literature during the sixteenth century. May be repeated for credit with consent of instructor.

267. German Literature of the Baroque (4). III. Schaefer Seminar—3 hours. The "Elegantized" and the varying methods used to portray it in seventeenth century German literature. May be repeated for credit with consent of instructor.

268. The Enlightenment in German Literature (4). II. Nerjes Seminar—3 hours. The revolt against the excesses of the "Elegantized" and the evolution of a literature based on reason and wit. May be repeated for credit with consent of instructor.

269. Sentimentality and "Sturm und Drang" in German Literature (4). III. Nerjes Seminar—3 hours; written reports. Reaction to overempha-
sis on Reason: the theories of Hamann and Herder and the works of Lessing, Lessing, and Schiller. May be repeated for credit with consent of instructor.

270. 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.

274. The Romantic Period in German Literature (4). III. Felzer Seminar—3 hours. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

275. Poetic Realism in German Literature (4). I. Bernd Seminar—3 hours. Outstanding figures in German literature between 1840 and 1890, important phases in their development. May be repeated for credit with consent of instructor.

276. Twentieth-Century German Literature (4). I. Menges Seminar—3 hours. Written report. The course will concern 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.

277. Group Study (1-6). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

280. Individual Study (1-12). I, II, III. The Staff (Chairperson in charge) (SU grading only.)

280. Individual Study (1-12). I, II, III. The Staff (Chairperson in charge) Discussion, directed reading (SU grading only.)

Professional Courses

390A. The Teaching of German (1). I. Henderson Lecture—1 hour. Prerequisite: graduate standing or con-
sent of instructor. Theological instruction in modern teaching
methods and demonstration of their practical application. Intended primarily for graduate teaching assistants.

390B. The Teaching of German (1). II. Henderson Lecture—1 hour. Prerequisite: graduate standing or con-
sent of instructor. Theoretical instruction in modern teaching
methods and demonstration of their practical application. Intended primarily for graduate teaching assistants.

390C. Practical Phonetics of German (1). I, II. Bernd Discussion—1 hour. An introduction to the sounds and sound patterns of modern German with laboratory exer-
cises. (SU grading only.)

400. Tutorial and Internship (3). I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: graduate standing. Student training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critical seminar. May be repeated for credit.

The Major Program

This major is designed to develop critical intelligence and to foster an understanding of ourselves and our world through the study of the past — both remote and recent. The Department offers a variety of approaches to history, each emphasizing basic disciplinary skills: weighing evidence, analyzing 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 man-
agement. Professional schools in these and related fields are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express...
conclusions logically in everyday language. These analytical skills are stressed in many history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A student electing a major in History may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly on the history of one geographic area or time period of their choosing. The purpose of Plan II is to encourage interested students, including those preparing for graduate work in history, to enroll in a seminar, to undertake independent work, and to study the history of Asia as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II. The purpose of Plan III is to enable students to study in depth the field of twentith-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 fields 20

a. Western Civilization: History 4A, 4B, 4C, 1, 2, 3, 10, 30
b. Asian Civilization: History 9A, 9B

Depth Subject Matter—Plan I 40-41

At least six upper division courses from one of the fields of concentration listed below include a two-quarter sequence of courses 24

At least three upper division courses from one of the other fields listed 12

At least one course from the following: History 101, or 102 (in field of concentration), or 103 (in field of concentration) 4-5

Total Units for the Major, Plan I 60-61

Depth Subject Matter—Plan II 42

At least four upper division courses from one of the fields of concentration listed below include a two-quarter sequence of courses 16

At least three upper division courses from one of the other fields listed 12

History 101 5

History 102 in field of concentration 5

History 103 in field of concentration 4

Total Units for the Major, Plan II 62

Depth Subject Matter—Plan III 41

At least three upper division courses chosen from the following list of twenty-course history courses, classified by area of concentration. At least one course must be from category A 12

A. Asia and Latin America: 161B, 163B, 165, 166B, 168, 190C, 193, 194C


C. Europe: 137C, 141, 143C, 144C, 147A, 147C, 151D

History 102 on a topic in twenty-century history (normally chosen from sections E, F, H, I, J, M, or N) 5

Two additional upper division history courses selected from courses within a single field of study (e.g., Europe, United States, Africa, Latin America, Asia) which do not cover twentieth-century history 8

Total Units for the Major, Plan III 61

Fields of Concentration:


f. A student may group courses from two related fields, (a) through (e) above, to make a field of concentration where there are not enough courses in one particular area of study. Approved groupings include: Africa and Europe, Africa and Latin America, Africa and the United States. For other groupings, or to meet special needs, a student should obtain written approval from an advisor. Within broad fields, a student may wish to concentrate some of the courses on a particular area or period, such as China or Great Britain in Medieval Europe. Special approval is not required.

Recommended

Completion of all three courses in Western Civilization (History 4A, 4B, 4C) and one or two courses (normally a two-quarter sequence) in one of the following fields: American studies, classics, cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, sociology, or statistics.


Minor Program Requirements:

History units may be taken in a single field of concentration, such as Africa, East Asia, Europe, Latin America or the United States. Alternatively, students may minor with a thematic emphasis, as listed below, or may choose to minor in consultation with a Department advisor. One course for the minor in history may be taken on a passed/not passed basis.

NOTE: For key to footnote symbols, see page 128.
Courses in History

Lower Division Courses

1. The Bible and Ancient History (4) I. Schwab
   Lecture—3 hours; discussion—1 hour. An examination of the Judeo-Christian tradition as it met ancient Near Eastern political, ideological, and religious 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. Fleisher
   Lecture-discussion—1 hour. The growth of ancient civilizations from the Sumerians to the Fall of the Roman Empire.

3. Cities: A Survey of Western Civilization (4) I, III. Willis

4A. History of Western Civilization (4) I, II. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. The growth of western civilization from late antiquity to the Renaissance.

4B. History of Western Civilization (4) 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) III. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. The development of Western Civilization from the Eighteenth Century to the present.

7. Latin American Civilization (4) III. Bauer
   Lecture—3 hours; discussion—1 hour. An introduction to Latin America from the Mayans, Incas and Aztecs to the present. The course presents a micro-cosmic picture of a single individual (ranging from an Aztec peasant to Eva Perón) which were drawn from documentary and photographic evidence. Supplementary sessions explain the individual's social context and significance.

8A. History of East Asian Civilization (4) I, II. Liu
   Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis on thought, religion, political and social life, art and literature. Perspectives on contemporary China are provided.

8B. History of East Asian Civilization (4) II. Kinmont
   Lecture—3 hours; discussion—1 hour. Surveys traditional Japanese civilization and its modern transformation. Emphasis on thought, religion, political and social life, art and literature. Perspectives on contemporary Japan are provided.

10. World Leaders: An Introduction to the Twentieth Century (4) II. Brower
   Lecture—3 hours; discussion—1 hour. Twentieth-century history through biography (Wilson, Lenin, Hitler, Roosevelt, Stalin, Mao, Nehru, Castro and others).

15. Introduction to African History (4) I, II. Brantley
   Lecture—3 hours; term paper. An examination of the long-range historical context as background to current conditions in Africa. The survey includes the early development of African civilizations through the twentieth-century colonial domination by Europeans.

17A. History of the United States (4) I, II.
   The Staff
   Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War.

17B. History of the United States (4) I, II, III.
   The Staff
   Lecture—3 hours; discussion—1 hour. The American people from Reconstruction to the present.

18. Introduction to United States History Through Film (4),
   Goodman
   Lecture-discussion—4 hours; use of film. An introduction to American history using approximately nine films with parallel readings on selected themes, such as the American Indian, the Civil War, the Great Depression, the culture of success, political and films may vary.

22. Violence and Law in America (4) III.
   Colburn
   Lecture—2 hours; discussion—2 hours. Movements of protest or social control from the revolutionary period to the present.

27A. Afro-American History (4) I, II.
   Lecture—3 hours; discussion—1 hour. The history of black people in the United States from the African background to Reconstruction.

27B. Afro-American History (4) II, III. Trotter
   Lecture—3 hours; discussion—1 hour. The history of black people in the United States from Reconstruction to the present.

36. Russian Culture History (4) I, Crummen
   Lecture—3 hours; written reports. A survey of Russia's history over the last thousand years as reflected in the lives of her political leaders, artists, and rebels. Lectures will use the biographies of Russian political leaders, artists and to illustrate the general currents of the country's political, social and cultural development.

61. Discovery and Settlement of Spanish America (4) II.
   Poppo
   Seminar—4 hours. Some knowledge of Spanish recommended. Examination of the laws, customs, and activities of pre-Colombian and colonial Spanish-Spanish men and women on the New World as reflected through reading and discussion of contemporary letters, reports, and other forms of documentation, and painting or translation. Each student to keep a journal of his studies. No final examination. Limited enrollment.

"Introduction to Brazilian History" (4) I, Poppo
   Lecture—1 hour; seminar—3 hours. Reading of basic documents in English translation and extensive use of slide. Emphasis on nineteenth-century slavery, race relations and economic development.

73A. Social History of American Woman and the Family (4)
   Rosenberg
   Lecture—3 hours; discussion—1 hour. The social and cultural history of women, marriage and the family in western colonial America to the end of the nineteenth century emphasizing changes resulting from the secularization, commercialization and industrialization of American society.

73B. Social History of American Woman and the Family (4)
   Rosenberg
   Lecture—3 hours; discussion—1 hour. The social and cultural history of women, marriage and the family in Western Europe and England in the eighteenth and nineteenth centuries. Emphasis on the family and the woman's role in the family and the family and the women's movement.

79A. Great Issues in American History I (4) Jackson
   Lecture—3 hours; discussion—1 hour. Discussion of historian's viewpoints of the nation's past, focusing upon the conflict of interpretation about key periods and events since 1865.

79B. Great Issues in American History II (4) Jackson
   Lecture—3 hours; discussion—1 hour. Discussion of historian's viewpoints of the nation's past, focusing upon the conflict of interpretation about key periods and events since 1865.

   Seminar—4 hours; term paper. Prerequisite: consent of instructor. Examination of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. Limited enrollment.

90A. Modernization of China (4) I, III.
   Lecture-discussion—4 hours. Written reports. Reading and discussion of aspects of modern China. Background on the contemporary period presented.

90B. Modernization of Japan (4) II.
   Lecture-discussion—4 hours. Written reports. Reading and discussion of aspects of modern Japan. Background on the contemporary period presented.

95. Preparatory in Historical Study (4) III. The Staff (Chairperson in charge)
   Discussion—3 hours; written reports. Prerequisite: consent of instructor. Primary for lower division students. (P/NP grading only.)

96. Special Study for Undergraduates (1-5).
   I, II, III. The Staff (Chairperson in charge)
   (P/NP grading only.)

Upper Division Courses

101. Introduction to Historical Thought and Writing (5).
   I, II. Landau
   Lecture-discussion—4 hours; term paper. Prerequisite: consent of instructor. Study of the history of historical thought and writing, and of critical and interpretative approaches of history and evaluation of modes of organization, interpretation and style 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 readings, discussion, research and writing in selected topics in various fields of history: (A) Ancient; (B) Medieval; (C) Renaissance and Reformations; (D) Europe to 1815; (E) Russia; (G) China to 1900; (H) China since 1800; (I) Britain; (J) Latin America since 1810; (K) American History to 1786; (L) United States since 1786-1860; (M) Japan; (N) Africa; (P) Christianity and Culture in Europe, 50-1800. May be repeated for credit. Limited enrollment.

103. Topics in Historical Research (4) I, II, III.
   The Staff (Chairperson in charge)
   Discussion—3 hours; individual consultation with instructor; paper. Prerequisite: consent of instructor. Individual research and writing in a relatively narrow topic in one of various fields of history. May be repeated for credit.

111A. Ancient History (4).
   Poppo
   Lecture—3 hours; discussion or paper (student option). History of the Near East and the ancient core of the European tradition.

111B. Ancient History (4).
   Poppo
   Lecture—3 hours; discussion or paper (student option). History of the Near East and the ancient core of the European tradition.

112C. History of East and Central Africa (4) II.
   Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, recommended. An introductory survey of the history of East and Central Africa from 1000 to the present. The course is a part of an interdisciplinary African sequence which includes Anthropology 1396 (fall), History 1156 (winter) and Political Science 136 (spring).

   Fleischer
   Lecture—3 hours; written reports. Prerequisite: courses 115A and 115B recommended. An introductory survey of the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1800 to 1950.

118. African History: Special Theme (4) III.
   Brantley
   Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B recommended. An introductory survey of the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1800 to 1950.

121A. Medieval History (4).
   I. Bowsey
   Lecture-discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century.

121B. Medieval History (4) II.
   I. Bowsey
   Lecture-discussion and panel presentations—3 hours. European history from Chaucer to the twelfth century.

121C. Medieval History (4) III. Bowsey
   Lecture-discussion and panel presentations—3 hours. European history from Chaucer to the twelfth century.

130A. Christianity and Culture in Europe: 50-1450 (4).
   Fleischer
   Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics.

130B. Christianity and Culture in Europe: 1450-1600 (4).
   Fleischer
   Lecture—3 hours; written report or research paper. A history of the Lutheran, Anglican and Catholic Reformations as foundation stones of a new culture in Europe, with special attention to the interconnections between the revival of antiquity and the different reform movements.

130C. Christianity and Culture in Europe: 1600-1800 (4).
   Fleischer
   Lecture—3 hours; written report or research paper. A survey of the intellectual, cultural and political re-orientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism.

131 A. Early Modern European History (4).
   I. Fleischer
   Lecture—3 hours; written report or research paper. A history of the intellectual, cultural and political re-orientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism.
183A. The Frontier Experience: Trans-Mississippi West (4). Jackson Lecture—3 hours; discussion—1 hour. Prerequisite: course 17A or 17B, or consent of instructor. Selected topical historical case from the period from 1800 to the present. Emphasis will be on analysis, synthesis and interpretive overview rather than a chronological narrative of events.

183B. Intellectual History of the United States (4) II. Smith Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: course 17A or the equivalent; or course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-Century American thought from the 1820s to about 1900, emphasizing Transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

185C. Intellectual History of the United States (4) II. Smith Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in modern political theory, philosophy, American literature, or sociological theory. Twentieth-Century American thought from about 1900 to the 1960s, emphasizing pragmatic individualism, naturalism in law and literature, protestant liberalism and neo-orthodoxy. Frequent currents in social thought and social criticism of the 1960s.

186A. Social and Cultural History of the United States (4) I. Merchant Lecture-discussion—3 hours; term paper. Study of social and cultural forces in American society from colonial times through the Civil War with emphasis on social structure, immigration and nativism, racial and occupational groups, social reform movements and changes in social values.

186B. Social and Cultural History of the United States (4) III. Rosen Lecture-discussion—3 hours; term paper and written or oral report. Study of social and cultural forces in American society since the Civil War with emphasis on social structure, immigration and nativism, labor organizations, racial and national groups, social reform movements and changes in social values.

186C. Social and Cultural History of the United States (4) III. Merchant Lecture-discussion—3 hours; written and/or oral reports. Prerequisite: course 17A or 17B or consent of instructor. Theories of class structure and "mass" culture in U.S. history; attention to several selected topics for the quarter, including such topics as popular religious movements, attitudes toward presidential election, advertising and popular mass media, popular literature and class subcultures.

177. Black History Since 1900 (4) III. Trotter Lecture—3 hours; discussion—1 hour. Prerequisite: courses 17A, 17B or 219 strongly recommended. Examination of the political, economic, social, and intellectual history of black people in the United States from 1900 to the present.

178. American Colleges and Universities (4) III. Smith Lecture—3 hours; term paper. A survey of American higher learning from colonial Harvard to the present, emphasizing institutional intellectual life and the role of colleges and universities in their larger society. Tutored term paper; readings of general interest. Offered in even-numbered years.

179. The Working Class in American Society (4) I. Brody Lecture—3 hours; written reports. Prerequisite: course 17B recommended. The social class structure of "mass" culture in the United States from the mid-nineteenth century to the present. Social, economic and political forces. Trade unionism and radical movements. Offered in even-numbered years.

180A. Growth of American Politics to 1815 (4) I. Goodman Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlement to 1815 focusing on the distribution of power, its change over time and the ways power has been used. Examines political party development and the social and intellectual origins of political behavior.

180B. Growth of American Politics, 1815-1880 (4) II. Goodman Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A.

180C. Growth of American Politics, 1880 to the Present (4) II. Goodman Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B.
204A. Historiography (4) I. The Staff (Chairperson in charge)
Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-history graduate students. Introduction to major works of historical scholarship from the Greeks to the present.

204B. New Methods of Historical Research (4) II. The Staff (Chairperson in charge)
Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-history graduate students. Introduction to basic historical data, to the methods currently employed in historical research, and to the problems of presenting findings in a literary form.

204C. Thematic Seminar (4) III. The Staff (Chairperson in charge)
Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-history graduate students. Interdisciplinary seminar emphasizing socioeconomic, political, and intellectual themes. May be repeated for credit.

211. Ancient History (4), II
Seminar—3 hours; prerequisite: courses 111A, 111B, 111C. A seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

221. Medieval History (4) I. Bowdy
Seminar—3 hours; prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

232. Russian History (4)
Seminar—3 hours; prerequisite: a reading knowledge of Russian. Topics related to the history of Muscovy and Imperial Russia before 1856.

242. History of the Enlightenment (4) II. Schwab
Seminar—3 hours; prerequisite: a reading knowledge of French, Intellectual and social history of Europe during the Enlightenment. May be repeated for credit.

245. Modern European History (4) I. Hagen, Margadant
Seminar—3 hours; prerequisite: course 201E. Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit.

246. Europe in the Twentieth Century (4) II. Willis
Seminar—3 hours; prerequisite: a reading knowledge of French, Intellectual and social history of Europe during the Enlightenment. May be repeated for credit.

251A-251B. English History (4-4) III
Seminar—3 hours. Prerequisite: courses 151A, 151B, 151C, 151D recommended. (Deferred grading only, pending completion of sequence.)

261. Latin American History (4) I, II, III. Bauer, Poppino
Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.

270. Early American History (4) III. Jacobson
Seminar—3 hours.

271. History of the United States, 1760-1815 (4) II. Goodman
Seminar—3 hours.

272. History of the United States, 1815-1861 (4) I. Calhoun
Seminar—3 hours.

273A-273B. Research Seminar in the Comparative History of Women and the Family (4-4) III. Rosen
Seminar—3 hours. Research in literature, methods, and historical approaches to the area of the women and the family culminating in each student completing a research paper in this field. (Deferred grading only, pending completion of sequence.)

274. Recent History of the United States (4) I
Seminar—3 hours. Topics in twentieth century American history.

275. American Social and Intellectual History (4) I. Smith
Seminar—3 hours. Prerequisite: courses 175A, 175B and 175C or the equivalent, or consent of instructor. Studies in the history of American society and culture. May be repeated for credit.

276. Social History of Science and Technology in America (4) I. Sherwood
Seminar—3 hours. Prerequisite: graduate standing. Studies in the historiography of, and research in, the history of science and technology in America from colonial times to the present.

278A. Seminar: Topics in Afro-American History (4) I. Trotter
Seminar—3 hours; term paper. Prerequisite: graduate students in a literary or consent of instructor. Examination of a series of topics (demographic, economic, social, cultural, and political) in Afro-American history from the African background to the present. Particular attention is given historiography, methodology, and problems in research on Afro-American life and history. Offered in odd-numbered years. (Deferred grading only, pending completion of sequence.)

278B. Seminar: Topics in Afro-American History (4) II
Trotter
Seminar—3 hours; term papers. Prerequisite: graduate students in history or consent of instructor. Examination of series of topics (demographic, economic, social, cultural, and political) in Afro-American history from the African background to the present. Particular attention is given historiography, methodology, and problems in research on Afro-American life and history. Offered in odd-numbered years. (Deferred grading only, pending completion of sequence.)

278C. Seminar: History of the United States: the Frontier (4) III
Boody
Seminar—3 hours. Emphasis on social and economic developments.

278D. Seminar: History of the United States: the Frontier (4) II. Jackson
Seminar—3 hours.

278H. History of the United States: the Frontier (4) III.
Shideley
Seminar—3 hours. Prerequisite: graduate standing. Emphasis on American history and closely related topics such as exports, transportation and politics.

291A-291B. Chinese History (4-4) III. Liu, Price
Seminar—3 hours. Prerequisite: consent of instructor. Research on topics to be chosen by the students for the purpose of writing article-length papers.

291C. Chinese History (4) II. Price
Seminar—3 hours. Prerequisite: reading knowledge of Chinese. Readings in Chinese historical materials. Training in the techniques of using Chinese reference works will be provided.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

299D. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Courses
300. The Teaching of History in the Junior College and Secondary Schools (3)
Lecture—3 hours. Prerequisite: junior or senior standing with a teaching major or minor in social studies. Methods for the presentation of history at the secondary and junior college levels.

300C. Teaching History in College (1) I, II, III.
Seminar—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the University. (SU grading only.)

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, home economics, 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. Additional comprehensive courses are acceptable. Courses without parentheses are required.)

UNITS
Preparatory Subject Matter .................................................... 61-83
Anthropology, cultural or general sociology (Anthropology 2 or Sociology 3) ................. 4
Biological science (Biological Sciences 1) ................................ 5
Chemistry, including organic (Chemistry 1A, 1B, 8A, 8B) ........................................ 16
Economics (Economics 1A, 1B) ............................................. 10
Physics (Physics 2 or 110) .................................................... 4.5
Psychology, general (Psychology 1) ........................................ 4
Statistics (Statistics 13 or Economics 12) ..................................... 4.5
Textiles and clothing, including properties of fabrics and social/psychological aspects of dress (Textiles and Clothing 6, 7) ........... 7

Other expression and oral expression (see College requirement, page 74) ........... 8

Depth Subject Matter .......................................................... 47-49
Economics, Consumer Economics 141, 142 ...................................... 11
Food and nutrition, Food Science and Technology 100A, 100B, Nutrition 101-102 or 110-111 .......................... 14-15
Human development, Human Development 110, and 100A or 100B or 100C ............................................. 8
Textiles and clothing, Textiles and Clothing 162 ........................................ 3

Plus a specialization, select one from the following:
(a) Consumer affairs ...................................................... 11
Agricultural Economics 112, Consumer Science 100, Rhetoric 140 or 141
(b) Food and nutrition ..................................................... 12
Food Science and Technology 101A, 101B, Nutrition 111L, 118, 120
(c) Housing and environmental design .................................... 12
Applied Behavioral Sciences 171, Design 134, and 180A or 180B or 180C
(d) Human development .................................................. 12
Human Development 100A, 100B or 100C, and 102 or 103
(e) Textiles and clothing ..................................................... 12
Textiles and Clothing 17A, 161 or 163, 161L, or 162L, or 163L, Design 143

Restricted Electives ........................................................... 31-37
Additional courses related to the major determined in consultation with adviser.

Unrestricted Electives ......................................................... 35
Total Units for the Major .................................................. 180


Graduate Study. See page 97.

Teaching Credential Subject Representative. See under the major in Agricultural Education.
Human Development

Courses In Home Economics

Lower Division Courses

90. Challenges and Opportunities in Home Economics (1) III. Schuiz in charge
Seminar—1 hour. Specialists in selected areas of home economics discuss current issues facing today's professional including challenges, opportunities, and prospects for appropriately trained university graduates. May be repeated once for credit with consent of instructor. (P/NP grading only.) Offered in even-numbered years.

92. Internship in Home Economics (1-12) II, III. The Staff (Schutz in charge)
Laboratory—36 hours. Work-experience opportunity on and off campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

192. Internship in Home Economics (1-12) II, III. The Staff (Schutz in charge)
Laboratory—36 hours. Work-experience opportunity on and off campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

196. Directed Group Study (1-5) II, III. The Staff (Schutz in charge)
Prerequisite: consent of instructor. Directed group study of selected topics in home economics. (P/NP grading only.)

198. Special Study for Advanced Undergraduates (1-5) II, III. The Staff (Schutz in charge)
Prerequisite: consent of instructor. Directed individual study for advanced undergraduate students. (P/NP grading only.)

Home Economics Education

See Agricultural and Home Economics Education

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 relationship of the person, the family, and the community. It is an appropriate major for those planning to pursue advanced degrees in the behavioral sciences and offers course work useful for persons who will later pursue careers in education, child guidance, social welfare, health science related fields, or research in human development.

Human Development majors observe infants, children, and adults in a variety of situations. You may also participate in study projects with people from different socioeconomic and cultural backgrounds who function in a variety of institutional settings (schools, hospitals, mental health clinics, and group foster homes).

Students who anticipate exploring the biological aspects of Human Development should include in their preparatory course work the prerequisites for upper division biological sciences courses.

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.)

Preparatory Subject Matter

- Anthropology 1 and 2
- Biology (Biology Sciences 1 or 10)
- Genetics (Genetics 10, 116)
- Nutrition 10 or 101
- Statistics

Human Development 30A-30B

Note: These courses are recommended in Biological Sciences 1, Genetics 116, and Physiology 110.

Depth Subject Matter

- Human Development 100A, 100B, 100C, 110
- Social-cultural processes (Human Development 102, 103)
- Assessment (Human Development 120, 121)
- Cognitive processes (Human Development 101, 132)
- Exceptional children (Human Development 130, 131)
- Practicum (Human Development 140A, 141, 142A, 142B, 142C)
- Additional upper division Human Development or related courses from list of restricted electives as determined in consultation with faculty advisor

Breath Subject Matter

- English or rhetoric, to include at least one upper division course (see College requirement, page 74)
- American history or political science

Unrestricted Electives

- 96-110

Total Units for the Major

180

Major Adviser: L. M. Bachhold.
Related Major Program. See the major in Applied Behavioral Sciences (page 146).

Courses in Human Development

Questions pertaining to the following courses should be directed to the instructor or the Department of Applied Behavioral Sciences, 119 AOS-4.

Lower Division Courses

30A-30B. Observational Techniques and Case Study of a Young Child (2-1) III, III. Walker
Lecture—2 hours; laboratory—2 hours (30A) semivar—1 hour (30B). Prerequisite: 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.)

96. Special Study for Undergraduates (1-5) II, III. The Staff (Schutz in charge)
(P/NP grading only.)

Upper Division Courses

101A. Infancy and Early Childhood (4) II, III. Harper
Lecture—3 hours; discussion—1 hour; field observation of preschool children. Prerequisite: Introductory psychology and biology. Analysis of the biological, social, and cognitive developmental processes of children, prenatal through age six.

100B. Middle Childhood and Adolescence (4) II. Bryant
Lecture—4 hours; 3 brief observations of school-age children. Prerequisite: course 101A or the equivalent. Introductory biology. Analysis of the interplay of biological and social-cultural factors in the development of cognitive and social development from middle childhood through adolescence.

100C. Adolescence (4) I, III. Hawkins
Lecture—3 hours; discussion—1 hour. Prerequisite: Introductory psychology. Bio-sociocultural aspects of adolescent development.

101. Cognitive Development (4) I. Kraft
Lecture—3 hours; discussion—1 hour. Prerequisite: Introductory psychology; courses 100A-100B recommended. Research related to cognitive development and its applications to perception, learning, memory, concept formation, and language.

102. Social and Personality Development (4) I. Byrne
Lecture—3 hours; discussion—1 hour. Prerequisite: Introductory psychology; courses 100A-100B recommended. Research related to the development of interpersonal and culturally valued skills.

103. Cross-Cultural Study of Children (4) III. Werner
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S.

110. Contemporary American Family (4) II. Crockenberg
Lecture—4 hours. Prerequisite: introductory psychology. Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.

120. Research Methods in Human Development (4) Barton
Lecture—2 hours; discussion—2 hours. Prerequisite: courses 100A-100B or the equivalent; elementary statistics. Research in selected areas of human development (e.g., Infancy, learning, cognition, socialization, personality).

121. Psychological Assessment (4) II, III. Barton, Werner
Lecture—4 hours. Prerequisite: courses 100A-100B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.

130. Emotionally Disturbed Children (4) III. Bryant; III, Bachhold
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or consent of instructor. Discussion of pervasiveness, learning, behavior, and socialization. Identification to community resources.

131. Developmental Disabilities (4) II. Barton
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities, etiology, diagnosis, education and socialization. Introduction to community resources.

132. The Gilded (3) III. Bachhold
Lecture—2 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) I, II, III. Walker
Lecture—2 hours; discussion—1 hour; laboratory—5 hours. Prerequisite: course 101A and consent of instructor; course 100A recommended. Communication and interaction model with children six months to five years of age. Linkage of communication theory with behavior.

140B. Laboratory in Early Childhood: Child-Care Programs (4) I, II, III. The Staff (Walker in charge)
Lecture—2 hours; discussion—1 hour; laboratory—5 hours. Prerequisite: course 140A and consent of instructor; interaction with children six months to five years of age in a preschool program. Linkage of child development theory with practice. Sec. 1, Infancy: Sec. 2, program planning and analysis. May be repeated for credit with a change in section.

141. Field Studies with Infants (4-6) II, I. The Staff (Crockeren in charge)
Discussion—2 hours; field study—6 hours. Prerequisite: course 100B or the equivalent and consent of instructor. Study of children's affective, cognitive and social development in the context of their family school environment. 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. Bachhold
Discussion—1½ hours; field study—6 hours. Prerequisite: course 101A and consent of instructor. Study of children identified as developmentally disabled.
emotionally distressed, or intellectually gifted. May be re-
peared for credit for a total of 12 units following consul-
tation with and consent of instructor.
190. Supervision and Administration of Early Childhood Education Programs (4) Extra-session summer. Weiler Lecture—40 hours total. Prerequisite: course 140A or prior experience in an early childhood education program. His-
try of early childhood programs in California, federal, state and local regulations. Implications of different regu-
lations for: funds and budgetary policy; making and implement-
ing policy; professional and legal responsibilities; staff development; and professional attitudes and issues. Offered in odd-
numbered years.
190C. Introductory Research Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: involvement in ongoing research. Research topics are presented and discus-
sions are held. May be repeated for credit. (P/NP grading only.)
198. Directed Group Study (1-5) I, II, III. The Staff (P.I.C. in charge) (P/NP grading only.)
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (P.I.C. in charge) (P/NP grading only.)

Graduate Courses
201. Infant Development (3) I. Crockenin Seminar—3 hours. Prerequisite: graduate standing and consent of instructor. Analysis of therapy and research on infant development. Emphasis on prenatal and perinatal in-
fluences, temperament differences, attachment, cognitive development, the family context, at-risk infants. Cons-
tinuous and cumulative research methodology. Offered in even-
numbered years.
211. Physiological Correlates of Behavioral Development (3) II. Biology Seminar—3 hours. Prerequisite: consent of instructor. An overview of the physiology of organismic development and the implications of developmental biology for the study of behavioral ontogeny. Consideration of parallels between major processes of organismic development and behavioral development in animals and in human and non-human mammals.
213. Cross-Cultural Study of Childhood (3) II. Werner Seminar—3 hours. Prerequisite: graduate standing. Current theory and research concerning with the relationship of child and social class, in humans and non-human primates. Emphasis on opportunities, environments, and relationships encour-
ging intra- and interpersonal growth and satisfaction empha-
sizes.
221. Psychological Assessment of Children (4) I. Backlund Lecture—2 hours; discussion—2 hours. Prerequisite: course 121 or consent of instructor. Study of children's behavior through observation, examination, and evaluation of perceptual-motor, cognitive, affective and social development. Problems in assessment of exceptional children. Consideration of assessment factors. Offered on a competitive basis to one child.
231. Issues in Cognitive and Linguistic Development (3) III. Krait Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.
237. Parent-Child Interaction (3) I. The Staff Seminar—3 hours. Prerequisite: consent of instructor; upper division course in the family relationship. Current theory and research. Emphasis on behavior of parent and child in their psychological well-being, social development, and moral development. Offered in odd-numbered years.

Individual Major

(Colleges 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 the faculty advisers and the appropriate college committee. This major enables the 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 and professional goals and provide, where appropriate, a basis for the student'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.

College of Agricultural and Environmental Sciences

(Graduate Programs in Agricultural, Environmental, and Natural Resources Sciences)

Program Office, 122 Horten Hall

B.S. Major Requirements:

Preparatory Subj. Matter (variable)

Lower division courses basic to the program and needed to satisfy preparatory requirements for upper division requirements.

Depth Subj. Matter (variable)

An individualized program of 45 upper division units taken from two or more areas of study (at least one of which must be within the College). At least 30 of the 45 must be units taken from courses provided by the College.

Unrestricted Electives (variable)

Total Units for the Degree

180

Additional Requirements:

At least 54 of the 180 units needed for graduation must be upper division. The College also requires that at least 8 units must be in English or a foreign language courses that emphasize written or oral expression (see page 74).

Major Adviser:

The course of study must be developed in consultation with the Master Adviser, 122 Horten 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.

College of Engineering

Program Office, 2122 Bainer Hall

B.S. Major Requirements:

Subject Areas (minimum) UNITS

Mathematics calculus, analytical equations, vector analysis) ........................................ 18

Physical and biological sciences (including at least 10 units of general chemistry and 15 units of physics for engineering and science students) ......................................................... 26

Analytic mechanics and strength of materials ................................................................. 6

Applied thermodynamics .......................................................... 3

Applied electricity and magnetism .......................................................... 5

Properties of materials .......................................................... 4

Engineering design (courses selected from a list developed for Individual Engineering Majors by the Undergraduate Study Committee) ......................................................... 5

Additional upper division engineering courses, exclusive of 180 units .......................... 24

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

Humanities-social sciences (from a list of courses and courses approved by the Undergraduate Study Committee) ......................................................... 24

Additional units to complete 180-unit program (Unrestricted electives, 10 units maximum) ......................................................... 57

Total Units for the Degree ......................................................... 180

Student Proposal

To follow this alternative, your completed program of study and a statement of objectives must be reviewed by the College Undergraduate Office prior to the official beginning date of the third quarter preceding graduation. It is your advantage to submit your proposal well in advance of this deadline (during your junior year) so that any modifications required by the Committee can be made before the begin-
ing of your senior year. Once your curriculum has been approved, changes may be made only for good cause and with the further approval of the Committee. Additional in-
formation may be obtained from the Engineering Under-
graduate Office. (Also see pages 80-83.)

College of Letters and Science

(Dean's Office)

Program Office, 150 Mark Hall

Committee in Charge

Robert L. Rudd, Ph.D. (Zoology), Committee Chairperson

Lawrence Berman, Ph.D. (Political Science)

Robert D. Glaz, Ph.D. (Mathematics)

Roland W. Hoermann, Ph.D. (Comparative Literature, German)

T.Y. Shen, Ph.D. (Economics)

Marian B. Ury, Ph.D. (Comparative Literature)
Integrated Studies; International Agricultural Development

A.B. and 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 ............................................................................. 45-54

Upper division units must include:

a. interrelated and complementary courses from two or more departments which provide a unified pattern and focus;

b. at least 30 units from Letters and Science teaching departments or programs;

c. no more than 10 units in courses numbered 194H, 198 and 199.

Total Units for Degree ................................................................. 180

Student Proposal

A student submits to the Dean’s Office his or her major proposal and an essay, discussing educational purposes, personal 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 Advisor(s) (selected by student). Principal Advisor: a faculty member in a teaching department or program in the College of Letters and Science in major field of emphasis. Secondary Advisor: a faculty member from secondary area of interest.

Honors Program

Toward the end of their junior year, students potentially eligible for highest honors at graduation (see page 96) may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee’s approval of a senior thesis prospectus that has been agreed upon by the student and faculty advisor. The prospectus must be presented to the Committee during the first quarter of the senior year. Graduation with highest honors will be conditional upon both the maintenance of the required grade-point average and the completion of the senior thesis project. The Committee will consider alteration of the student’s original major proposal to allow up to 3 units of independent study during each of the last two quarters of the senior year for work on senior honors thesis.

Integrated Studies

(College of Letters and Science)

Kenneth R. Greider, Ph.D., Program Director

Program Office, 816 Sproul Mall (752-3377)

Committee in Charge

Kenneth R. Greider, Ph.D. (Physics), Committee Chairperson

Robert S. Bloch, M.A. (Music)

Donald Gibbs, Ph.D. (Philosophy and Civilizations)

Arthur E. McGuinness, Ph.D. (English)

Alan A. Stambusky, Ph.D. (Drama)

Merna R. Villarpe, Ph.D. (Biochemistry and Biophysics), Winter and Spring Quarters

Faculty

Daniel R. Brower, Jr., Ph.D., Professor (History)

Gordon J. Edlin, Ph.D., Professor (Genetics)

Donald Gibbs, Ph.D., Associate Professor (Oriental Languages and Civilizations)

Kenneth R. Greider, Ph.D., Professor (Physics)

Peter L. Hays, Ph.D., Professor (English)

*Arthur E. McGuinness, Ph.D., Professor (English)

Nora McGuinness, M.A., Lecturer (Integrated Studies)

*David A. Robertson, Ph.D., Associate Professor (English)

G. Thomas Salley, Ph.D., Professor (Mathematics)

Alan A. Stambusky, Ph.D., Professor (Drama)

Daniel Wick, Ph.D., Lecturer (Integrated Studies)

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. These disciplines relate to a common historical period or a common theme. The program encourages cross-disciplinary interests in its faculty and students. It values close contact between student and professor, and these disciplines both in the classroom and in the residence hall. Integrated Studies offers an intelligent model for the fulfillment of the college breadth requirements as all of these courses count toward the completion of requirements in all three undergraduate colleges. Integrated Studies courses are open to all students with consent of the instructor. Enrollments are limited in order to keep the class sizes small. (Approximately 70.) Students take three integrated Studies courses during the year, as well as the Integrated Studies Seminar each quarter, and live in "B" Building of the Terceo dormitory complex.

Courses in Integrated Studies

Lower Division Courses

1A, 1B, 1C, 1D. Ideas and Issues in the Sciences (4) I, II, 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 1982-83 the themes are perspectives on "Contemporary Societies" and "Civilization and Culture." Each field selected are history, literature, theology, and a year-long course in twentieth-century Western European, Asian, and American culture.

2A, 2B, 2C, 2D, 2E. Ideas and Issues in the Arts (4) I, II, III. The Staff (Greider in charge) Lecture—4 hours. Exploration of major themes and/or major figures in the humanities. Emphasis on the integration of history and the arts. Themes and fields will vary from year to year. For 1982-83 the themes are perspectives on "Contemporary Societies" and "Civilization and Culture." Each field selected are drama, history, literature, theology, and a year-long course in twentieth-century Western European, Asian, and American culture.

8. Colloquium (1) I, II, III. The Staff (Greider in charge) Discussion—1 hour. Lectures, films, and readings on the interactions between the arts and sciences. May be repeated for credit. (P/NP grading only.)

9. Seminar (1) I, II, III. The Staff (Greider in charge) Lecture—1 hour. Preparation of a research report. Lectures, films, and readings on the themes for the year. May be repeated for credit. (P/NP grading only.)

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 and stability, 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 consulting firms, and in multinational development companies working overseas.

International Agricultural 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.)

Preparatory Subject Matter ......................................................................................................................... 49-50

Social Sciences core

Physical Science (Chemistry 1A, 1B) ........................................................................................................ 10

Mathematics (Mathematics 19, 19A, Agriculture) .................................................................................... 10

Science and Management (150) ................................................................................................................ 7

Biological science (Biological Sciences 1, 2, 3, 4) .................................................................................... 7

Nutrition 10, Botany 2, Zoology 1 ............................................................................................................ 12

English (see College requirement, page 74) ............................................................................................... 8

Social Sciences (Applied Behavioral Sciences 19, Anthropology 2, Political Science 2, Sociology 1, History 4C) ......................................................................................................................... 12

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International Agricultural Development

185. Field Study in Mexican Agricultural Development (3). II. Hansen (Agricultural Economics). Field trip—8 days; seminar—four 2-hour sessions. Prerequisite: prior enrollment with consent of instructor required. Knowledge of Spanish is not required. Observation of agricultural development strategies and impact on Northwestern Mexico. Discussion with farmers and agency staff members. Study of unique Mexican institutional arrangements and experiences in dealing with agricultural development problems. United States influences on Mexican agriculture. (PINP grading only.)

186. Directed Group Study (1-5). I, III. The Staff (Major Adviser in charge). Prerequisite: consent of instructor. (PINP grading only.)

189. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Major Adviser in charge). (PINP grading only.)

Graduate Courses

206. Analysis of Agro-Ecosystems for Agricultural Change (4). III. Sands (Agronomy and Range Science; Plant Growth Laboratory). Lecture—3 hours; discussion—1 hour. Prerequisite course 100A-100B (or the equivalent) for consent of instructor. Ecosystems analysis applied to major world agricultural ecosystems as a basis for the design and management of agro-ecosystems for improved agricultural productivity. (PINP grading only.)

207. Analysis of Farming Systems (4). I. The Staff (Graduate Group Chairperson in charge). Lecture—3 hours; discussion—1 hour. Prerequisite course 100A-100B or consent of instructor. Analysis of the farming systems as a basis for understanding farmer behavior, designing improved farming systems, and contributing to design of agricultural policies; development of decision-making models for agriculture. (PINP grading only.)

208. Social Systems and Agricultural Development (4). II. 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 process; agrarian movements and revolution; evaluation of theories of rural development; application of social analysis to design and implementation of rural and agricultural policies and programs.
International Relations

(College of Letters and Science)
Program Office, 351 Voorhis Hall (752-3063)

Committee in Charge
Paul E. Zinner, Ph.D. (Political Science), Committee Chair
Conrad J. Bahre, Ph.D. (Geography)
Arnold J. Bauer, Ph.D. (History)
David J. Boyd, Ph.D. (Anthropology)
Waken K. Domke, Ph.D. (Political Science)
W. Eric Gustafson, Ph.D. (Economics)
James P. Hawley, Ph.D. (Sociology)
Key H. Kim, Ph.D. (Oriental Languages and Civilizations)

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 more 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" or 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 knowledge of English and the working knowledge of one other modern (foreign) language (approximately 26 units of course credit or the equivalent). Students with a native language other than English may satisfy this requirement through examination and certification.

One program of special interest to International Relations majors is the Education Abroad Program ("junior-year abroad"). Students of international affairs have found EAP an invaluable experience, providing insights into the life and culture of individuals in another country.

The work-learning program assists students in obtaining internships for academic credit related to their field of study. Legislative, legal, and business internships have proved to be the most popular among International Relations students. The "Davis in D.C." program arranges summer internships in Washington, D.C.

International Relations gives the student a wide range of opportunities for advanced study and for careers in agencies of the federal government—in the U.S. or abroad, state agencies, international or non-governmental 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:

Preparatory Subject Matter: 25-51
Economics 1A, 1B: 10
Political Science 3: 4
Geography 10: 4
History 4C: 4
One course selected from Anthropology 2, History 4B, 7, 9A, 9B, 15, 17B, Political Science 1, 2: 4

Approximately 26 units for the equivalent in one modern foreign language: 0-26
Recommended: one course in a language, (e.g., Economics 12, Sociology 46A, 46B, Statistics 13)

Depth Subject Matter: 48
Political Science 130: 4
Economics 115A, 115B, or 115C: 6
One course from History 137C, 143C, 146B, 161B, 168, 190C, 194C: 4
One course from Political Science 120, 122, 123, 133: 4
Interdisciplinary seminar, Political Science 190 (Normandy in senior year): 4
Cluster emphasis: 2-4
Choose one from the three clusters shown below. These three courses are divided among at least three departments, including at least two courses from each of two departments. Courses must be in addition to those applied toward requirements above.

Total Units for the Major: 73-99

Course List for Cluster Emphasis

Economics (two courses in Economics required)

Anthropology 122
Economics 115B, 115C, 115D, 115E, 115F, 115G
History 141, 142, 143

Politics 117, 123, 127, 132, 137, 140, 178
Sociology 116, 139, 141, 170

(2) Political Science (two courses in Political Science required)

Anthropology 128, 129
Economics 115B, 115C, 115D, 115E, 115F, 115G
History 141, 142, 143

Political Science 117, 123, 127, 132, 133, 134, 136, 137, 138, 140, 141, 142, 144, 146, 147, 148A, 149B, 149C, 178, 179
Sociology 116, 139, 141, 170, 175

(3) Regional Emphasis: Latin America, Europe, East Asia, Soviet Union and Eastern Europe, or Africa (two courses in History required in the selected region)

Anthropology 128, 135, 139A, 194B, 146, 147, 162, 190, 191


Political Science 128, 132, 133, 134, 136, 137, 140, 141, 142, 144, 146, 147, 148A, 149B, 149C, 178, 179
Sociology 139, 147, 170

Major Adviser: P. E. Zinner (Political Science)

Italian

(College of Letters and Science)
Department Office (French and Italian), 513 Sprout Hall (752-0830)

Faculty
Alfonso De Petris, Dottore in Filosofia, Professor
Dennis J. Dusichke, Ph.D., Associate Professor
Gustavo Foscari, M.A., Lecturer
Maria I. Manoliu-Manea, 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 and to develop an appreciation for Italian language and culture. The program of Italian studies at UCD is small and geared to the individual needs of the student. A full range of courses is offered which satisfies the humanities and fine arts area requirement. The use of Italian is stressed on all levels and a knowledge of the language is required for literature courses which are taught only in Italian. Also offered are literature courses in translation which are intended for those students not majoring in Italian. A course on Italian culture and civilization is also taught in English. 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 people which have a uniquely rich culture and history.

A minor in Italian is available to those aware that a knowledge of foreign languages is of vital importance in today's increasingly international world. In every sector of society, language skills enhance our chances of getting jobs and successfully keeping them. In a more general sense, our understanding and appreciation of other cultures is dependent on our ability to perceive them clearly; there is no better means of perceiving a foreign culture than through its own language. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live (for brief or longer periods of time) and work in Italy have a choice of cities: Milan for business, Rome for international concerns in agriculture and nutrition in the F.A.O., and Florence for retail commerce and the arts, just to name a few. In the U.S., foreign owned companies or American companies with interests in the foreign market need qualified people who are also fluent in a foreign language.

Italian

A.B. Major Requirements:

Preparatory Subject Matter: 0-21
Italian 1, 2, 3, 10A or 10B (for equivalent): 0-21

Depth Subject Matter: 36
Upper division courses in Italian: 36

Two of these courses may be chosen from department approved courses in related fields.

Total Units for the Major: 36-57
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) III, De Petris Lecture-discussion—3 hours; weekly essays. Prerequisite: course 10I or consent of instructor.

107. Survey of Italian Culture and Institutions (4) III, Fascini Lecture-discussion—3 hours; term paper. An assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed on achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English.

108. The Image of Man in the Italian Renaissance (4) III, De Petris Lecture—3 hours; term paper. Prerequisite: course 10B or consent of instructor. Process of progressive naturalization of the concept of man and emphasis upon different perspectives of human autonomy, self-determination and scientific "curiosity," in three parts: (a) Renaissance man and his environment; (b) philosophical thought: the adversary evaluation of the concept of Man; (c) prose and poetry.

113A. Italian Literature before the Renaissance: from Augustus to the Popes (4) I, II, III, V Fascini Lecture-discussion—3 hours. Prerequisite: course 10B or consent of instructor. Study of the origins of lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The development of an Italian standard of poetry, with emphasis on the Sicilian School of Poetry, the Dolce Stil Nuovo, and Petrarch.

113B. Italian Literature after the Renaissance: Dante's Divine Comedy and Boccaccio (4) II, Duttich Lecture-discussion—3 hours; term paper. Prerequisite: course 10B or consent of instructor. Study of the origins of non-lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The Divina Commedia and the development of a prose style (emphasis on Boccaccio's De camerino).

115A. Italian Literature of the Renaissance and the Baroque: from Humanism to Machiavelli (4) III, De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 10B or consent of instructor. The development of a Renaissance ideal of man and the subsequent loss of faith in this ideal as evidenced in the work of Lorenzo de Medici, Politico, Ariosto and Machiavelli.

115B. Italian Literature of the Renaissance and the Baroque: from Cavallino to Marino (4) III, De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 11A: A continued examination into the loss of an ideal. Emphasis on the conflicts in Machiavelli and Tasso leading to Marino, with an excursion on Galilei's role in the formation of a modern literary standard.

118. Italian Literature of the Eighteenth Century (4) I, De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 10B or consent of instructor. The development of modern Italian literature. Emphasis on the works of Goldoni, Bettinelli, Barretti, Patini, Affari and Vico.

119. Italian Literature of the Nineteenth Century (4) I, De Petris Lecture-discussion—3 hours; term paper. Prerequisite: course 10B or consent of instructor. Aspects of Romanticism in Italy, including Manzoni, Verga and Verlaine.

120A. Italian Literature of the Twentieth Century: The Novel (4) II, Duttich Lecture-discussion—3 hours; term paper. Prerequisite: course 10B or consent of instructor. The development of the novel from Luigi Pirandello and his role in the development of contemporary Italian drama.

120B. Italian Literature of the Twentieth Century: Poetry and Drama (4) II, Duttich Lecture-discussion—3 hours; term paper. Prerequisite: course 10B or consent of instructor. Italian poetry with emphasis on Hermann, the theater of Luigi Pirandello and its role in the development of contemporary Italian drama.

130A. Italian Literature in English: Early Italian Literature and Dante Alighieri (4) I, Duttich Lecture-discussion—3 hours; term paper. The origin of the Italian Lyricism with emphasis on authors of the Sicilian School, the Dolce Stil Novo, and Dante's Vita Nova and Divine Comedy.

130B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) I, Duttich Lecture-discussion—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Ages and the
Land, Air and Water Resources; Landscape Architecture

Robert G. Plocchin, Ph.D., Adjunct Lecturer
Richard D. Grotjahn, Ph.D., Assistant Professor (Atmospheric Science)
Frank F. Harradine, Ph.D., Professor Emeritus
Gordon L. Higginson, Ph.D., Adjunct Lecturer
Andre E. Lauchli, Ph.D., Professor (Plant Nutrition)
Donald N. Munns, Ph.D., Professor (Soil Science)
Leonard O. Myrup, Ph.D., Professor (Meteorology)
H. Michael Reisenauer, Ph.D., Professor (Soil Science)
Victor V. Rendig, Ph.D., Professor (Soils and Plant Nutrition)
Dennis E. Rolston, Ph.D., Professor (Soil Science)
Roger H. Shaw, Ph.D., Associate Professor (Meteorology)
Michael J. Singer, Ph.D., Associate Professor (Soil Science)
Harry O. Walker, Ed.D., Senior Lecturer (Resource Sciences)
Bryan C. Warden, Ed.D., Associate Professor (Meteorology)
Lynn D. Whitling, Ph.D., Professor (Soil Science)
Veihmeyer Hall Faculty Office
113 Veihmeyer Hall (752-0453)
Jaime Amorosco, Ph.D., Professor (Water Science, Civil Engineering)
James W. Bogan, Ph.D., Professor (Water Science)
Robert H. Burgy, M.S., Professor (Water Science, Civil Engineering)
Lloyd D. Douven, Ph.D., Professor Emeritus
Water Science and Engineering
Donald W. Grimes, Ph.D., Adjunct Lecturer
Water Science
Robert M. Hagan, Ph.D., Professor (Water Science)
Jerry L. Hatfield, Ph.D., Associate Professor (Water Science)
D. H. Henderson, Ph.D., Professor (Water Science)
Theodore C. Hiatt, Ph.D., Professor (Water Science)
 Awareness Science)
Alien W. Knight, Ph.D., Professor (Water Science)
Miguel A. Marín, Ph.D., Professor (Water Science, Civil Engineering)
Robert J. Miller, Ph.D., Adjunct Lecturer (Water Science and Engineering)
Donald R. Nielsen, Ph.D., Professor (Soil and Water Science)
William O. Pruitt, Jr., M.S., Adjunct Lecturer
Frank E. Robinson, Ph.D., Lecturer (Water Science)
Anne H. 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 and Engineering)
Kenneth K. Tanji, M.S., Professor (Water Science)
and Water Science)
Westley W. Wallender, Ph.D., Assistant Professor (Water Science and Engineering)
Major Programs. Majors offered in the field of resource sciences are Atmospheric Science, Resource Sciences, and Soil and Water Science.
Advising Center is located in 122 Hoagland Hall (752-1699).
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 advisers for these areas and the Announcement of the Graduate Division.

Landscape Architecture
(Previously for Agricultural and Environmental Sciences)
Faculty
See under Department of Environmental Horticulture.
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 technical expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem-solving related to design of parks, urban open spaces, energy-efficient neighborhoods, land use planning, 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 in environmental design assessment and development. This major complements the study of landscape architecture major.

Landscape Architecture
B.S. Major Requirements:
(F时机 convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses may be acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Preparatory Subject Matter</th>
<th>48-57</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological sciences (Biology 1, 10)</td>
<td>4-5</td>
<td></td>
</tr>
<tr>
<td>Botany (Botany 2, Plant Science 2)</td>
<td>4-5</td>
<td></td>
</tr>
<tr>
<td>Chemistry (Chemistry 1A, 10)</td>
<td>4-5</td>
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<tr>
<td>Physics (Physics 1A, 2A, 10)</td>
<td>3-4</td>
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<tr>
<td>English (English 1, 2, 20, 103)</td>
<td>4</td>
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<tr>
<td>Public speaking (Speech 111, 112)</td>
<td>2</td>
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<tr>
<td>Two-dimensional design (Art 16, Design 21, Engineering 4)</td>
<td>3</td>
<td></td>
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<tr>
<td>Three-dimensional design (Art 121, 121A)</td>
<td>3</td>
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<tr>
<td>Earth sciences (Geology 1, 2, Soil Science 10)</td>
<td>4</td>
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<tr>
<td>Economics (Economics 1A, 1B, Agricultural Economics 147)</td>
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<tr>
<td>Computer science (Mathematics 19, 29A)</td>
<td>3</td>
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<tr>
<td>Mathematics (Mathematics 16A, 26, Statistics 13, Agricultural Science and Management 150)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social science (Anthropology 2, Geography 2, Psychology 1, Sociology 1)</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Humanities elective</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Introduction to landscape architecture (Landscape Architecture 40) | 3 |
Landscape architecture studio: introduction, recreational open space, site planning (Landscape Architecture 111, 112, 113) | 12 |

Landscaping graphic communication (Landscape Architecture 121) | 4 |
Advanced communication for landscape architecture (Landscape Architecture 122) | 4 |
Introduction to landscape construction, site engineering, construction details and drawings (Landscape Architecture 131, 132, 133) | 15 |
History of landscape architecture (Landscape Architecture 140) | 3 |
Introduction to environmental plants (Environmental Horticulture 6) | 3 |
Plant 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 190) | 3 |

Breadth Subject Matter | 16-21 |
Resource sciences, two upper division courses with approval of adviser | 6-8 |
Ecology (Environmental Studies 100, 110, 114A, 114B, Botany 117, Entomology 104, Zoology 128) | 3-5 |
Environmental awareness (Psychology 144) | 3-4 |
Related design electives | 3-4 |
Course equivalents to periferal to landscape architecture (Environmental Planning and Management 110, 110B, 122, 127, Environmental Studies 126, 161, 171, 172, Agricultural Economics 18, Civil Engineering 1, Design 6) | 8 |
Unrestricted Electives | 24-41 |
Total Units for the Major | 180 |

Major Adviser: R.L. Thayer (Environmental Horticulture).
Advancing Center is located in Temporary Building 105 (752-6326).
Graduate Study. See page 97.

Courses in Landscape Architecture
Lower Division Courses
40. Introduction to Landscape Architecture (3) I. Francis Lecture—3 hours. History, theory, philosophy, techniques and applications of landscape architecture and the analysis, planning, design, and management of outdoor spaces.
Upper Division Courses
111. Landscape Architecture Studio: Introduction (4) I. Thayer—4 hours. Prerequisite: course 110. A University course in drafting. Introductory studio problems in landscape architectural analysis, planning, design, graphics, and evaluation. Limited enrollment.
112. Landscape Architecture Studio: Recreational Open Space (4) I. Dawson—4 hours. Prerequisite: course 111. Open to Landscape Architecture majors only. Studio problems in analysis, planning, design, and management of physical outdoor areas for recreational open space use. Emphasis on development of parks, trail corridors, and other outdoor recreation facilities. Limited enrollment.
113. Landscape Architecture Studio: Site Planning (4) III. Thayer—4 hours. Prerequisite: course 112. Open to Landscape Architecture majors only. Studio problems in analysis, planning, and design of intermediate-scale landscape developments involving the siting of structures and design of circulation systems, parking, open spaces, and outdoor facilities. Emphasis on residential, institutional, and commercial site planning for solar/energy conservation.
121. Landscape Graphic Communication (4) I. Thayer—4 hours. Prerequisite: course 111. Studio work in graphic representation of landscapes and landscape architectural plans. Introductory work in sketching, render-
122. Advanced Communication for Landscape Architecture (4) III. Francis.
Laboratory—4 hours. Prerequisite: course 121. Open to Landscape Architecture majors only. Advanced concepts in multimedia and graphic presentation of landscape architecture projects, to include preparation of proposals, reports, audio-visual productions, and mixed-media presentations. Limited enrollment.

131. Landscape Architecture: Introduction (3) I. The Staff.
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 40. Engineering 1 recommended. Introductory analysis of materials and methods of construction of landscape developments. Emphasis on mechanical, functional, and aesthetic properties on materials and construction methods in common landscape construction practice.

132. Landscape Construction: Site Engineering (4) II. The Staff.
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 131. Topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, sections and profiles and cut and fill calculations. Limited enrollment.

133. Landscape Construction: Details (4) III. The Staff.
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 132. Open to Landscape Architecture majors only. Advanced study of materials and methods in landscape construction. Emphasis on design and integration of details and specifications. Limited enrollment.

134. Landscape Construction: Drawings (4) I. The Staff.
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 133. Technical solution of an intensive landscape architectural design problem with emphasis on preparation of production drawings and construction implementation document. Limited enrollment.

140. History of Landscape Architecture (3) III. The Staff.
Lecture—3 hours. History of landscape architecture as an art form, technology, and profession. Emphasizes design of gardens and outdoor spaces from prehistoric civilization to the present.

181. Landscape Architecture Studio: Planning and Analysis (4) II. Francis.
Laboratory—8 hours. Prerequisite: course 113. Senior landscape architecture studio to include the solution of large-scale landscape architectural problems with emphasis on landscape planning and analysis methods and environmental concerns. Limited enrollment.

182. Landscape Architecture Studio: Urban and Community Design (4) II. Francis.
Laboratory—8 hours. Prerequisite: course 181. Senior landscape architecture studio emphasizing solution of community and urban design problems with emphasis on community and social processes, participatory design methods, and comprehension of behavioral factors relating to community design.

Seminar—1 hour. Prerequisite: senior standing in Landscape Architecture or permission of instructor. Lectures and discussion of critical issues in landscape architecture. May be repeated for credit. (P/NP grading only.)

203. Internship in Landscape Architecture (1-12) I, II, III. The Staff.
Field experience. Prerequisite: senior standing in Landscape Architecture major. Professional field experience in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)

213. Senior Project in Landscape Architecture (1-5) I, II, III. The Staff.
Prerequisite: senior standing in Landscape Architecture major. Directed design/research of a significant landscape architectural project under supervision of instructor. May be repeated for credit. (P/NP grading only.)

197. Tutoring in Landscape Architecture (1-5) I, II, III. The Staff.
Tutoring—3-15 hours. Prerequisite: consent of instructor. Tutoring in landscape architecture courses. (P/NP grading only.)

198. Directed Group Study in Landscape Architecture (1-5) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. Directed group study course. (P/NP grading only.)

199. Special Study for Advanced Undergraduates in Landscape Architecture (1-8) I, II, III. The Staff (Chairperson in charge).
Prerequisite: consent of instructor. Special study for advanced undergraduates. (P/NP grading only.)

NOTE: For key to footnote symbols, see page 128.

Graduate Courses

290. Graduate Seminar in Landscape Architecture (2) I, II, III. The Staff.
Seminar—2 hours. Prerequisite: graduate standing and consent of instructor. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. (SU grading only.)

292. Group Study (1-5) I, II, III. The Staff.
Prerequisite: graduate standing and consent of instructor. Selected projects in landscape architecture research, analysis, planning, design, communication, or education. (SU grading only.)

293. Directed Individual Research for Graduate Students (1-5) I, II, III. The Staff.
Prerequisite: graduate standing and consent of instructor. Directed research in landscape architecture for graduate students. (SU grading only.)

1. 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)
Dean's Office, 101 Martin Luther King, Jr. Hall
(752-0243)

Faculty

Homer G. Angelo, J.D., LL.M., Professor
John D. Ayer, J.D., M.L.S., Professor
Edward 1. Barrett, J.D., J.D., Professor
Florian Bartosic, B.C.L., LL.M., Professor
Marsha A. Bedwell, J.D., Visiting Lecturer
Antonia E. Bernhard, J.D., Visiting Lecturer
Roger Berven, J.D., A.M., Visiting Professor
Edgar Bodenheimer, J.D.D., LL.B., Professor Emeritus
Alan E. Brownstein, J.D., Acting Professor
Carol A. Bruch, J.D., Professor
Paul W. Comiskey, J.D., M.A., Visiting Lecturer
John C. Dobris, LL.B., Professor
Harrick C. Dunne, LL.B., Professor
Daniel J. Dykstra, LL.B., S.J.D., Professor
Floyd F. Feeney, LL.B., Professor
Daniel Wm. Fesseler, J.D., S.J.D., Professor
Susan F. French, J.D., Professor
Gary S. Goodpaster, J.D., Professor
Sarah D. Gray, Ph.D., Associate Professor
Robert W. Hillman, J.D., Acting Professor
James E. Hogan, LL.B., Professor
Margaret Z. Johns, J D., Visiting Lecturer
Emma Jordan, J.D., Professor
Friedrich K. Juenger, J.D., Professor
Leslie A. Kurtz, J.D., M.A., Acting Professor
Cecilia D. Lanno, J.D., Lecturer
Peter R. Lisleaux, LL.B., LL.M., Professor
Jean C. Love, J.D., Professor
Sharon F. Mah, J.D., Associate in Law
John Martinez, J.D., Lecturer
John B. Oakley, J.D., Professor
Raymond I. Pamas, J.D., LL.M., S.J.D., Professor
Rex R. Perschbacher, J.D., Acting Professor

John W. Polous, J.D., Professor
Edward H. Rabin, LL.B., Professor
Michael Satris, J.D., Visiting Lecturer
Mortimer D. Schwartz, J.D., LL.M., M.S., Professor
Berndt S. Schweiger, M.S., Ph.D., Professor
Richard A. Seitzer, J.D., Acting Professor
Lois G. Sherman, J.D., M.A., Visiting Lecturer
Floyd D. Shimmura, J.D., Acting Professor
Daniel L. Simmons, J.D., Professor
James F. Smith, J.D., Visiting Lecturer
Martha S. West, J.D., Visiting Acting Professor
Bruce A. Wolk, M.S., J.D., 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 115. The symbols are (I) for Fall Semester and (II) for Spring Semester.

Courses in Law: Professional Curriculum

First Year Courses

201. Introduction to Law (1) I. Bodenheimer, Love Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, and the precedent system in its practical operation, the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (SU grading only.)

201A-201B. Property (3-3) I, II. Bernhardt, Dobris Discussion—3-3 hours. Study of doctrines and institutions which govern allocation and use of land and improvements thereon. Emphasis is placed upon estates-in-land system, landlord-tenant relationship, conveyancing, and private and public means for land use control. (Deferred grading only, pending completion of sequence.)

202A-202B. Contracts (3-3) I. Irioloseaux, Shimomura Discussion—3-3 hours. Course examines the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noneconomic transactions. Inquiry is made into the means by which traditional doctrine adjudicates—or fails to adjust—to changing social demands. (Deferred grading only, pending completion of sequence.)

203A-203B. Civil Procedure (3-3) I, II. Martinez, Perschbacher Discussion—3-3 hours. The methodology of presenting a civil controversy for adjudication in a state or federal court, without reference, however, to the rules and tactics relating to the proof of disputed facts, which are the subject matter of Evidence and Trial Practice, respectively. The principal matters studied are those governing the formulation of the issues in dispute in a particular case, the method of pleading, joinder of parties and the resolution of these issues at or before trial, and the finality of the trial court's disposal of the case. (Deferred grading only, pending completion of sequence.)

204A-204B. Torts (3-3) I, II. Brownstein, Johns, Jordan, Juenger, Kurz, Love Discussion—3-3 hours. Course in tort law is designed to familiarize the students with the legal concepts which apply to actions brought by litigants who seek relief for injury. It is thus concerned with intentional invasions of personality and property and with the unintentional invasion of these same interests. More specifically the course seeks to analyze civil actions based upon wrongs carrying labels such as assault, battery, false imprisonment, negligence, defamation, invasion of privacy, misrepresentation, and nuisance. (Deferred grading only, pending completion of sequence.)

206. Criminal Law (3) I. Goodpaster, Polous Discussion—3-3 hours. A study of the elements and policies of selected criminal offenses.

207. Legal Research (1) I. Bernhard Discussion-laboratory—1 hour. Description of the variety of sources of law and secondary authority instruction in their location and use. Graded on basis of weekly self-teaching research drills. No final examination.

208. Legal Writing (2) I, II. Bernhard, Johns, Pamas, Sherman Lecture—2 hours. Instruction in the form and substance of writing. A variety of legal-related documents will be discussed.
209. Legal Imagination (2) (A) Ayer Discussion—2 hours. Intended for students interested in extensive thinking and writing about the legal system and the role of lawyers in the system. Students will be expected to write short weekly papers and engage in weekly group discussion of their work. Limited enrollment with permission to third-year students. (SU grading only.)

210. Skills (2) Laboratory—2 hours. Course designed to introduce second-year students to the judicial and practical skills exercised by the lawyer. Through simulations, role-playing, and the use of videotapes, training will be given in interviewing and counseling, preventive law, and the advanced legal skills, both in civil and criminal cases. Individual student required to resolve a series of legal problems generated by real fact patterns, and the work will be individually critiqued. Recommended for students planning to undertake clinical work. Limited enrollment. (SU grading only.)

211. The Lawyer as Negotiator (2) (B) Goddard Discussion—2 hours. Negotiation process generally engaged by legal practitioners. Reading materials consist of writings by attorneys, psychologists, and business practitioners. Participants will be divided into three layers. Through simulations, role-playing, and the use of videotapes, training will be given in interviewing and counseling, preventive law, and the advanced legal skills, both in civil and criminal cases. Individual student required to resolve a series of legal problems generated by real fact patterns, and the work will be individually critiqued. Recommended for students planning to undertake clinical work. Limited enrollment. (SU grading only.)

212. Business Organizations I (3) Discussion—4 hours. The first fifteen hours of the course devoted to alternatives to incorporation for persons in quest of profit. Examined are the sole proprietorship, general and limited partnerships, and the various corporations. Recommended for students interested in the legal aspects of business ventures. Integrated concepts are integrated into this material. Balance of the course concentrates upon "close corporations" with emphasis upon the necessities of attempting to organize these, the corporate concept a venture intended to be owned by few persons.

213. Business Organizations II (3) Discussion—4 hours. Examination of the concepts developed in Business Organizations I, the focus of this practical-oriented offering is upon the legal problems surrounding the dissolution, corporate phenomenon of the industrial state—the public issue of corporate. Comparative attention is given to the traditional statutory and judge-made legal principles which will rapidly expanding "the legal corporation law." Among the areas studied are: the governance of the public issue corporations (its operations through a board of directors, committees and officers), the preoccupation of shareholders in the decision-making process, the increasing importance of the concept of corporate social responsibility, the problems of the global regulation of the proxy system and sales of securities.

214. Commercial Law (3) (B) Loeppke Discussion—3 hours. The basic core course in Commercial Law. Emphasis on secured commercial transactions, particularly under Article 9, Uniform Commercial Code. Topics covered create security interests, validity of secured interests against third parties, the relationship between the secured party and the debtor, the existence of the duty of due care and enforcement upon default. Enrollment in this course is helpful, although not a prerequisite to, enrollment in Debtor and Credit.

217. Constitutional Law I (3) (B) Barnett, Poulos Discussion—3 hours. Separation of powers, including the case and controversy doctrines and powers of the President. Discussion of powers between federal and national government relations. Constitutional limitations on governmental regulations of economic interests and fundamental personal interests under the equal protection and due process clauses.

218. Constitutional Law II (3) (B) Barnett, Poulos Discussion—3 hours. Suspect classifications; due process and procedure, the state action concept; freedom of speech and religion.

219. Evidence (4) L. Wyckoff; II. Setzau Discussion—4 hours. The rules regarding the admissibility of testimonial and documentary proof during the trial of civil and criminal cases. Includes the concept of relevance, hearsay, the exception to the hearsay rules, the examination and impeachment of witnesses, the opinion rule, constitutional and statutory privileges.

220. Federal Taxation I (4) IV. Wolf; II. Simmons Discussion—4 hours. A study of the statutory, judicial, and administrative material concerning federal income taxes.

221. Trusts, Wills and Decedents' Estates I (3) (B) Dobris, II Discussion—3 hours. Familiarizes students with rules and concepts governing estate planning and administration, and provides excellent preparation for general practice and for advanced tax and planning courses. Course coverage includes: intestate succession; family protection and limits on the power of taxation; executors, revocable and irrevocable wills, introduction to inter vivos trusts; contracts to make wills; will substitutes; creation, modification and termination of wills and trusts; estate and trust taxation; the nature of the beneficiaries' interests in private trusts; introduction to charitable trusts; introduction to the administration of wills and trusts; principal and interest;增值税; non-charitable trusts; testamentary powers; duties, rights and liabilities of fiduciaries; management of assets and fiduciary accounting.

222. Trusts, Wills and Decedents' Estates II (3) Discussion—4 hours. The course covers the drafters of the dispositive provisions of estate plans. Course coverage includes: language used to create future interests; utility and operation of conditions of survival, two essential estate planning devices, class gifts and powers of appointment; construction of ambiguous and defective dispositive provisions; and operation of the Rule Against Perpetuities, including drafting to avoid violations of the Rule, and the impact of violations on the dispositive plan.

223. Estate Planning (4) Discussion—4 hours. Prerequisite: courses 221, 222, and 245. Problem-solving concerning preparation and administration of estate plans.

224. Estate and Gift Taxation and Planning (4) (B) Dobris, Wolf Discussion—4 hours. Prerequisite: courses 221, 222, Tax and planning aspects of wealth transfers.

225. Matrimonial Property (3) (B) Bruch Discussion—3 hours. The California community property system, matrimonial property, community and family property, implications of non-marital habitation; property, support, tax consequences of marriage dissolution; marital property settlement in a broad sense—nuptial and related contracts.

226. Communications Law (2) (B) Kutz Discussion—2 hours. Covers survey legal issues associated with the mass media. Topics covered will include legal problems of news gathering, the regulation of broadcasting, free press after trial, and cable television, and the effect of the new technologies.

227. Criminal Procedure (3) (B) Barrett, Ilene Feeney Discussion—3 hours. Principles of search, arrest, search, surveillance, confessions, lineup, the exclusionary rule, post-arrest phases of the criminal process with major emphasis on pretrial and sentencing phases.

228. Business Planning (2) II. Hillman Discussion—3 hours. Prerequisite: courses 220, and either courses 213 and 245. Consideration of selected problems in business planning.

229. Corporate Takeovers (1) Discussion—seminar—1 hour. Prerequisite: courses 213 and 245. Consideration of the legal and economic factors pertaining to control acquisition, and the acquisition techniques employed by the offerors and with the defensive devices used by target companies. (SU grading only.)

230. Family Law (Short Course) (2) I. Bruch Discussion—2 hours. Legal aspects of marriage, the family and divorce. Among the subjects covered are support, custody, paternity, illegitimacy, adoption and intramural violence. Family law reform in the United States and where and recent California developments will be included.

231. Legislative Process (2) I. Shimomura Discussion—2 hours. Basic examination of the legislative branch of federal and state government. Includes the process of enacting legislation, bill drafting, the committee system, the development of a legislative history, and the budget formulation process.

232. Real Estate Finance (3) (B) Ayer Discussion—3 hours. Examination of the problems in the acquisition, financing and ownership of real estate, and of remedies in the event of default.

233. Philosophy of Responsibility and Punishment (2) II. Poulos Seminar—2 hours. Interdisciplinary approach to some basic problems of criminal justice, among them the following: (1) the relation between freedom of the human will and the imposition of legal and criminal sanctions; (2) the nature of the beneficiary's interests in private trusts; (3) introduction to charitable trusts; introduction to the administration of wills and trusts; testamentary powers; duties, rights and liabilities of fiduciaries; management of assets and fiduciary accounting.

234. Family Law Practice (2) III. Alancon, Mah Seminar—2 hours, clinical—1 hour. Prerequisite: course 225, and course 230 or 272 (combined). Correlated seminar to prepare student under the direct supervision of the instructor. Clinical participation required 2-3 weeks during semester. Students also participate in weekly 2-3 hour seminar which will cover a wide range of topical areas pertaining to family law practice. Limited enrollment. (SU grading only.)

235. Administrative Law (3) (B) Shimomura Discussion—3 hours. Control of the administrative operations of government, both regulatory operations such as approval or prohibition of business practices and social security policies. The powers exercised by administrative agencies, principles governing the exercise of those powers and the legal remedies of persons aggrieved by administrative decisions. Examined California as well as federal administrative law will be treated.

236. Securities Regulation (2) II. Hillman Discussion—2 hours. Prerequisite: courses 213 and 245, or course 213. The primary object is to familiarize students with laws and regulations, federal and state, relating to the issuance of and trading in corporate securities. It includes materials pertaining to the scope of the term "securities," the registration of securities, interstate and private offerings, and civil liability under the Securities Act of 1933 and the Securities Exchange Act of 1934.

237. Commercial Paper (2) I. Jordan Discussion—2 hours. A course in commercial paper covering Articles 3 and 4 of the Uniform Commercial Code. This will cover concepts of negotiability, requisite of negotiable paper, transfer, liability of parties, and rights of holders. The Articles 4 coverage includes a discussion of deposits and collections and the relationship between banks and customers.

238. Income Taxation of Partners and Partnerships (2) II. Shimomura Discussion—2 hours. Prerequisite: course 220. Study of Federal income tax problems encountered in organization and operation of partnership enterprises created by death or retirement of partner, sale of partnership interest, and distribution of partnership assets.

239. Admiralty Law (2) I. Barrett Discussion—2 hours. Jurisdiction of federal and state courts in admiralty and selected aspects of the law applicable to maritime workers and transactions. Classbook will be used. Examination only.

240. Law of Elections and Political Campaigns (2) Discussion—2 hours. Course covers constitutional, statutory, administrative and case law aspects of federal and
state elections, including laws relating to primaries, general elections, initiatives, recalls, filing requirements, financial disclosures and conflicts of interest.

241. Legal Accounting (2) I. Ayer

Discussion—4 hours. Course considers the application of accounting practices and procedures to a variety of situations arising from financial, tax, business, and legal transactions. Special attention will be given to legal accounting fundamentals and that their relation to legal problems may be demonstrated. Students will be required to complete a term paper (6-8 credit hours or more) as a final part of this course.

242. Conflicts of Laws (4) I. Juenger

Discussion—4 hours. Study of transactions with multistate or international implications involving choice of law and conflict of laws principles indicates the effect of foreign judgments, and choice of applicable law. Special attention will be given to the influence of varying theoretical considerations on the resolution of conflicts problems.

243. Debtor and Creditor (3) I. Ayer

Discussion—3 hours. Prerequisite: commercial law recommended. Course focuses on the rights of debtors and creditors. The first part concentrates on remedies of unpaid creditors under state law and the protection of debtors through limitations on creditors such as exemption laws. The second part involves a study of the Bankruptcy Code with emphasis upon ordinary bankruptcy.

244. Basic Human Physiology (2) II. Gray (Human Physiology)

Lecture—2 hours. Overview of the principles of physiology with the object of giving the law student some understanding of the functions of the various organ systems of the human body. (SU grading only.)

245. Estate and Gift Taxation (3) I. Mauer

Discussion—3 hours. Prerequisite: course 220. Study of the federal estate and gift tax laws and their effects.

246. Federal Jurisdiction (3) II. Love

Discussion—3 hours. Survey of federal court system and examination of sources and substance of federal jurisdiction. Attention will be devoted to: (1) parameters of appellate and collateral review of state court decisions in federal courts and of federal question, diversity, and maritime jurisdiction; (2) jurisdictional conflicts, the federal courts; (3) jurisdictional conflicts, the state courts; (4) sovereign immunities and other constraints on exercise of federal jurisdiction; (5) rules of decision applied in federal courts; (6) the jurisdictional limits of governmental entities; (7) jurisdictional limits of federal courts and between federal and state courts; and (8) political factors in exercise of federal jurisdiction.

247. Federal Taxation II (4) I. Simmons

Discussion—4 hours. Prerequisite: course 220. Emphasis on income tax problems of corporations and their shareholders. The class considers problems on the organization, financing, operation, dissolution and reorganization of corporate entities.

248. International Law (3) II. Angelo

Discussion—3 hours. A survey of the fundamental problems of international law arising out of the relations, both public and commercial, between nations. Research resources will be identified. The course will examine national law systems and the development of modern international law and institutions. Emphasis will be given to the development of international organizations, and individuals throughout the world. The shortcomings of the classical system of international law will be examined. This course is open to qualified students on a space available basis.

249. Comparative Law (2) II. Juenger

Discussion—2 hours. Comparison of methods and sources of common and civil law; background and structure of the principal civil codes; analysis and study of problems arising in the contexts of foreign legal systems.

250. Jurisprudence (2) I. Goodpasture

Seminar—2 hours. Course includes an examination of the nature, functions, aims and devices of law as a system, the relation of law to society, the meaning of justice, and the nature of legal systems, and national and international law, and will be given to the perspective of philosophers and social theorists such as Nietzsche, Mill, Marx, and Tocqueville. Readings will be drawn from texts such as Rawls and Blackstone.

251. Labor Law (4) I. West

Discussion—4 hours. A study of the law, primarily statutory, relating to: (1) employee organization and the establishment of collective bargaining; (2) the negotiation of the collective bargaining agreement; (3) the exer- tion of primary and secondary economic pressure; and (4) the rights of the individuals employees vis-a-vis their employer and their union.

252. Products Liability (2) II. Dykstra

Discussion—2 hours. The civil action for harm to the consumer resulting from dangerous and defective products.

NOTE: For key to footnote symbols, see page 128.

254. Developmental Legal History (2)

Discussion—2 hours. While some seventeenth, eighteenth and nineteenth-century English materials will be used, course will focus on certain major legal developments in Anglo-American law during the period 1780-1800. The emer- gence of a conscious conception of law as an instrument of wealth regulation will be examined, as will the early recognition of the relationship between economic development and transformations in legal doctrine during the eighteenth century. Course will be concerned with legal doctrine due to the emergence of competitive econo- mic uses; the recognition of functional and doctrinal limi- tations upon the attainment of rights to property; and the early experience with the promotion, regulation and evolution of a transportation matrix with emphasis on the structure of property law, the theory of restrictions and the demands of public convenience and necessity.

255. Land Use Regulation (3) II. Brownstein

Discussion—3 hours. Course content substantially overlaps the material covered in other courses. It also includes additional topics such as rent control, condominium conversions, and the effect of land use regulation on property tax rates. Students who have had course 256 may not receive credit for course 255. It is anticipated that the two courses will be offered in alternate years.

256. Land Use Planning (2) legislative, judicial, and adminis-

Discussion—2 hours. The legislative, judicial, and adminis-

257. Law and Social Sciences (2) Discussion—2 hours. Study of the methodology of social science and its application to law.

258. Professional Responsibility (1) I. Black, Wyckoff

Discussion—1 hour. A study of ethical duties and re-

259. Employment Discrimination (2) I. West

Discussion—2 hours. Consideration of employment dis-

260. Local Government (2) Discussion—2 hours. Examination of a number of recurrent issues concerning the organization and structure of local governments. Why have local governments? What functions are appropriate to local government, and which can be best left to private persons? What standards are "fair" for the organization and operation of local govern-

261. Annuity (3) Wyckoff

Discussion—3 hours. Study of the federal annuity laws including their effect on employees, the status of annuitants and the improvement of annuity laws.

262. Water Law (3) I. Dunning

Discussion—3 hours. Allocation of water rights in water, protection of instream uses of water, legal aspects of water development projects, interstate and state-federal disputes over water, groundwater law, property law, water conservation and legal aspects of water-based recreation. Emphasis is placed upon California water law and water development.

263. Quality Control in the Market (2) I. Lowenstein

Seminar—2 hours. Course will investigate various statutory, court and administrative aspects of the regulation of the quality of goods sold in U.S. markets. Topics include: express wa-

264. Taxation of International Transactions (2) Seminar—2 hours. Prerequisite: course 247 or consent of instructor. Analysis of the manner in which the United States taxes foreign sources of income and foreign corporations and aliens. Consideration will be given to the foreign tax credit, tax treaties, and the use of controlled foreign corporations as an avoidance device and as an incentive for export of U.S. products (i.e., domestic interna-

265. Consumer Protection (2) I. Jordan

Discussion—2 hours. Study of selected consumer law problems, including a survey of state and federal regulatory efforts. Course coverage may include the following: First Amendment protection of commercial speech, common law and statutory remedies for fraudulent or deceptive prac-

266. Criminal Business Transactions (2) I. Hiltman

Discussion—2 hours. Consideration of selected problems in international business transactions.

267. Labor Law Seminar (2) I. Bartoletti

Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Study of critical current questions, including cases pending before the Supreme Court, law reform, im-

268. Family Law (Long Course) (3)

Discussion—3 hours. Designed for the student with a sub-

269. The Law and the Police (2)

Discussion—2 hours. Prerequisite: course 227 recom-

270. Juvenile Justice Process (2) I. Feeley

Discussion—2 hours. Study of theurple conduct of the juvenile police, the juvenile justice process, and the legal system. The course content includes: juvenile court hearing and disposition; juvenile corrections; the legal system and the juvenile justice process. Emphasis will be given to the perspectives of the victim, the criminal, the public official, the criminal justice system, and the legal system. (SU grading only.)

271. Antitrust (3) Wyckoff

Discussion—3 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrange-

272. Criminal Procedure (2) I. Seiter

Discussion—2 hours. Prerequisite: course 256A. Advanced criminal procedure and practice. Participation in mock trials with individual evaluations and suggestions from instructor. (SU grading only.)

273. Water Law (3) I. Dunning

Discussion—3 hours. Allocation of water rights in water, protection of instream uses of water, legal aspects of water development projects, interstate and state-federal disputes over water, groundwater law, property law, water conservation and legal aspects of water-based recreation. Emphasis is placed upon California water law and water development.

274. Taxation of International Transactions (2) Seminar—2 hours. Prerequisite: course 247 or consent of instructor. Analysis of the manner in which the United States taxes foreign sources of income and foreign corporations and aliens. Consideration will be given to the foreign tax credit, tax treaties, and the use of controlled foreign corporations as an avoidance device and as an incentive for export of U.S. products (i.e., domestic interna-

275. Food and Tobacco (2) I. Bedwell, Leosea, Schwergelt (Food and Tobacco)

Discussion—2 hours. Legal and scientific issues involved in regulation of the nation's food supply and nutritional status. Producers and manufacturers underlying the regulatory statutes are approached through consideration of court cases. Emphasis will be placed upon critical sources of information necessary for effective communication with government and the public food policy formation. The U.S. Food and Drug Ad-

276. Environmental Regulation (3) I. Brownstein

Discussion—3 hours. Consideration of selected problems in international business transactions.

277. Food and Tobacco (2) I. Bedwell, Leosea, Schwergelt (Food and Tobacco)

Discussion—2 hours. Legal and scientific issues involved in regulation of the nation's food supply and nutritional status. Producers and manufacturers underlying the regulatory statutes are approached through consideration of court cases. Emphasis will be placed upon critical sources of information necessary for effective communication with government and the public food policy formation. The U.S. Food and Drug Ad-

278. Union Authority and Individual Rights (2) I. Bartoletti

Seminar—2 hours. Prerequisite: consent of instructor. Study of the role of law in promoting democracy, including the legal bases for worker organization in the United States, and private union affiliation, compulsory unionism, the right to admission and fair representation, civil liberties of members, disciplin-
480. Legal Problems of the Prison Inmate (2-4) I. Comakley, II. Sarna
Clinical program: student/instructor case conference—1 session per week, evening seminar—1 session per week.
Students who spend time in the District Attorney’s or Public Defender’s office in one of several surrounding counties for a minimum of 13 hours per week, are required to participate in full. Students are required to keep attendance at court and to submit reports on their progress. Limited enrollment. (SU grading only)

485. Instruction in Legal Research and Writing Skills (2) I, II
Bernard, John; Parnes, Sherman
Prerequisite: course 207 or 208. Students will be placed in the legal research and writing seminar program for first-year students under the direction of the legal research and writing instructors. Approval of the research and writing instructors required for enrollment. The seminar meets once a week for the semester. (SU grading only)

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Linguistics
(College of Letters and Science)

Lenora A. Timm, Ph.D., Program Director
Program Office, 912 Sprout Hall, 752-1219

Committee in Charge
Richard A. Ogle, Ph.D. (Linguistics, Committee Chairperson)
Ronald A. Arbin, Ph.D. (Philosophy, Winter-Spring Quarters)
James Gallant, Ph.D. (Russian)
Maria L. Manoliu-Manea, Ph.D. (French)
Jarret Shimbamoto, Ph.D. (Oriental Languages and Civilizations)
Susan B. Shimanoff, Ph.D. (Rhetoric)
Lenora A. Timm, Ph.D. (Linguistics, Winter-Spring Quarters)
Edward J. Tully, Jr., Ph.D. (Mathematics)

Faculty
Ronald A. Arbin, Ph.D., Associate Professor (Philosophy)
Jarvis R. Bastian, Ph.D., Associate Professor (Psychology)
Wilbur A. Benware, Ph.D., Associate Professor (German)
Linnea C. Ehr, Ph.D., Associate Professor (Education)

James Gallant, Ph.D., Associate Professor (Russian)
Wayne Harsh, Ph.D., Professor (Linguistics, English)
Maria L. Manoliu-Manea, Ph.D., Professor (French)
Barbara J. Merino, Ph.D., Assistant Professor (Education)
Richard A. Ogle, Ph.D., Assistant Professor (Psychology)
David L. Olmstead, Ph.D., Professor (Anthropology)
Daniel Rancour-Lafondre, Ph.D., Associate Professor (Russian)
Winfried Schleiner, Ph.D., Associate Professor (English)
Gwendoyn Schwabe, M.A., Lecturer (English)
Jarret Shimbamoto, Ph.D., Assistant Professor (Oriental Languages and Civilizations)
Susan B. Shimanoff, Ph.D., Assistant Professor (Rhetoric)
Lenora A. Timm, Ph.D., Associate Professor (Spanish)
Carolyn F. Wall, Ph.D., Associate Professor (Anthropology)
Benjamin E. Wallacker, Ph.D., Professor (Oriental Languages and Civilizations)

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 through time. It also has important applications within many other disciplines, such as anthropology, biology, communications, education, language teaching, literature, philosophy, psychology, and sociology.

The major is designed to familiarize students with the methods of linguistic analysis at the fundamental level of methodological and theoretical complexity through a sequence of "core" courses. Elective courses allow the student to explore areas of overlap linguistics.

Linguistics

A.B. Major Requirements:

- Preparatory Subject Matter

**UNITS**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>0-24-34</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 1 or 136</td>
<td>4</td>
</tr>
<tr>
<td>Foreign language</td>
<td>4</td>
</tr>
<tr>
<td>or 22 units of another language or 30 units of two different languages</td>
<td>20-30</td>
</tr>
</tbody>
</table>

- Depth Subject Matter

**UNITS**

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>40</th>
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</thead>
<tbody>
<tr>
<td>Linguistics 110, 113, 114, 115</td>
<td>16</td>
</tr>
<tr>
<td>Linguistics 102 or 112</td>
<td>4</td>
</tr>
<tr>
<td>Oriental Languages and Civilizations</td>
<td>4</td>
</tr>
<tr>
<td>Anthropology 220 (see page 92 for procedure governed by undergraduate enrollment in a graduate course)</td>
<td>4</td>
</tr>
</tbody>
</table>

At least 12 upper division units from the following courses:

- Anthropology 115, 120, Education 1175; English 105A, 105B, French 159, 160, Human Development 101, Italian 150, Linguistics 135 (if not used as an alternate to course 1 above), any other linguistics course not included in the 24-unit requirement above; Philosophy 137; Psychology 132, 190, Rhetoric 105, 107; Russian 160, Spanish 131, 132, 133.

The student should note that a number of these courses have prerequisites. It is usually advisable to consult with the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.

Total Units for the Major: 64-74

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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 110, 119 or 130, and 140 | 16 |

Additional units of upper division courses, chosen in consultation with an adviser.

Minor Advisers: Same as Major advisers.

Graduate Study:
The Linguistics Graduate Group offers study and research leading to the M.A. degree. Detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.


Courses in Linguistics

Lower Division Courses


Upper Division Courses

102. Historical Linguistics (4) I. Benware. Lecture—3 hours: discussion—1 hour. Prerequisite: courses 1 and 106. 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 102.

106. German Phonology-Morphology (4) III. Benware. Discussion—3 hours; written or oral report. Prerequisite: German 4; course 1 recommended. Modern German phonetics and the structure of the phonological system. Elementary morphological analysis. Offered in odd-numbered years. (Same course as German 106.)

108. History of the German Language (4) III. Benware. Discussion—3 hours: writing reports. Prerequisite: course 1 or German 106 recommended. Survey of the development of the German language and study of its structure in historical perspective. Offered in even-numbered years. (Same course as German 106.)

109. Phonetics (4) I, Wall. Lecture—3 hours: discussion—1 hour. Thorough grounding in articulatory phonetics with some attention to some fundamentals of acoustic phonetics. (Same course as Archaeology 109.)

110. Elementary Linguistic Analysis (4) III. Olmsted, Shimbamoto. Lecture—3 hours: discussion—1 hour. Introduction to phonetics. (Same course as Anthropology 110.)

111. Intermediate Linguistic Analysis (4) III. Olmsted. Lecture—3 hours: discussion—1 hour. Prerequisite: course 110. Continuation of course 110. More advanced work in phonemics, morphophonemics, and morphemics. (Same course as Anthropology 111.)

112. Comparative Linguistics (4) I. Olmsted. Lecture—3 hours: discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and reconstruction. (Same course as Anthropology 112.)

113. Language and Sex (4) III. Timm. Lecture—3 hours: discussion—1 hour. Prerequisite: course 1 recommended. Investigation of real and putative (stereotyped) sex-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus on English, but other languages are also discussed.
Literature In Translation

The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

Classics

1. Homer and the Tradition of Ancient Epic
2. Greek Tragedy
3. Greek Literature in Translation
4. Greek and Roman Comedy
5. 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
9. 10A-N. Masterpieces of World Literature
10. 13. Dramatic Literature
11. 15. The Spiritual Quest
12. 20. Man and the Natural World
13. 40. Introduction to Comparative Literature
14. 49. Freshman Seminar: General Topics in Comparative Literature
15. 135. Women Writers
16. 159A-G. Special Topics in Comparative Literature
17. 160A. The Modern Novel
18. 160B. The Modern Drama
19. 161A. Tragedy
20. 161B. Comedy
21. 161C. Tragedy
22. 162. The Theory and Practice of Literary Translation
23. 163. Biography and Autobiography
24. 164A. The Middle Ages
25. 164B. The Renaissance
26. 164C. Baroque and Neoclassicism
27. 164D. The Enlightenment
28. 166A. The Epic
29. 166B. The Novel
30. 167. Comparative Study of Major Authors
31. 168A-C. Modern Literary Movements and Styles
32. 169. The Avant-Garde

Dramatic Art

20. Introduction to Dramatic Art
21. Theatre and Drama: Aeschylus to Machiavelli
22. Theatre and Drama: Shakespeare to Schiller
23. Theatre and Drama: Ibsen to Albee
24. Contemporary Experimental Theatre and Drama

East Asian Studies

1. Modern Chinese Literature

English

*20. The Epic
171A. The Bible as Literature: The Old Testament
171B. The Bible as Literature: Prophets and New Testament

French

*25. French Literature in Translation

German

48. Myth and Saga in the Germanic Cultures
49. Freshman Seminar
50. Survey of German Culture
51. Masterworks of German Literature I
52. Masterworks of German Literature II
110. Old 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
116. Intellectual Backgrounds of German Literature

Italian

25. Italian Literature in Translation

*139A. Early Italian Literature and Dante Alighieri
*139B. Boccaccio, Petrarch and the Renaissance
139C. Modern Italian Literature
Mathematics

(College of Letters and Science)

Carlos R. Borges, Ph.D., Chairperson of the Department

G. Thomas Salliee, Ph.D., Vice-Chairperson of the Department

Department Office, 565 Kerr Hall (752-0827)

Faculty

Henry L. Alder, Ph.D., Professor Emeritus
Hubert A. Arnold, Ph.D., Associate Professor Emeritus

George A. Baker, Ph.D., Professor Emeritus
Dallas O. Banks, Ph.D., Professor
David W. Barnette, Ph.D., Professor
Donald C. Benson, Ph.D., Professor
Carlos R. Borges, Ph.D., Professor

Robert J. Buck, Ph.D., Associate Professor

Albert C. Buxton, Ph.D., Professor Emeritus

Guilford D. Cherekian, Ph.D., Professor

Doyle O. Cutler, Ph.D., Associate Professor

James R. Diedrich, Ph.D., Associate Professor

Allan L. Edelson, Ph.D., Professor

Curtis M. Fulton, Ph.D., Professor Emeritus

Robert D. Glauz, Ph.D., Professor

Shirley A. Goldman, M.S., Lecturer

Alan M. Hastings, Ph.D., Assistant Professor

Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Frank A. Howard, Ph.D., Associate Professor

Kenneth I. Joy, Ph.D., Assistant Professor

Kurt Kreith, Ph.D., Professor

Arthur J. Kerner, Ph.D., Professor

Melven R. Krom, Ph.D., Professor

Gary J. Kuroski, Ph.D., Professor

Peter Linz, Ph.D., Professor

Marc S. Mangell, Ph.D., Assistant Professor

David G. Mead, Ph.D., Professor

E. C. Millon, Ph.D., Associate Professor

Donald A. Norton, Ph.D., Associate Professor

Wesley F. Pfeiffer, Ph.D., Professor

Richard E. Pike, Ph.D., Associate Professor

Edward R. Roessler, Ph.D., Professor Emeritus

G. Thomas Salliee, Ph.D., Professor

Evelyn M. Silvia, Ph.D., Associate Professor

SHERMAN K. STEIN, LIT.D. (Hon.), Ph.D., Professor
Robert W. Stirnall, Ph.D., Associate Professor
Takayuki Tamura, D.S.C., Professor
Edward J. Tuffy, Jr., Ph.D., Associate Professor
Howard J. Weiler, Ph.D., Professor
Richard G. West, B.A., Lecturer

The Major Programs

Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. The latter is especially recommended for students who intend to pursue mathematics at the graduate level. Under either degree program the student may prepare for various careers by an appropriate choice of elective courses.

Developing an ability to think and communicate in mathematical terms is the basic objective of both bachelor degree programs. This ability requires familiarity with the concepts and techniques of various branches of mathematics and is necessary for graduate study in mathematics as well as the successful pursuit of mathematically oriented careers. In particular, mathematics is an essential tool for people working in the physical sciences, and mathematics is now being widely applied to studies in the biological and social sciences as well. Students with career oriented programs in applied mathematics should supplement their mathematics curriculum with courses in other departments which provide background in their proposed area of application. Mathematics provides an excellent background for entry into the Schools of Administration, Law, Medicine, Veterinary Medicine and for graduate study in many other areas. Mathematics is also fine preparation for employment immediately after graduation, since the completion of a mathematics major is taken by many employers as evidence that an applicant can think and learn, two attributes highly prized in an employee. Also, as more and more fields become quantified and scientific, a strong background in mathematics will be required of persons to make meaningful contributions and to reach the top.

Mathematics

A.B. Major Requirements:

Preparatory Subject Matter .................................................. 36-45

Mathematics 101, 108A should be taken prior to junior year .................................................. 8

Choose one Track from the following two ..................................... 28-37

Track 1: Secondary Teaching

Mathematics 141

Choose one course sequence from each of (a), (b), and (c) .................................................. 15A

(a) Mathematics 121A-121B or 127A-127B

(b) Mathematics 139A-139B or 135A-151B

(c) Statistics 130A-130B or Mathematics 131A and Statistics 131B

Additional upper division mathematics to minimum of 36 upper division units (2-6)

Recommended: Mathematics 129A, 129B, 140, 143, 168

Track 2: General Mathematics

Choose one course sequence from each of (a), (b), and (c) .................................................. 15A

(a) Mathematics 115B-115C or 39A-139B or 151A-151B

(b) Mathematics 118A-118B or 121A-121B or 127A-127B

(c) Mathematics 140 or 143

Additional upper division mathematics to minimum of 36 upper division units (15-18)

Recommended: Additional units in computer science

Total Units for the Major .................................................. 64-76

Mathematics

B.S. Major Requirements:

Preparatory Subject Matter .................................................. 28-39

Mathematics 11 (or high school equivalent) .................................................. 0-3

Mathematics 21A, 21B, 21C, 22A, 22B, 36 .................................................. 18

Mathematics 29A or Electrical and Computer Engineering 4 .................................................. 3

Choose according to Track selected (see Depth Subject Matter) .................................................. 7-15

Track 1: Mathematics 22C, Physics 8A, 8B, 8C

Track 2: Mathematics 22C, Physics 8A, 8B, 8C

Track 3: Mathematics 36 (strongly recommended this course be taken during freshman year), Physics 8A

Track 4: Mathematics 36 (strongly recommended this course be taken during freshman year), Statistics 13 or 102

Choose according to Track selected (see Depth Subject Matter) .................................................. 4

Track 1: Physics 8A

Track 2: Statistics 13 or 102

NOTE: For key to footnote symbols, see page 128.
Mathematics

Depth Subject Matter ........................................... 45-54
Mathematics 101, 108A (should be taken prior to junior year) 5
Choose one Track from the following four 40-49

Track 1: Preparation for Graduate Study in Mathematics
Mathematics 121H or 185A-185B
Additional upper division mathematics to total minimum of 45 upper division units (10-16)
Recommended: Mathematics 118A, 118B, 119, 141, 147

Track 2: Applied Mathematics
Mathematics 118A, 118B, 119, 128A, 167
Choose one course sequence from each of (a), (b), and (c)
(a) Mathematics 121A-121B or 127A-127B-127C
(b) Mathematics 128B or 128C
(c) Mathematics 140 or 143
Related upper division units (11-14) from one of the following areas: engineering, computer science, life sciences, or some other physical science (not mathematics). To be developed in consultation with adviser.

Note that prerequisites to upper division courses should be taken early in program. Sets of courses are available from an Applied Mathematics adviser.

Track 3: Mathematics for Secondary School Teachers
Mathematics 115A, 141
Choose one course sequence from each of (a), (b), and (c)
(a) Mathematics 121A-121B or 127A-127B
(b) Mathematics 139A-139B-167 or 151A-161B-161C
(c) Statistics 130A-130B or Mathematics 131 and 131B
Additional upper division mathematics to total minimum of 45 upper division units (11-15)
Recommended: Mathematics 129A, 129B, 140, 143, 168

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 151A-151B
(b) Mathematics 118A-118B or 121A-121B or 127A-127B
(c) Mathematics 140 or 143
Additional upper division mathematics to total minimum of 45 upper division units (19-24)
Recommended: Mathematics 126, 165A, 165B; additional units in computer science.

Total Units for the Major ........................................... 73-83

Computer Science and Mathematics

B.S. Major Requirements: 

UNITs
Preparatory Subject Matter ........................................... 27

Depth Subject Matter ........................................... 50
Electrical or Computer Engineering 170 22
Minimum of two upper division units selected from Mathematics 129C, 170, 171, 173, 175, 176, 177 9
Additional upper division courses in mathematics or computer science as approved by the adviser 9

Total Units for the Major ........................................... 77

Recommended Language Preparation
Bachelors of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Depth Subject Matter Requirements
Certain mathematically oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 45 unit requirements with prior departmental approval. In general, 190C, 192, 197C, 198, 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.


Information for Undergraduates. Students interested in the study of mathematics should obtain the Undergraduate Handbook, 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, 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, physics, and chemistry, secondary teaching, or general mathematics should consult an undergraduate adviser.

Prerequisite Credit. Credit will not normally be given for a course if it is prerequisite to a course already successfully completed. Exceptions can only be made by the Department Chairperson.

Minor Program Requirements:

UNITs
Mathematics ........................................... 20
Upper division units in mathematics (excluding 191, 192, 197C, 198, 199) 20
Three of these units could be from Mathematics 36.

Teaching Credential Subject Representative. G. T. Sallee. See page 103 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.


Courses in Mathematics

Lower Division Courses

B. Elementary Algebra (no credit) I. The Staff Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to concurrent student enrollment. (P/NP grading only.) (There is a fee of $45.)

C. Trigonometry (no credit) I. The Staff Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to concurrent student enrollment. (P/NP grading only.) (There is a fee of $30.)

D. Intermediate Algebra (no credit) I. The Staff Lecture—3 hours. Basic concepts of algebra, designed to prepare the student for college work in mathematics, such as course 164, or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. Not open to concurrent student enrollment. (P/NP grading only.) (There is a fee of $15.)

10. Mathematics and Civilization (4) II. Kreith 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 covered.

11. Analytic Geometry (3) I, II. The Staff Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry. Analytic geometry in two dimensions; elementary functions.

16A. Short Calculus (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on 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 trigonometric, exponential and logarithmic functions; applications. Not open to students who have received credit for course 21A.

16C. Short Calculus (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open to students who have received credit for course 21C.

98. Basic Concepts of Computing (3) I, II, III. The Staff Lecture—2 hours; laboratory—1 hour. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Mathematics Diagnostic Examination. Only two units of credit will be allowed to students who have credit for course 16A, 16B. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of functions. Differentials. L'Hopital's rule.

21A. Calculus (4) I, II, III. The Staff Lecture—discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 11 may be taken concurrently); and obtaining required score on Mathematics Diagnostic Examination. Only two units of credit will be allowed to students who have credit for course 16A, 16B. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average value of function, improper integral, functions of several variables. Only two units of credit will be allowed students who have received credit for course 16B.

21B. Honors Calculus (4) I, II, III. The Staff Lecture—4 hours. More intensive treatment of material covered in course 21A. Students completing 21BH can continue with course 21BH or the regular 21B.

21B. Calculus (4) I, II, III. The Staff Lecture—discussion—4 hours. Prerequisite: course 21A or 21B. Continuation of one-dimensional calculus. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average value of function, improper integral, functions of several variables. Only two units of credit will be allowed students who have received credit for course 16B.
112. Projective Geometry (3) I. The Staff Lecture—3 hours. Prerequisite: course 108. Analytic and synthetic methods and theorems for projective geometry. Point-line duality, collinearity, projective transformations, and projective space. Proofs of theorems and applications.

114. The Theory of Convex Sets (3) III. The Staff Lecture—3 hours. Prerequisites: 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) I. Alder Lecture—3 hours. Prerequisite: course 108. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers.

115B. The Theory of Numbers (3) II. Alder Lecture—3 hours. Prerequisite: course 21C. Algebra, number theory, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years.

115C. The Theory of Numbers (3) III. Alder Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in even-numbered years.

116. Metric Differential Geometry (3) III. The Staff Lecture—3 hours. Prerequisite: courses 22A, 22C, or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years.

118A. Partial Differential Equations; Elementary Methods of Solution (3) III. The Staff Lecture—3 hours. Prerequisites: courses 22A, 22B, 22C. Partial differential equations of mathematical physics, solution by separation of variables.

118B. Partial Differential Equations: Boundary Value Problems and Special Functions (3) III. The Staff 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) III. The Staff Lecture—3 hours. Prerequisites: courses 22A, 22B, 22C. Existence and uniqueness of solutions of ordinary differential equations, methods of linear systems, linearization and approximations, local behavior near a critical point and stability theory.

120. Complex Variables and Applications (3) III. The Staff Lecture—3 hours. Prerequisites: courses 22A, 22B, 22C. Analysis of functions of one complex variable, Laplace transforms, and applications.

121-121B. Advanced Calculus for the Sciences (3-3) I-II. The Staff Lecture—3 hours. Prerequisites: courses 21C, 22A, 22B, 22C, 22D. Multivariable calculus, vector calculus, applications to the natural sciences, and linear algebra, complex variables.

212A-121B. Introduction to Statistical Procedures (3-3)-II. The Staff Lecture—3 hours. Prerequisite: course 121A. Programming and statistical techniques for solving problems in the sciences. (P/N grading only.)


212B. Computer Data Structures (3) I. The Staff Lecture—3 hours. Prerequisites: courses 22A, 22B, 22C, or knowledge of FORTRAN or ALGOL. Use of in-core storage and data structures. Applications to file organization, sorting, searching, and various other computer algorithms. (P/N grading only.)

3111. Application of mathematics to problems of the natural sciences and engineering. (P/N grading only.)

130A. Introduction to Algebra (3) I. The Staff Lecture—2 hours. Prerequisite: course 108 or consent of instructor. Introduction to the theory and applications of groups, rings, and fields. No open to students who have received credit for courses 130A-130B. (P/N grading only.)

130B. Introduction to Algebra (3) II. The Staff Lecture—2 hours. Prerequisite: course 130A. Linear algebra, Galois theory, and applications. (P/N grading only.)

131. Probabilistic Models in Operations Research (3) III. The Staff Lecture—3 hours. Prerequisite: course 121A. Applications of probability to the study of biological and social systems. Topics include the Poisson process, reliability, queuing, inventory models, Markov chains, and processes, diffusion processes. Offered in odd-numbered years.

136. Development of Mathematical Ideas (3) II. Keil Lecture—3 hours. Prerequisite: course 21C. Topics and mathematicians studied with an emphasis on the role of modern mathematics. May be repeated for credit with consent of instructor.

139A. Introduction to Algebra (3) I. The Staff Lecture—2 hours. Prerequisite: course 219A or 219B or consent of instructor. Introduction to the theory and applications of groups, rings, and fields. Open to students who have received credit for course 130A, 130B, 131A, 131B, 132A, 132B, 133A, 133B, 134A, 134B, 135A, 135B, 136A, or 136B. Offered in even-numbered years.


142. Computer Data Structures (3) I. The Staff Lecture—3 hours. Prerequisites: courses 22A, 22B, 22C. Applications of mathematical techniques in biology and the life sciences. Computational analysis, enzyme kinetics, population models, blood flow and neural modeling.
Mathematics

147. Topology (3) III. The Staff Lecture—3 hours. Prerequisite: course 127C, and 131A or 131B, or consent of instructor. Introduction to point-set and combinatorial topology. Offered in even-numbered years.

151A-151B-151C. Algebra (4-4-4) III-I-II. The Staff Lecture—3 hours; extensive reading and problem solving. Prerequisite: course 108. Groups, rings, fields and linear transformations. The emphasis in this course is on the development of the ideas underlying the classical theory of linear equations, with applications to physics, engineering, economics, and biology and statistics.


170. Data Processing (3) III. The Staff Lecture—3 hours. Prerequisite: course 25C or the equivalent. Physical characteristics of digital and random storage media, data structures, file manipulation, data-base management. COBOL programming.

171. Automata Theory and Formal Languages (3). The Staff Lecture—3 hours. Prerequisite: course 120C or the equivalent. Finite automata and regular languages, context-free languages, bounded automata and context sensitive languages. Turing machines, Computability.

173. Computer Graphics (3) I. Joy Lecture—4 hours. Prerequisite: course 22A, course 129A or Electrical and Computer Engineering 180. Introduction to the basic principles of computer graphics. Current graphics methods, shading and texturing operations in two- and three-dimensional space, matrices and transformational geometry, clipping, graphics system design, standard graphics program development.

174. Topics in Artificial Intelligence (3) I. The Staff Lecture—3 hours. Prerequisite: course 129C. Surveys current topics in artificial intelligence, and introduces the artificial intelligence language, LISP. Topics include knowledge organization and representation, searching techniques, natural language understanding, expert systems, games, program matching, and theorem proving.

175. Techniques in Pattern Recognition (3) II. The Staff Lecture—3 hours. Prerequisite: course 129A. Presents basic techniques in pattern recognition, including Bayes decision theory, parameter estimation, supervised learning, nonparametric methods, linear discriminant functions, unsupervised learning, clustering, and scene analysis.

176. Software Design (3) III. Joy Lecture—4 hours. Prerequisite: course 129B. Surveys current topics in software design and testing. Topics include: program structure design, design practices, programming style, testing principles, module testing, reliability, proving programs, software metrics, and software support systems.

185A-185B. Functions of a Complex Variable (3-3-3) I-II. The Staff Lecture—3 hours. Prerequisite: course 22C. Complex number systems. Cauchy-Riemann equations, elementary functions. Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions. Offered in even-numbered years.

201A-210B-210C. Topics in Algebra, Analysis and Geometry (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisites: courses 208B and 127A-127B-127C (or the equivalent) or consent of instructor. Applications of complete metric spaces in solving algebraic, differential and integral equations, Hilbert and Banach spaces, applied approximation theory. Optimization in function spaces, quadrature functions, Newton’s method in boundary value problems. Offered in even-numbered years.

205A-205B-205C. Functions of a Complex Variable (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: course 127C. Theory of analytic functions. Cauchy integral theorem, power series, analytic continuation, conformal mapping, special functions. Offered in even-numbered years.

210A-210B-210C. Topics in Algebra, Analysis and Geometry (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisites: courses 208B and 127A-127B-127C (or the equivalent) or consent of instructor. Topics in advanced algebra, analysis, and topology. Theory to curriculum at all levels. (Courses 210A, 210B, 210C series may be repeated for credit with prior consent of instructor.)

216A-216B-216C. Topics in Algebra, Analysis and Geometry: Discussion (1-1-1) I-II-III. The Staff Lecture—discussion—1 hour (to be arranged). Prerequisites: course 210 (concurrently); consent of instructor. Special topics related to courses 210 which are of special interest to teachers and candidates for the MAT degree.


215A-215B-215C. Topology (3-3-3) I-II-III. Eidelson Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point-set topology, homotopy theory, and homology theory. Offered in even-numbered years.


219A-219B. Ordinary Differential Equations (3-3) I-II. The Staff Lecture—3 hours. Prerequisite: courses 22A, 127C. Ordinary differential equations and complex domains; existence and uniqueness theorems; linear systems; analysis of singular points; Slum-Liouville theory; asymptotic expansions. Offered in odd-numbered years.

220A-220B-220C. Mathematical Physics for the Sciences (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisites: courses 22A, 118B, and 120 or the equivalent. Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices and calculus of variations.

221A-221B. Mathematical Fluid Dynamics (3) I-II. Howes Lecture—3 hours. Prerequisite: course 118B. Dynamics of fluid motion, perfect fluids, rotational and irrotational motion, two-dimensional and three-dimensional axisymmetric flows, compressible and incompressible viscous flows. Offered in odd-numbered years.

225A-225B. Numerical Analysis (3-3) I-II. Krom Lecture—3 hours. Prerequisite: course 125 or the equivalent. Approximation theory, convergence, and completeness of the field of numerical mathematics. Theory and examples in both fixed and variable concept algorithms. Functional analysis of parallel and hyperbolic partial differential equations. Offered in even-numbered years.


224A-224B. Mathematics of Renewable Resources (3-3-3) I-II. Magel Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Logistic equation; population; economic considerations; operational considerations. Deterministic and stochastic theory and applications; nonlinear models and applications; dynamical systems; aggregation models and applications; distribution models and applications; age dependent models and applications; multispecies models: stochastic models. Offered in even-numbered years.

225A-225B-225C. Probability Theory (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: course 127C. Measure-theoretic foundations of probability, distribution functions, and characteristic functions, laws of large numbers and central limit theorems, conditional probabilities, martingales.

240A-240B-240C. Differential Geometry (3-3-3) I-II-III. Chairker Lecture—3 hours. Prerequisite: course 116 or consent of instructor. Introduction to differentiable manifolds, the tangent bundle, tensor fields, differential forms, Diffeomorphism, connections, Lie groups, Riemannian Geometry. Offered in odd-numbered years.

229A-229B-229C. Algebra (3-3-3) I-II-III. Cutter Lecture—3 hours. Prerequisite: standing in mathematics or consent of instructor. The theory of groups, rings, and fields.

221A-221B-221C. Advanced Algebra (3-3-3) I-II-III. The Staff Lecture—3 hours. Prerequisite: courses 250 or consent of instructor. Advanced study of groups, semigroups, algebras, rings, fields, abelian groups, field theory, homological algebra, algebraic number theory, and others. Offered in even-numbered years.

226A-226B. Topics in Computer Science (3) I, II. III. The Staff Lecture—3 hours. Prerequisites: graduate standing or consent of instructor. Advanced study of various fields of computer science including (A) Automata Theory, (B) Formal Languages, (C) Coding Theory, (D) Computer Graphics, (E) Software Design, (F) Artificial Intelligence, (G) Computer-Aided Design.


228. Topics In Pure and Applied Mathematics (1-3) I, II, III. The Staff Lecture—1-3 hours. Prerequisite: graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty.

229. Seminar (1-6) I, II, III. The Staff (Chairperson in charge) Lecture—Advanced study in various fields of mathematics, including the following: algebraic geometry of semigroups, control theory, mathematical logic, combinatorics, differential equations and applications, multivariable calculus, probability and statistics, measure theory, and univalent functions. (SU grading only)
Medical

Microbiology

See Medicine

Medical

School of this page: Medicine (Veterinary Medicine), see page 266

Medicine

(School of Medicine)

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Gary L. Henderson, Ph.D., Assistant Dean
Charles C. Semple, M.B.A., Assistant Dean
Larry G. Stark, Ph.D., Assistant Dean
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NOTE: For key to footnote symbols, see page 128.
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Hiroshi Yamauchi, M.D., Clinical Professor (Internal Medicine)

NOTE: For key to technic symbols, see page 128.
Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also page 117.

Courses in the School of Medicine

Departmental Courses

New Grading Schedule (affecting new medical students only). Effective Fall Quarter 1979, medical students enrolling in the School of Medicine for the first time will be graded on the letter-grade basis. Medical students enrolling prior to Fall Quarter 1979 will continue to receive the H/S/U mode of grading on courses listed following. For further details on the new grading system, contact the School of Medicine.

Anesthesiology

Professional Courses

420. Case Management Conference (1) I, II, III, IV. The Staff (Collopy in charge)

Discussion—1 hour. Prerequisite: Items and residents, advanced medical and veterinary students, consent of instructor.

Informal discussion of current hospital case material presented by house officers, interns and faculty. Clinical and research conference, combined with pertinent literature references. I hope to bring the problems with emphasis on preventative as well as corrective measures.

421. Basic Science Conference (1) I, II, III, IV. The Staff (Reitan in charge)

Discussion—1 hour. Prerequisite: Advanced medical, veterinary, and graduate students, consent of instructor.

Discussion of basic science material related directly to anesthesiology, particularly in the areas of physiology and pharmacology. Selected reading assignments are given in advance and utilized by the instructor to encourage discussion in selected instances. The topics are organized and presented by the students and residents.

490. Resident Seminar (1) I, II, III, IV. The Staff (Collopy in charge)

Lecture—1 hour. Prerequisite: Degree in medicine or veterinary medicine or consent of instructor. A series of lectures covering a spectrum of anesthesia and related topics in depth, primarily oriented but also including relevant research material. Presented by faculty, residents, and visiting professors. Pertinent reference lists are circulated in advance of seminars.

499. Anesthesiology Research (1-6) I, II, III, IV. The Staff (Ellis in charge)

Laboratory—18 hours. Prerequisite: Third- or fourth-year medical students, advanced undergraduates, veterinary graduate students, consent of instructor. Problems in clinical and/or laboratory research.

Behavioral Biology

Lower Division Courses

98. Directed Group Study (1-3) I, II, III, IV. The Staff (Chapman in charge)

Discussion—1 hour. Prerequisite: Consent of instructor. Extended evaluative and critical discussions of selected topics related to the psychological and biochemical bases of behavior. Prerequisites: Introduction to Psychology, theory and concepts of current research. (P/NP grading only.)

99. Special Study for Undergraduates (1-3) I, II, III, IV. The Staff (Chapman in charge)

Prerequisite: Consent of instructor. Laboratory research on selected topics related to the biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research project. (P/NP grading only.)

Upper Division Courses

188. Recent Developments in Behavioral Biology (2) I, Pollock

Lecture—1 hour. Discussion—1 hour. Prerequisite: Consent of instructor. What is new and interesting at the leading edge of development of behavioral biology? Through presentations by faculty and the potential for student research and the instructor, the course will answer this question in lectures, demonstrations, experimental workshops and discussions. A grading scale will be contingent upon submission of a written description of each student's significant learning experience in the course. (P/NP grading only.)

198. Directed Group Study (1-3) I, II, III, IV. The Staff (Chapman in charge)

Prerequisite: Consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research. (P/NP grading only.)

Special Study for Advanced Undergraduates (1-3) I, II, III, IV. The Staff (Chapman in charge)

Prerequisite: Consent of instructor. Laboratory research on selected topics relating to the biological bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problems. (P/NP grading only.)

Graduate Courses

245. Psychophysiology of Stress (3) II, Sapersnath

Lecture—2 hours. Discussion—1 hour. Prerequisite: Consent of instructor. Stress and the endocrine, autonomic and behavioral stress response systems. Determinants of effective coping. Physiological and behavioral effects of chronic psychosocial and environmental stress on the CNS control of affect, sexual function and drug abuse.

290. Seminar (2) I, II, III, IV. The Staff (Chapman in charge)

Seminar—1 hour. Lecture—1 hour. Series of lectures by invited speakers and students on current topics in behavioral biology. (Same course as 490.)

298. Group Study (1-5) I, II, III, IV. The Staff (Chapman in charge)

Discussion—1-5 hours. Prerequisite: Consent of instructor. Extended evaluative and critical discussions of selected topics relating to the physiological and biochemical bases of behavior. Primary emphasis within any topic will be on the methodology, theory and concepts of current research.

399. Research (1-12) I, II, III, IV. The Staff (Chapman in charge)

Prerequisite: Consent of instructor; open to graduate students. Laboratory research on selected topics relating to the physiological and biochemical bases of behavior. Participation in ongoing research projects or planning, initiation and execution of individual research problems. (S/U grading only.)

Professional Courses


Lecture—2 hours. Laboratory-experiential laboratory—2 hours. Cognitive and experiential study of the ancient and modern mnemonics of the mind/body. Critical examination of several such disciplines, focusing on their common medi- cally relevant aspects. Reading about, discussing, and ex- periences mind/body interrelationships.

486. Three-Dimensional Structure of the Human Brain (1) I, Pollock

Lecture—2 hours. Laboratory—discussion of two to three 2-hour sessions—20 hours minimum (intensive, somewhat flexible early-quarter scheduling). Course goal is the student retaining through oral and written exams the major anatomic features of the major structures of the human brain. Phases: slide-illustrated lecture emphasizing function; gross dissection; build clay model of brain; identify structures on slides. (S/U grading only for graduate students.)

Biological Chemistry

Lower Division Course

92. Internship in Biological Chemistry (1-3) I, II, III, IV. The Staff (Bradshaw in charge)

Work-learning experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work-study experience in biological chemistry and related fields. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Watson in charge)

Prerequisite: Consent of instructor. (P/NP grading only.)

Graduate Courses

249. Biological Significance of Prostaglandins and Related Lipids (2) I, Zilversmit

Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiology Cell Sciences 101A-101B or Physiology 100A-100B or equivalent. Isolation, quantitative estimations and biochemical studies of prostaglandins, thromboxanes, pros- tas:colin and leukotrienes; biosynthesis from precursor fatty acids; action of prostaglandins and their role in diseases (allergic, inflammatory). (Same course as Biochemistry 246.)

213. Principles of Comparative Biochemistry (5) I, Benesik, Fever (Food Science and Technology)

Lecture—3 hours. Prerequisite: Biochemistry 201C or consent of instructor. An introduction to comparative biochemistry. Comparison of living systems, their structures and functions on a molecular basis, biochemistry, and related subjects. Experimental course in biochemistry (243). (Same course as 243.)

214. Contemporary Medical Biochemistry (1) I, II. The Staff (Troy in charge)

Seminar—1 hour. Prerequisite: Course in biochemistry or equivalent. Current topics in clinical and research interests. Emphasis on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance. No examination. (S/U grading only.) (Same course as 414.)

216. Protein Structure (3) I, Benesik, Bradbury

Lecture—3 hours. Prerequisite: Biochemistry and Biophysics 201A or consent of instructor. This course is designed to acquaint students at graduate level with currently applied techniques employed in determination of protein structure and significant results derived from them. Techniques which will be presented include amino acid sequence analysis, three-dimensional structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in odd-numbered years. (S/U grading only.)

220. Molecular Biology Laboratory (4) II, IV. Hershby, Do (biochemistry)

Lecture—1 hour. Laboratory—9 hours. Prerequisite: Medical and graduate students with consent of instructors. A variety of laboratory techniques will be used to repeat significant experiments in the text through selected laboratory exercises. Emphasis on understanding molecular mechanism of synthesis and transcriptional controls. Examples from bacterial, mammalian, and plant cells and their viruses. (S/U grading only for graduate students.)

222. Mechanisms of Translational Control (2) I, Hershby

Lecture—1 hour. Discussion—1 hour. Prerequisite: Consent of instructor. Molecular mechanisms of protein synthesis and translational controls. Examples from bacteria, mammalian, and plant cells and their viruses. (S/U grading only for graduate students.)

235. Biochemical Mechanisms of Mammmalian Hormones (4) II, Wilson

Lecture—3 hours. Prerequisite: Biochemistry 201A-201B or consent of instructor. Biochemical mechanisms by which hormones modify molecular and cellular processes. Cyclical nucleotides and CA as hormone second messenger. Role of action of insulin in regulation of transport, metabolism and protein synthesis. Control of gene function by steroids. Interaction between hormones. Offered in even-numbered years.

299. Current Topics in Biological Chemistry (1) I, II, III, IV. The Staff (Watson in charge)

Seminar—1 hour. Prerequisite: A course in biochemistry. Current topics of interest. Participation in preparation of papers and/or reviews of laboratory work in progress. (Same course as 490.)

201. Current Topics in Protein Synthesis (5) I, II, III, IV. Hershby

Discussion and seminar sessions. Prerequisite: Consent of instructor. Review of current research in structure and function of bacterial and mammalian ribosomes and control of protein synthesis. (S/U grading only for graduate students.) (Same course as 491.)
Clinical Psychology

Graduate Courses

202. Theory of the Person-Adult (4) (A), Abramowitz and staff
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Major theoretical orientations will be examined and compared. Emphasis will be placed on those theories which are most relevant to contemporary intervention techniques. (SU grading only.)

203. Observational Practicum (1-3) I, II, III, IV. 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. Didactic material and field experience. (SU grading only.)

204. Theories in Clinical Child Psychology (4) (A) Stewman
Lecture—4 hours. Major theories in clinical child psychology as related to research and clinical findings in pediatrics, child psychiatry and child development.

205. Psychopathology (4) (A) Meadow, Reiterer
Seminar—4 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Major theories on the etiology of schizophrenia and the chief methods of therapy.

206. Issues in Clinical Psychology (1-4) I, II, III, IV. The Staff
Lecture—1-4 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Detailed examination of topics in psychology with special interest to the faculty members, such as psychological stress, aggression, suicide, and the etiology of schizophrenia. May be taken for credit. (SU grading only.)

207. Introduction to Community Psychology (4) (A) III. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate students in Clinical Psychology or consent of instructor. Exploration of the basic literature and relevant research findings regarding community mental health. Focus on basic theoretical issues, methods and results of need assessment and program evaluation, implications for mental health planning with specific emphasis on innovative programs.

208. Theories of Group Consultation (3) I, II, III. Seminar—3 hours. Prerequisite: consent of instructor. A sociopsychological approach towards the study of the interrelationships among the individual, group, community, and society. Applications to models of small group and social system consultation. (SU grading only.)

209. Practicum in Group Consultation (1-3) I, II, III, IV. The Staff (Morrison in charge)
Seminar—3 hours. Prerequisite: consent of instructor. A practicum including systematic observations, participation, and consultation in a variety of social settings including self-help and community psychotherapy groups and educational and mental health organizations. May be repeated for credit. (SU grading only.)

Seminar—4 hours. Prerequisite: graduate student in Clinical Psychology and consent of instructor. The seminar on the "structure-interactionism" theory of Jean Piaget will include mastery of his theory of cognitive developmental stages, experience with methods of assessment and application of the core concepts to clinical psychopathology in children and adolescents. (SU grading only.)

211. Design and Analysis in Clinical Research I (4) I. The Staff (Davison in charge)
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 those methods having the broadest application to contemporary clinical investigation.

212. Design and Analysis in Clinical Research II (4) II. The Staff (Abramowitz in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student in Clinical Psychology course 210 (or equivalent) or consent of instructor. Advanced statistical methods for clinical research. Quasi-experimental, analogue, archiv, single-subject and other methodological alternatives available to the clinical researcher will be reviewed.

213. The Psychology of Women (3) III. Pelligrino Rockwell Seminar—3 hours. Prerequisite: consent of instructors. Course will trace developmental path of women from birth to death. Implications for psychotherapy and coping styles will be explored. (SU grading only.)

214. Psychotherapy Practicum (1-3) I, II, III, IV. The Staff Seminar—11/2 hours; discussion—2 hours. Prerequisite: graduate status in Clinical Psychology or consent of instructor. Supervision and discussion of clinical problems with the framework of specific models of psychotherapy. May be repeated for credit. (SU grading only.)

215. Assessment Practicum (1-3) I, II, III, IV. The Staff Seminar—2-3 hours. Prerequisite: graduate student in Clinical Psychology or consent of instructor. Students will select the specific test and will function as the instructor offering supervision. Students will also write assessment reports including their interpretation of test results and make comment on their supervisor's supervision.

216. Psychological Assessment I (3) I, II, 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 theories of projective techniques with emphasis upon the theory of administration and interpretation of the Rorschach and TAT for children and adults. (SU grading only.)

217. Introduction to Projective Assessment (3) I, II, 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 theories 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) I, II, III, Hines Discussion-seminar—2 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 and techniques of the behavior therapist. Techni- ques surveyed include relaxation training, systematic desensitization, implosion, modeling, role rehearsal, cognitive restructuring, contingency management, and self-control strategies. (SU grading only.)

220. Professional Development and Ethics (1-4) I, III, Rockwell Seminar—1-4 hours. Prerequisite: graduate student standing with consent of instructor. Course intended for future professional psychologists. Topics to include ethics of professional ethics, the social system and its impact on the professional, and the professionalization processes. (SU grading only.)

221. Research (1-2) I, II, III, IV. The Staff Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (SU grading only.)

NOTE: For key to footnote symbols, see page 128.
Medicine, School of

Graduate Courses

201. Medical and Environmental Epidemiology (S3, II, III, IV, Berhane)
Lecture—2 hours; discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and discussions will include the basic principles of medical and environmental epidemiology as related to selected infectious, noninfectious or environmental disease processes including appropriate control of health, medical ecology and prevention and disease control.

202. Community and Preventive Medicine (1-0-0) I, II, III, IV, Berhane and staff
To be arranged. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and discussions will focus on the principles of preventive medicine and related aspects of community health in relation to the prevention and control of specific diseases.

203. Medicine and the Environment (2) I, III, II, IV, Berhane
Lecture—1 hour; discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Lectures and seminars will cover the impact of environmental issues on both human health and the environment, with a focus on the interaction between the two.

204. Medical and Health Care Delivery Patterns (3) II, III, Berhane, Leonard (Oncology/Hematology), Bauer, Weier
Lecture—2 hours; discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Seminar will include the study of various medical and health care delivery patterns and their impact on patient care.

205. Issues in Community Health (2) II, I, III, II, IV, Berhane, Bauer, Weier
Lecture—1 hour; discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Seminar will focus on current issues and trends in community health.

206. Nutrition and Health (2) II. Berhane and staff
Lecture—1 hour; discussion—1 hour. Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Seminar will cover the role of nutrition in health and disease.

207. Political and Economic Determinants of Health Care (3) III, II, Berhane, Weier
Lecture—2 hours; discussion—1 hour. Group study will examine the role of politics and economics in determining health care policies.

208. Advanced Information Systems (3) II, III, Weier
Lecture—2.5 hours; discussion—1 hour. Group study will focus on advanced information systems in health care.

209. Psychiatric Implications of Legal Intervention (2) I, III, Bauer, Tupin (Psychiatry), Schurer
Discussion—2 hours. Prerequisite: consent of instructor. Seminar will explore the psychiatric implications of legal interventions in health care.

210. Advanced Information Systems (3) II, III, Weier
Lecture—2 hours; laboratory—2 hours. Prerequisite: medical, graduate or veterinary students, or consent of instructor. Seminar will cover advanced information systems in health care.

211. Community Health (1-3) I, II, III, IV, Berhane, Weier, Tupper
Seminar—1.3 hours. Prerequisite: medical, graduate or veterinary students, or consent of instructor. Seminar will cover community health issues and their impact on health care delivery.

Dermatology

Upper Division Courses

192. Internship in Cutaneous Biology (1-1-2) I, II, III, IV, The Staff (Gomez in charge)
Internship—3-36 hours; final report. Prerequisite: upper division standing or consent of instructor. Seminar will focus on advanced skills in dermatologic research and related fields.

199. Special Study in Cutaneous Biology (1-5) II, III, IV, The Staff
Gomez in charge. Prerequisite: advanced understanding of clinical aspects of skin disease. May be arranged by arrangement of special topics in skin disease. May be arranged by agreement of special topics in skin disease.

Family Practice

Lower Division Courses

81. Preventive Health Care (2) II, Chang in charge. Rockwell, Jones
Lecture—2 hours; final examination. Students will learn preventive health care information that will enable them to live a healthier life. Emphasis will be placed on sexually transmitted diseases, mental health and drug abuse (P/N grading only).

82. 222B-222C-222D-222E-222F-222G-222H. Internship in Family Practice (5-3-3-3-3-3-3) I-III, IV-V-V-V-V-V-V-V, Scherer
Clinics—four 8-hour sessions; clinic meeting—discussion—1 hour; directed group committee work—8 hours. Prerequisite: consent of instructor; open to lower division students. Helps them understand how to work in a clinic setting. Prerequisites: knowledge of basic anatomy, physiology, and pathology. Seminar will cover advanced understanding of clinical aspects of skin disease.

92K. Health Science Practicum (3-3) 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 clinic setting.

92L. Health Science Practicum (3-3) 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 clinic setting.

Upper Division Courses

110. Basic Office Skills for Primary Care Providers (1) I, Weier
Discussion—1 hour; laboratory—1 hour. Techniques of basic office skills, medical terminology and the Physician Assistants Law in California. (P/N grading only).

119A-119B. Clinical Preceptorship for Mid-Level Health-Care Providers (FNP/PA) (variable 6-9) I, II
Lecture—1 hour; laboratory—2 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. (Deferred grading only, pending completion of 119A.)

119C-119D. Clinical Preceptorship for Mid-Level Practitioners (FNP/PA) (variable 5-8) III, IV, White
Laboratory—16-24 hours (spread over two quarters). Prerequisite: courses 119A-119B, 120A-120B, 120C-120D (concurrently). Direct patient care under physician supervision developing skills in diagnosis and treatment of patients with medical problems commonly seen in primary care. (Deferred grading only, pending completion of 119D.)

120A-120B. Fundamentals of Medicine for Mid-Level Health-Care Providers (FNP/PA) (5-5) III, IV, Morgan
Lecture—5 hours; laboratory—5 hours. Prerequisite: registered student in Family Nursing Program/Physician Assistant Program. Study of anatomy, physiology, pathophysiology and clinical skills necessary for assessment and treatment of common medical problems seen in patient care. Approach to symptom diagnosis and treatment management of common medical problems. (Deferred grading only, pending completion of 120B.)

120C-120D. Fundamentals of Medicine for Mid-Level Practitioners (FNP/PA) (5-5) III, IV, Morgan
Lecture—5 hours; laboratory—5 hours. Continuation of course 120A-120B. (Deferred grading only, pending completion of 120D.)

121A-121B. Communication Skills and Role Development (2-2) II, III, Mentink
Seminar—2 hours. Prerequisite: course 120A (concurrently). Interview techniques, communication skills self-awareness, awareness of others and their needs as they relate to patient care and the FNP/PA role.

121C. Behavioral Science: Influence on Patient Care (2) II, III, Mentink
Seminar—2 hours. Prerequisite: course 121A-121B. Students assess patient concerns and assist patients in reaching their own solutions.

121D. Behavioral Science: Influence on Patient Care (2) II, IV, Mentink
Seminar—2 hours. Prerequisite: course 121C. Students continue to assess patient concerns and assist patients in reaching their own solutions.

123A-123B-123C-123D-123E-123F. Internship in Family Practice (3-3-3-3-3-3) I-III, IV-V-V-V-V-V-V,
Scherrer
Clinics—four 8-hour sessions; clinic meeting—discussion—1 hour; directed group committee work—8 hours. Prerequisite: open to upper division students; satisfactory completion of courses 121A through 123F and consent of instructor. Helps them understand how to work in a clinic setting. Prerequisites: knowledge of basic anatomy, physiology, and pathology. Seminar will cover advanced understanding of clinical aspects of skin disease.
systems and referral resources, to assess the needs of patient groups, and to utilize and develop needed community health resources. (PNN grading only.)

194. Family: Cause and Effect on Health and Disease (1) I, II, III, IV. lentink Seminar—1 hour. Prerequisite: core courses 118, 120, 121. Information to enable student to assess family relationships in their many forms and the influence on health and disease. (PNN grading only.)

195. Addressing Patient Concerns (1) II, III, IV. lentink Seminar—1 hour. Prerequisite: courses 118, 120, 121. An organized method of teaching the provider to address patient concerns. (PNN grading only.)

196. Cultural Influence on Patient Response to Health Care (1) II, III, IV. lentink Seminar—1 hour. Prerequisite: courses 122, 123, 124. Understand the basic cultural principles which influence utilization of the health-care system. Course explores alternative healing methods. (PNN grading only.)

197. Directed Group Study (1) I, II, III, IV. The Staff (Scherger in charge) Prerequisite: consent of instructor. Directed group study for advanced undergraduates interested in health care delivery system. (PNN grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Scherger in charge) Prerequisite: consent of instructor. Special study for advanced undergraduates interested in the health care delivery system. (PNN grading only.)

Graduate Courses

268. Law and Medicine (2) I. Schwartz (Law and staff) Lecture—3 hours. Prerequisite: second-year medical and second-year law students with consent of instructor. Social class and emphasizing class work, field trips, independent projects re medical education and practice, attorney-patient relations, development of human behavior, community health care and medicolegal problems.

271. Clinical Pharmacology (2-10) I, II, III, IV. Winners Lecture—2-10 hours; ward rounds. Prerequisite: advanced graduate students or postdoctoral fellows. Principles of pharmacology will be related to the diagnosis and treatment of drug induced disease status as well as principles of therapy of common clinical diseases. (Same course as Pharmacology 271.)

298. Group Study (1-5) I, II, III, IV. The Staff (Scherger in charge) Prerequisite: consent of instructor. Group study for graduate students to explain selected areas of primary care and the health care delivery system. (See 1, letter grading only; all other sections, SU grading only.)

Professional Courses

410A-410B-410C. Analysis of Health Care Delivery Systems (2-2-2) I-II-III. Program Staff (Mitchell in charge) Lecture—2 hours. Prerequisite: graduate student standing; admission to M.H.S. degree program. (410A) Designed to provide an overview of health care delivery systems, including historical evolution, system characteristics, structure and incentives; (410B) addresses utilization of services and providers of services; (410C) addresses defining and meeting health service needs.

411A-411B-411C. Family and Community Concepts (2-2-2) I-II-III. Program Staff (Mitchell in charge) Lecture—2 hours. Prerequisite: graduate student standing; admission to M.H.S. degree program. (411A) Designed to provide an introduction to the individual as part of a family and community; impact of illness on the family; and (411C) addresses alternative models for care.

412A-412B-412C. Organizational Behavior and Organizational Development in Health Care (2-2-2) I-II-III. Program Staff (Mitchell in charge) Lecture—2 hours. Prerequisite: graduate student standing; admission to M.H.S. degree program. (412A) Provides an introduction to the behavior of organizations in the health care system; (412B) covers organizational development issues and patterns; (412C) addresses inter-organizational conflict in health systems.

NOTE: Key to footnote symbols, see page 128.

420A-420B-420C. Advanced Clinically-Related Study (2-2-2) I-II-III. Program Staff (Mitchell in charge) Directed study—approximately 8 hours. Prerequisite: graduate student standing; admission to M.H.S. degree program. Each student will complete three quarters of supervised applied clinically-related study, to provide balance between classroom instruction and the study of topics that are being addressed.

420A-420B-420C. Special Study in Health Care Delivery (1-3) I-II-III. Mitchell Literature review, community research, discussion, seminars combined—40-120 hours. Prerequisite: admitted to M.H.S. degree program. Supervised study of current topics in health care delivery through literature research, community research, and professional seminars; preparation of reports and papers synthesizing and analyzing the study results. Elective course.

420A-420B-420C. Special Study of Health Care Organizations (1-3) I-II-III. Mitchell Special study—40-120 hours. Prerequisite: admitted to M.H.S. degree program. Supervised study of health care organizations through on-site observation and analysis of hospitals, nursing homes, and other types of facilities; preparation of reports and papers synthesizing and analyzing the study results. Elective course.

440A-440B-440C. Research Methods and Effective Teaching Skills (2-2-2) I-II-III. Program Staff (Mitchell in charge) Lecture—2 hours. Prerequisite: graduate student standing; admission to M.H.S. degree program. Provides an introduction to research methods and statistical analysis; (440B) covers teaching skills in the individual setting; and (440C) includes teaching skills in the group.

450A-450B-450C. Primary Care Research Practicum (2-2-2) I-II-III. Program Staff (Mitchell in charge) Directed study/research projects; approximately 8 hours. Prerequisite: graduate student standing; admission to M.H.S. degree program. Students will complete a supervised research project in health sciences in order to make practical application of classroom discussions.

475. Fundamentals of Medical Psychology (3) I, II, III, IV, May Lecture—1 hour; discussion—1 hour. Prerequisite: consent of instructor. Applications of "Medical Psychology" focuses on the participants' intra- and interpersonal patterns of response to interpersonal interactions. A model for reducing interprofessional stress is presented and participants are required to videotape one interview using this model. Role-playing is used extensively as well as the dynamics of interactions between groups members. (SU grading only.)

476. Physical Medicine Clinic (2) I, II, III, IV, May Discussion—4 hours. Prerequisite: course 476; consent of instructor. Etiology of psychosomatic symptoms and strategies for effective change in those symptoms: hypnosis, progressive relaxation/imagery, and biofeedback. Under instructor supervision, students conduct therapy with patients utilizing one of three preferred methods. This is an intensive practice experience in psychological medicine. (SU grading only.)

Human Anatomy

Upper Division Courses

101. The Gross and Microscopic Structure of the Human Body (4) I, II. Hunter Lecture—4 hours; laboratory—3 hours. Prerequisite: biological science background at the level of 2-3 or Zoology 22L recommended. A study of the gross and microscopic structure of the human body with emphasis on function.

101L. The Gross and Microscopic Structure of the Human Body (2) I, II. Hunter Laboratory—two 3-hour sessions. Prerequisite: course 101 (may be taken concurrently). Laboratory will be taught from prepared materials and models and is open to students the opportunity to learn from direct experience.

192. Internship in Morphology (1-12) I, II, III, IV. The Staff (Enders in charge) Work-learning experience—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by supervisor prior to period of work-learning. Experience of supervised work study in research laboratories of members of the Department. (PNN grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Discussion—2 hours; laboratory—6-8 hours. Prerequisite: consent of instructor. Directed reading and laboratory experience on selected topics. (PNN grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PNN grading only.)

Graduate Courses

200. Gross Anatomy (8) I. Kenney Lecture—14 hours; discussion—1 hour; laboratory—10-12 hours. Prerequisite: graduate student status and consent of instructor. Provides students with a vocabulary of human body structure and to acquire skills with structural relationships through dissection and lecture to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

201. Human Embryology (2) I. Hendrick Lecture—2 hours. Prerequisite: graduate student status and consent of instructor. Developmental anatomy of the human from fertilization to parturition including the origin of the basic form of the embryo, development of the organ systems, and nature of anomalous development.

202. Human Microscopic Anatomy (8) II. Enders Lecture—8 hours; discussion—2 hours; laboratory—6 hours; including periodic reviews (4 weeks). Prerequisite: graduate status; biology, physiology (may be taken concurrently). Structure of cells and tissues will be studied from the organismal or in some cases molecular level to that of organs relating structure to the general and specific functions of the cells and organs in the human body.

203. Human Neuroanatomy (6) II. Gross Lecture—6 hours; laboratory—3 hours. Prerequisite: consent of instructor. Macrocopscopic, dyes of the nerve system for its relationship to coverings, topography, and blood supply. Microscopic anatomy, pathways and internal organization of the nervous system.

205. Biology of Mammalian Gametoe and Fertilization (2) III. Meisel Lecture—4 hours; discussion—11-12 hours. 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 mechanisms essential for fertilization. Several background lectures will be followed by reading and critical analysis of relevant literature. Offered in odd-numbered years.

206. Advanced Human Neuroanatomy (3) I. Gross, V.K. Vijayan Lecture—3 hours. Prerequisite: basic neuroanatomy course equivalent to course 203 (former course 201); consent of instructor. Detailed microscopic anatomy. Prerequisite for course included in course 203. Together these two courses will give students a comprehensive knowledge of neuroanatomy stressing the anatomical basis for function and dysfunction. Offered in odd-numbered years.

207. Teratology (2) I. Hendrick Lecture—1 hour and discussion—1 hour (sessions variable). Prerequisite: embryology, anatomy or consent of instructor. Principles and concepts of abnormal development, including use of animal models, role of concepts, placenta and maternal system in teratogenic susceptibility and extrapolation of animal tests to humans. Offered in even-numbered years.

211. Preclinical Development of Human Nervous System (5) I, II, III, IV. O'Nahilly Discussion—4 hours; laboratory—2 hours. Prerequisite: consent of instructor and substantial background in biology, including basic embryology. Graduate course for comprehensive study of development of human nervous system, including, where possible, correlation with development of function and behavior. (SU grading only.)

212. Advanced Course in Human Preclinical Development (5) III, IV. O'Nahilly Discussion—4 hours; laboratory—2 hours. Prerequisite: consent of instructor and substantial background in biology, including basic embryology. Graduate course for comprehensive study of human nervous system, including, where possible, correlation with development of function and behavior. (SU grading only.)

213. History of Anatomy (4) I, II, III, IV. O'Nahilly Discussion—4 hours. Prerequisite: consent of instructor. Graduate course in chronology of human and comparative anatomy. (SU grading only.)

290. Seminar (1) I, II, III, IV. The Staff Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)
Human Physiology

Upper Division Courses

192. Internship in Human Physiology (1-12) I, II, III, IV. The Staff (Rinken in charge)

Work-study experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in physiology and related fields. (P(N)P grading only.)

198. Directed Group Study (1-5), II, III, IV. The Staff (Rinken in charge)

To be arranged. Prerequisite: consent of instructor. Directed reading and discussion of laboratory experience on selected topics. (P(N)P grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Rinken in charge)

Laboratory—115 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P(N)P grading only.)

Graduate Courses

200. Advanced General Physiology (3-3) I. The Staff (Rinken in charge)

Lecture—3 hours. Prerequisite: Biochemistry 101B, Chemistry 110B, Physiology 100B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on the nature and permeability of characteristics at both the cellular and tissue level. Offered in even-numbered years.

213. Cellular Physiology of Excitable Membranes (4) I, Sobchak

Lecture—2 hours, discussion—1 hour; 1 hour problem sets or written review per week. Prerequisite: elementary physics and calculus. Beginning with electrochemistry, this course uses elementary calculus and physics for lectures and problem sets on diffusion potentials, electrotonic conduction, synaptic transmission, etc. Several topics will be covered by invited lecturers on their research interests. Offered in odd-numbered years.

217. Renal Physiology (3) I, Rabowitcz

Lecture—3 hours. Prerequisite: Physiology 112 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of biological transport: fluid and electrolyte homeostasis, comparative renal physiology, and pathophysiology of the kidney in man.

231. Renal Physiology Laboratory (1) I, Rabowitcz

Laboratory—3 hours. Prerequisite: Physiology 112 or the equivalent; graduate standing and consent of instructor. Experimental study of renal function in mammals including measurement of renal blood flow, filtration rate, concentration ability, excretion of ions and the action of hormones and drugs.

230. Physiological Systems Analysis (5) I, Smith

Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematical Analysis 228B and Physiology 113. Laboratory—20 hours minimum. The quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological controls; the application of these techniques to investigation of homeostasis.

250. Pulmonary Function Evaluation (4) I, II, III, Cross Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent and consent of instructor. (Same course as 480.)

255. 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 a series of lectures and discussion sessions on the physiology of mammalian peripheral circulation including topics on anatomy, physiology, and pharmacology of vascular smooth muscle, regional circulations, microcirculatory control mechanisms, and dynamics of capillary transport. Offered in even-numbered years.

268. Group Study (1-5) I, II, III, IV. The Staff (Rinken in charge)

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

269. Research (1-12) I, II, III, IV. The Staff (Rinken in charge)

Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Allergy

Upper Division Course

192. Internship in Internal Medicine (1-12) I, II, III, IV. The Staff (Rinken in charge)

Work-study experience—3-36 hours; final report. Prerequisite: upper division standing. Supervised work-study experience in internal medicine and related fields. (P(N)P grading only.)

Internal Medicine—Cardiology

Graduate Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Amsterdam in charge)

Prerequisite: consent of instructor. Directed reading, discussion, and laboratory experience on selected topics. (P(N)P grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Rinken in charge)

Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. Undergraduate research project. (P(N)P grading only.)

Graduate Courses

230. Group Study (1-5) I, II, III, IV. The Staff (Mason in charge)

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

239. Research (1-12) I, II, III, IV. The Staff (Mason in charge)

Prerequisite: consent of instructor. Thesis research. (SU grading only.)

Internal Medicine—Endocrinology

Graduate Course

239. Research (1-12) I, II, III, IV. The Staff (Kumagai in charge)

Prerequisite: consent of instructor. Endocrinology research. (SU grading only.)

Internal Medicine—General Medicine

Graduate Course

240. General Medicine Research (1-18) I, II, III, IV. The Staff (In charge)

Discussion—2 hours; laboratory—6 hours minimum. Prerequisite: consent of instructor. Research in problems of chronic and acute lung injury, lung immunology. Techniques involve large animal expertise of members of Division of General Internal Medicine. Alternatively, the research effort will be directed toward investigation of a clinical problem of general medical interest.

Internal Medicine—Hematology—Oncology

Upper Division Course

196. Research in Hematology—Oncology (1-5) I, II, III, IV. MacKenzie and staff

Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P(N)P grading only.)

Graduate Courses

260. Topics in Hematology (1-4) I, II, III, IV. The Staff (Lewis in charge)

Graduate course. Prerequisite: one year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students.

266. Research (1-12) I, II, III, IV. The Staff (Lewis in charge)

Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

Internal Medicine—Infectious Diseases

Upper Division Course

196. Infectious Diseases Research (1-5) I, II, III, IV. The Staff (Goldstein in charge)

Discussion—1 hour; seminar—1 hour; laboratory—4 hours; per individual arrangement with instructor. Prerequisite: chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred), and consent of instructor. A discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with the instructor and via seminar presentation. (P(N)P grading only.)

Graduate Course

408. Research Topics in Infectious Disease (2-12) I, II, III, IV. The Staff (Goldstein in charge)

Prerequisite: successful completion of the first year of study in School of Medicine, graduate student status, and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation.

Internal Medicine—Nutrition

Graduate Course

216. Nutritional Aspects of Medical Practice (3) III. The Staff (Lecture-discussion—3 hours. Prerequisite: medical and graduate students and/or consent of instructor. Lectures and reading assignments on clinical nutrition. Preselected topics will relate to disease processes, organ systems and patient care. (SU grading for graduate students.)

Internal Medicine—Pulmonary Medicine

Upper Division Course

196. Research (1-5) I, II, III, IV. The Staff (Gorin in charge)

Discussion—2 hours; laboratory—6 hours minimum. Directed research in problems of lung water balance, vascular permeability, acute lung injury. Techniques involve large animal surgery, use of radiolabels, physiologic monitoring, and biochemical analysis. (P(N)P grading only.)

Graduate Course

299. Research in Lung Pathophysiology (1-12) I, II, III, IV. The Staff (Discussion—2 hours; laboratory—6 hours minimum; paper to be prepared over term. Prerequisite: consent of instructor. Research in problems of chronic and acute lung injury, lung immunology. Techniques involve large ani-
mal surgery, radiosurgery, tracer technique, physiologic monitoring, biochemical and immunologic analysis. (SU grading only.)

Professional Courses

491. Research in Lung Pathophysiology (2-3) II, III, IV. The Staff
Discussion—2 hours, laboratory—3 hours maximum; term paper. Prerequisite: undergraduate course in biochemistry or physiology. Research in problems of lung function: basic research, acute pulmonary injury, lung immunology. Techniques involve large animal surgery, radiostereotactic tracer technique, physiologic monitoring, biochemical and immunologic analysis.

Internal Medicine—Rheumatology

Lower Division Course

99. Directed Research in Immunology (1-5) I, II, III, IV. Gerstein
Laboratory—1-5 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (PINF grading only.)

Upper Division Course

199. Directed Research in Immunology (1-5) I, II, III, IV. Gerstein
Laboratory—1-5 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (PINF grading only.)

Graduate Courses

281. Clinical Immunology and Immunopathology (4) III, Gerstein
Lecture—4 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 270, or consent of instructor. Descriptive aspects of animal and human pathologic processes that interface with the immune system. Emphasis on infections, genetics, transplantation, allergy and autoimmunity. Offered in even-numbered years. (Same course as Allergy 281.)

289. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV, Gerstein
Lecture—2 hours. 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, Gerstein
Laboratory—1-12 hours. Prerequisite: consent of instructor. Independent research will be encouraged in both animal model and human disease (including collagenal, juvenile rheumatoid, aspergillomas, and neurologic phenomena). (SU grading only for graduate students.)

Medical Microbiology

Lower Division Course

81. Preventive Health Care (2) II. Chang in charge, Rockwell, Jones
Lecture—2 hours; final examination. Students will learn preventive health care information that will enable them to live a healthier life. Emphasis will be placed on sexually transmitted diseases, mental health and drug abuse. (PINF grading only.) (Same course as Family Practice 61, Psychiatry 61.)

Upper Division Courses

107. Chemical and Cellular Immunology (4) II, Benjamini, Sobel, Sibalis
Lecture—4 hours; laboratory experience provided to selected individual students. Prerequisite: Biochemistry 101A, 101B or consent of instructor. The chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies, and antigen-antibody interaction; cellular basis of immunity: immunohistochemical and cellular aspects of disease activity and related immunological phenomena. (Same course as course 407.)

115. Ecological Paratology (2) II. Theis
Lecture—2 hours. Course will be devoted to the study of mankind's influence on environmental factors that affect the development and spread of parasitic agents.

NOTE: For key to footnote symbols, see page 129.
200. Advanced Pharmacology of Cardiovascular System (3) I, West.
Lecture—2 hours; discussion—1 hour. Prerequisite: course 200A-200B or 400A-400B. 200-400B. In-depth study of action and effects of drugs on electrical and mechanical properties of mammalian heart and on mammalian vasculature. Offered in even-numbered years.

220. Statistical Approach to Pharmacological Research (2) III, Hardin.
Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to the application of statistics in pharmacological research and therapeutics. Basic concepts of distribution, measures of location, dispersion and correlation, significance, probability, and the design of experiments.

271. Clinical Pharmacology and Toxicology (2) III, Winters (in charge) and staff.
Lecture—1 hour; seminar—2 hours. Prerequisite: advanced graduate students or postdoctoral fellows. Principles of pharmacology and toxicology related to diagnosis and treatment of drug-induced states as well as principles of the pharmacology of individual clinical diseases.

Discussion—1 hour; laboratory—3 hours. Prerequisite: courses 200A-200B or 400A-400B. Observing and participating in the equivalent. Laboratory procedures in advanced pharmacology. Experiments and discussions designed to familiarize the student with the subject and the course sequence of 200A-200B.

Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in odd-numbered years.

204. Pharmacology of the Nervous System I: Hypnotics, Sedatives and Anesthetics (1-3) I, E K. Killam.
Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of centrally acting sedatives, hypnotics and anesthetics with emphasis on alterations in brain function. Offered in even-numbered years.

205. Pharmacology of the Nervous System II: Stimulants and Anticonvulsants (1-3) I, II, Killam.
Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of centrally acting stimulants and anticonvulsants and their effect on animal behavior. Offered in even-numbered years.

Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacological agents, hallucinogens, antipsychotics, and antidepressants. Offered in odd-numbered years.

207. Advanced Pharmacology of Renal and Respiratory Systems (3) II, West.
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 200A-200B or 400A-400B. In-depth study of interaction between drugs and renal and respiratory systems with particular emphasis on pharmacologic intervention in homeostatic processes subserved by the kidney and the respiratory system. Offered in odd-numbered years.

208. Pharmacology of Respiratory Disease (1) I, Killam.
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 200A, 200B, or the equivalent. Physiochemical and physiological pharmacology of the respiratory tract, me- tabolism and excretion of drugs. Methodological and graphical methods for determining pharmacokinetic parameters. Calculation of dose regimens. Laboratory analysis of drug levels in experimental animals and development of pharmacokinetic model.

Laboratory—3-9 hours. Prerequisite: some knowledge of basic physiology and biochemistry; consent of instructor. Interaction of drugs and subcellular components with special emphasis on mechanism of action. Offered in odd-numbered years.

Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

NOTE: For key to footnote symbols, see page 128.

251. Existentia-Humanistic Psychotherapy (2) I, Baitse-Sebastian.
Discussion—2 hours. Prerequisite: consent of instructor. An existential-humanistic approach to psychotherapy based on an existential analysis of human condition. Role-playing of psychotherapeutic sessions will be used to complement reading and discussions. Emphasis will be placed on work of Jim Bugental. (SU grading only.)

252. Death and Dying (2) I, II, Rockwell, Otto.
Lecture—1 hour; discussion—2 hours. Prerequisite: medical student or consent of instructor. The process of death and issues surrounding death and dying. Theoretical and ethical considerations of dying and death. The psychological aspects, and emotional changes related to issues of death and dying. Aspects of the dying process are explored using lecture, film, video, and discussion. Topics include stages of dying, managing death, bereavement, suicide, partial deaths, and euthanasia. (HSU grading only for medical students.)

Seminar—1 hour; laboratory—2 hours; term paper. Prerequisite: medical students and graduate students with consent of instructor. Course will provide students with an understanding of the social and psychological factors that affect the perception and reaction of pain.
289. Directed Group Study For Graduate Students [I-5], II, III, IV, V. The Staff (supervision). Lecture—3 hours (in charge). Prerequisite: consent of instructor. Medical students desiring to explore particular topics in depth (SUI grading only for graduate or medical students).

498. Research in Nuclear Medicine (1-12) I, II, III, IV. The Staff (G.L. DeNardo in charge). Prerequisite: consent of instructor.

Radiology—Diagnostic
Professional Courses
406A-406B: Physics of Diagnostic Radiology (1-1) I-II IV. Weinheilbaumer, Farber Lecture—1 hour. Prerequisite: one-year college physics course for non-engineering students (e.g., Physics 2A-2B, 2A-3B-3C) or consent of instructor. Subjects discussed are from fields of basic radiologic physics, physics of diagnostic radiology, and physics of nuclear radiology. Offered at VA Hospital, Mattawan. (PINF grading only for undergraduates; SUI grading for graduate students.)

499. Research in Diagnostic Radiology (1-12) I, II, III, IV. The Staff Prerequisite: consent of instructor.

Radiology—Nuclear Medicine
Upper Division Courses
101. Biomedical Radiology (3) III S. J. DeNardo Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor is designed to combine knowledge of nuclear physics, chemistry, and biology into a comprehensive and constructive lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate tracers (SUI grading only.)

198. Directed Group Study (1-12) I-III, IV. The Staff (S. J. DeNardo in charge) Lecture—1 hour; discussion—2 hours. Prerequisite: upper division standing and consent of instructor. Selected readings in nuclear medicine. (PINF grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (G. L. DeNardo in charge) Lecture—3 hours; laboratory—2 hours. Prerequisite: upper division standing and consent of instructor. Students will learn the scientific and laboratory techniques pertaining to the biological investigation of the Nuclear Medicine Laboratory. (PINF grading only.)

Graduate Course
200. 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 study and research for graduate students. (SUI grading only.)

Professional Courses
408A. Fundamental Nuclear Medicine (4) I. Hines, G. L. DeNardo (in charge) Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of instructor. Course is intended to cover in a comprehensive and practical fashion those fundamental and clinical sciences which are the basis for the practice of nuclear medicine and nuclear medical technology.

408B. Fundamental Radiology (4) I, II S. J. DeNardo, Stadum, G. L. DeNardo (in charge) Lecture—3 hours; laboratory—2 hours. Prerequisite: content of instructor. Course is intended to cover in a comprehensive, didactic and practical manner those fundamental and clinical sciences which are the basis for the practice of nuclear medicine and nuclear medical technology.

401. Biomedical Radiology (3) III S. J. DeNardo, Chen Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing and consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and constructive lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate tracers and beta and gamma radioisotopes, cometabolism cardiac and radioimmunossay. (Same course as 61.)

Medicine
(School of Veterinary Medicine)

Murray E. Fowler, D.V.M., Chairperson of the Department

Department Office, 2106 Medical Science 1A (752-1363)

Faculty
Donald F. Amsden, Ph.D., Associate Professor Terence C. Amis, B.V.Sc., Ph.D., Assistant Professor
Alexander A. Arndts, D.V.M., M.S., Professor J. Desmond Bagott, M.V.M., Ph.D., Professor Dale L. Brooks, D.V.M., Ph.D., Lecturer Gary P. Carlson, D.V.M., Ph.D., Associate Professor
Larry D. Cowgill, D.V.M., Ph.D., Assistant Professor
Laurence R. Enos, Pharm.D., Lecturer
Murray E. Fowler, D.V.M., Professor
Lisle George, D.V.M., Ph.D., Assistant Professor
Ron Hesrick, Ph.D., Assistant Professor
Roy V. Herrickson, D.V.M., Lecturer
Charles A. Higbee, D.V.M., Professor
E. Michael Huffman, M.S., D.V.M., Assistant Professor
Peter J. Ihalo, V.M.D., Assistant Professor
421. Veterinary Dermatology (9x per week) I, II, III. Stannard Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns and residents are responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff dermatologist. (SU grading only.)

423. Pulmonary Diseases (9x per week) I, II, III. Gillespie Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and clinical signs. (SU grading only.)

426. Zoo and Wildlife Medicine (9x per week) I, II, III. Fowler Laboratory—25 hours. Prerequisite: professional standing, intern in Veterinary Medical Teaching Hospital, or consent of instructor. Interns responsible for handling and treatment of clinical cases. Techniques of manual and chemical restraint of a wide variety of mammals, birds, reptiles, and fish. Medication problems, anesthetic techniques and surgical procedures will be discussed and practiced. (SU grading only.)

491. Small Animal Grand Rounds (9x) 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.)

492. Large Animal Grand Rounds (9x) I, II, III. The Staff (Rumbough 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 ambulatory clinics. May be repeated for credit. (SU grading only.)

493. 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 in dogs and cats. Interns and residents will assist in the presentation of seminar material. May be repeated for credit. (SU grading only.)

### Medieval Studies

#### A.B. Major Requirements:

**Preparatory Subject Material Recommended:**
- 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

- History, at least 12 units from History 102B, 121A, 121B, 121C, 201B
- Literature: at least 16 units, including two courses from each of the following:
  - English 111, 115, 113, 150A, 150B, 189, 189
  - French 115A, 115B
  - German 120, 121A, 121B
  - Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190; Religious Studies 102, 110
  - Arts and language, at least 8 units from Art 175A, 175B, 176C, 177A, 178A, 178B; Drama 146, German 106; Music 114 (note prerequisite), 199; Rhetoric 110, 111
  - Political thought, at least one course from Political Science 115, 116, 118
  - Senior thesis, Medieval Studies 190

### Total Units for the Major

- 52

#### Major Advisers

- W. M. Bowksy (History), D. J. Dutschke (Italian), J. J. Murphy (Rhetoric), D. A. Traill (Classics)

#### Courses in Medieval Studies

**Lower Division Courses**

**20A. Early Medieval Culture (4)** I. The Staff Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the Codes of Justinian, the Confessions of Saint Augustine, The Consolation of Philosophy of Boethius, Beowulf, the Nibelungenlied, and the Song of Roland.

**20B. The Culture of the High Middle Ages (4)** I. The Staff Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the Simone 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—3 hours; discussion—1 hour; paper or formal presentation. Course deals with the great medieval transformations that took place before the Renaissance. Topics will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields.

- Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

- Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Upper Division Courses**

**120-F. The Medieval World (4)** I, II, III. The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour; term paper. Course deals with selected themes from the Middle Ages: the Fall of Rome to the beginning of the Renaissance. Subjects will vary from year to year and cover such topics as (A) The Medieval Orders; (B) Origins of Universities; (C) The Seven Liberal Arts, and their Significance in the Middle Ages; (D) Family and Society; (E) Chivalry; and (F) Church and State.

**NOTE:** For key to footnote symbols, see page 128.
Mexican-American (Chicano) Studies; Microbiology

190. Senior Thesis (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge.

197. Tutoring in Medieval Studies (1-4) II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: courses 20A and 20B, upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Mexican-American (Chicano) Studies

A.B. Major Requirements:

Humanities Emphasis

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<tr>
<td>Preparatory Subject Matter</td>
</tr>
<tr>
<td>Spanish 1 or 1ATA, 2 or 2ATA, 3; (or the equivalent)</td>
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<tr>
<td>Spanish 4 or 7A, 5 or 7B, 28 or 7C</td>
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<td>Linguistics 1</td>
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Depth Subject Matter

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<tbody>
<tr>
<td>Sociology 110</td>
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<tr>
<td>Spanish 128, 129, 135</td>
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<tr>
<td>One course from Spanish 131, 132, 133</td>
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<tr>
<td>One course from Linguistics 115, 150 or Education 151</td>
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<tr>
<td>History 169A, 169B, 166A or 166B</td>
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<tr>
<td>Political Science 168</td>
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Total Units for the Major 46-70

Recommended

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<tr>
<td>Linguistics 115 and 150 (above), American Studies 45; two courses from Spanish 8A, 8B, 9 (for non-native speakers of Spanish); English 2 (for native speakers of Spanish); two courses from American Studies 110, Sociology 124, 130; Anthropology 104, 105A, 1398; Spanish 108B, 132 and 133 (above), 300.</td>
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Sociology Emphasis

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<td>Chicano Studies 10</td>
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<tr>
<td>Spanish 4 or 7A, 5 or 7B, 28 or 7C</td>
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<tr>
<td>Sociology 1, 46A, 46B</td>
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<td>Linguistics 1</td>
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Minor Program Requirements:

This interdepartmental minor provides the student with a general view of the Chicano in terms of the history, culture, political involvement and role in the society of the Southwestern United States.

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<tr>
<td>Mexican-American (Chicano) Studies</td>
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<tr>
<td>Chicano Studies 10</td>
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<tr>
<td>History 169A or 166B</td>
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Microbiology

See Also Medical or Veterinary Microbiology

Microbiology (A Graduate Group)

David Pratt, Ph.D., Chairperson of the Group
Group Office, 156 Hutchison Hall (752-0262)

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.A. and Ph.D. degrees. For information on the graduate study and undergraduate preparation for the program contact the graduate adviser or the Chairperson of the group. See also page 97.

Graduate Advisers. B. L. Berman (Medical Microbiology); Y. C. Zee (Veterinary Microbiology); P. Baumann (Bacteriology); M. W. Miller (Food Science and Technology).

Sociology 110

Political Science 168

Two elective courses to be chosen from:

Education 116, 151; History 169A or 169B (not to duplicate one of the above);

Linguistics 115; Sociology 168, Spanish 128

Courses in Chicano Studies

Lower Division Courses

10. Introduction to Chicano Studies (4) I, Riddell
Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicano (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas.

98. Directed Group Study (1-5) I, II, III. The Staff (Riddell in charge)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Riddell in charge)
(P/NP grading only.)

Upper Division Courses

101. Political Economy of Chicano Communities (4) III. Riddell
Lecture-discussion—4 hours. Prerequisite: upper division standing; a lower division Chicano Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicano communities. Includes critical of traditional and Marianist theories and concepts applicable to Chicano communities, case studies of Chicano communities, especially in California and Texas.

123. Chicanas in Contemporary Society (4) III. Riddell
Lecture—3 hours; term paper. Prerequisite: course 10 or Spanish 124 or History 169B. Analysis of the role and status of Chicanas in contemporary American society. Special emphasis is on their historical role, the political, economic and social institutions which have affected their status, and their contributions to society and their community.

196. Directed Group Study (1-5) I, II, III. The Staff (Riddell in charge)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Riddell in charge)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)
Courses in Military Science

Military Science

(Military Science in Microbiology

Graduates of the Graduate Research Conference (1) I, II, III. The Staff (Nota in the conference.)
Discussion-conference -10 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of student research activities. Designed for advanced graduate students. May be repeated for credit. (SU grading only.)

209. Research (1-15) I, II, III. The Staff Laboratory-Varité Research under the guidance of the dissertation committee. (SU grading only.)

Military Science (College of Letters and Science)

John F. Keith, Lieutenant Colonel, Chairperson of the Department
Department Office, 125 Hickey Gymnasium (752-0514)

Faculty
Mike T. Eastman, Captain, Assistant Professor
John F. Keith, Lieutenant Colonel, Associate Professor
Youchun Lim, Captain, Assistant Professor
William Richey, Major, Associate Professor
Donald J. Surface, Major, Assistant Professor
William P. Ureche, Captain, Assistant Professor

Program of Study

The Military Science Department extends the educational opportunities and provides extracurricular activities which, when combined with a baccalaureate degree, qualify a student for a commission in the Army Reserve or Regular Army. The program assists qualified students in all academic fields to prepare for positions of leadership in military or civilian careers. A continuing effort is made to assign graduates to military career fields aligned with their major field of study, individual capabilities and preferences. 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 freshmen at U.C. Davis. The three-year and two-year are awarded to freshmen and sophomores who are already attending college. Application for the four-year scholarship is completed prior to December 15th of the senior year in high school. The three-year and two-year scholarship applications are made during March of the freshmen or sophomore year.

Department Programs

Students are enrolled in military science under one of the following programs:

Four-Year Program

Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. There is no military obligation associated with attendance in lower division courses. Admission to the advanced course (upper division) is by application from second-year lower division students who meet the academic, physical and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service experience.

NOTE: For key to footnote symbols, see page 128.

Upper division students receive $100 subsistence per month after executing a contract agreeing to complete the course and accept a commission if offered. During the course all military science textbooks, uniforms and equipment are provided without cost. Students are given leadership development experiences at Army camp between the third and fourth years of the course. Emphasis is on individual participation, leadership development and the capability to function effectively in positions of significant responsibility.

Two-Year Program

This program is designed for students who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during winter term of the year preceding enrollment in the two-year program. All other provisions explained above for the upper division course apply to the two-year program. Other methods for entering the upper division program are available by arrangement with the department.

Scholarship Program

Four-year merit scholarships are awarded to high school seniors in nationwide competition. One-, two-, and three-year scholarships are applied for through the Military Science Department after entering the University. Scholarship winners receive all tuition, fees, books, uniforms, and $100 subsistence allowance per month. Scholarship students incur a four-year active duty military obligation. For further details on these scholarships contact the department.

Leadership Laboratory

During the course of the school year seven Saturdays are spent in the conduct of practical exercises. These are voluntary for lower division students. Classes emphasize adventure activities including mountain trekking, orienteering, and rifle marksmanship. Upper division students are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at ROTC Advanced Camp.

Air Force ROTC

For information about the Air Force ROTC, contact the Military Science Department office.

Academic Credit

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree in the extent of the unrestricted elective units available in the curricular 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.

Microbiology; Military Science; Music

Courses in Military Science

Lower Division Courses

11. Introduction to Military Science (1) I. The Staff Lecture-1 hour. A discussion of the history of military as an element of national security and international diplomacy. Course surveys the United States defense structures to include military strategies and organizations.

12. Introduction to Military Science (1) II. The Staff Lecture-1 hour. A discussion of the military's role in American society. Course focuses on current social attitudes within the military and technological developments of modern military forces.

13. Introduction to Military Science (3) III. The Staff Lecture-1 hour. A survey of the organization and structure of the United States Army. Course includes discussions of various branches of the Army, their roles in the overall organization, and their interface with one another.

21. Military History (3) 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 periods from Graeco-Persian Wars to Age of Louis XIV.

22. Military History (3) II. 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 (3) III. The Staff Lecture-2 hours. An analysis of modern military conflict from World War I to present. Emphasis is on development of mechanized warfare and its impact on current world-wide military doctrine.

Upper Division Courses

131. Principles of Military Instruction (2) I. The Staff Lecture-2 hours. Principles applicable to military instruction to include planning, presentation and evaluation. Students presentations exemplify 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 (3) III. The Staff Lecture-3 hours. Advanced study of military operations, to include an analysis of the functions of primary and supporting branches and commands.

141. Principles of Military Administration (2) I. The Staff Lecture-2 hours. Discussion of the functions of military staff organizations to include military briefings, correspondence, procedures, and the system of military justice.

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 (3) III. The Staff Lecture-2 hours. Analysis of revolutionary conflict to include an examination of insurgency and counterinsurgency movements in the world arena.

Music

(Microbiology; Military Science; Music)

(College of Letters and Science) D. Kern Holoman, Ph.D., Chairperson of the Department
Department Office, 112 Music Building (752-0666)

Faculty
Lawrence E. Anderson, Ph.D., Adjunct Lecturer
Robert S. Bloch, M.A., Associate Professor
Sydney R. Charles, Ph.D., Professor
Andrew D. Frank, M.A., Associate Professor
D. Kern Holoman, Ph.D., Associate Professor

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Music

John Hsu, M.M., Visiting Professor (Artist in Residence)
Albert J. McNeil, M.S., Professor
David A. Nutter, Ph.D., Assistant Professor
Jerome W. Rosen, M.A., Professor
Richard G. Swift, M.A., Professor
William E. Valente, M.A., Associate Professor

Faculty Affiliates in Applied Music
Dona Brandon, M.S.M., Adjunct Lecturer (organ)
Lois Brandwynne, M.A., Visiting Lecturer (piano)
James Crenshaw, Visiting Lecturer (French horn)
Carrie Crenshaw, M.S., Visiting Lecturer (viola da gamba)
Susan E. Erickson, Ph.D., Visiting Lecturer (harp)
James Fish, B.A., Visiting Lecturer (oboe)
Stephanie Friedman, M.A., Visiting Lecturer (voice)
Stanley Lunetta, M.A., Visiting Lecturer (percussion)
Thomas Stauffer, M.A., Visiting Lecturer (cello)

The Robert Bloch String Quartet of UC Davis
Robert S. Bloch, M.A., violin
Anne Crowden, L.R.A.M., violin
Jerome Ireland, 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 Bachelor of Arts degree.

The student engages in the study and performance of music of all styles and periods. Options are provided for those students with special interests in composition, history, teaching and performance, and for those who plan to continue 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.

Music

A.B. Major Requirements:

UNITS

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 1 additional upper division unit in Music to achieve a total of 36 upper division units (Open 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

Piano Skills

Music 3 (or the equivalent as determined in consultation with major adviser)

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 a prerequisite to upper division courses in the major. Students with deficiencies will be required to pass Music 3. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisors 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.


Minor Program Requirements:

Music

UNITS

A minimum of upper division Music courses 18


Teaching Credential Subject Representative. A. J. McNeil. See page 103 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. S. R. Charles.

Courses in Music

Lower Division Courses

P. Rudimentary Piano (no credit) I, II, III. The Staff (Holman in charge). Laboratory—two hours. Prerequisite: consent of instructor with priority given to music majors. Designed for students requiring training to meet the minimal piano requirements for music majors. (P.N.P. grading only, pending completion of course.)

1. Basic Musicmanship (I) I, II, Anderson Lecture—three hours. Fundamentals of music: singing, ear-training and conducting for beginners in music. Designed for students with career plans where musical literacy is important; for example, primary level classroom teachers, actors, theatre directors, designers, and stage managers. Not open to students who have successfully completed 3A, 4A, or the equivalent.

3A. Introduction to Music Theory (I) I, II, Valente, II, Swift, III. Lecture—three hours, laboratory—two hours. Fundamentals of music theory, ear-training, harmony, counterpoint and analysis directed toward the development of listening and writing techniques. Course 3A is prerequisite to course 3B. Intended for the general student.

3B. Introduction to Music Theory (I) II, III, Valente, III. Swift Lecture—three hours, laboratory—one hour. Continuation of course 3A. Intended for the general student.

4A-4B-4C. Elementary Theory (5-5-5) II, III, Frank Lecture—five hours. Development of writing and listening techniques through the study of music fundamentals; ear-training, beginning tonal counterpoint and harmony; keyboard harmony; score reading; analysis of repertory. Intended primarily for music majors and minors.

5A-5B-5C. Intermediate Theory (4-4-4) I, II, III, Rosen Lecture—four hours. Prerequisite: course 4C. Intermediate tonal counterpoint and harmony.
Music; Native American Studies

322. Brass Instruments (1) I. Anderson Laboratory—2 hours. Prerequisite: course 4C. Offered in odd-numbered years.

223A-232B. Woodwind Instruments (1-1) I-II. Anderson Discussion—2 hours. Prerequisite: course 4C.

234. Percussion Instruments (1) I. Lunetta Laboratory—2 hours. Prerequisite: course 4C. Considers teaching of percussion instruments. Survey course. Offered in odd-numbered years.

Native American Studies

(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Applied Behavioral Sciences.

The Major Program
The Native American Studies major is designed to affect the lives of American Indian people as directly as possible. In order to accomplish this the major is designed to prepare you to: (1) work with Indian people and community service personnel and tribal administrators, etc.; (2) understand Indian values and problems; (3) develop data and creative products directly usable by Indian people or by schools and agencies serving Indian people; (4) apply results of past experiences or research to finding solutions to the many problems faced by Indian communities; (5) further creative development of Indian people through innovations within the context of Indian artistic and musical traditions; and (6) enter into graduate programs either in Native American Studies or in related fields. In consultation with the Native American Studies Major Review Committee, you will select the course sequence most appropriate for your educational goals. A minimum of 20 units shall be in a primary field of specialization. (This major is under review. Contact the Dean, College of Agricultural and Environmental Sciences, before applying.)

Native American Studies

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.)

UNITS

Preparatory Subject Matter .................................................. 36

Introduction to Native American Studies (Native American Studies 1) .................................................. 4

Native American experience (Native American Studies 201) .................................................. 4

Native American art (Native American Studies 335) .................................................. 4

Inquiry course which develops intellectual skills in: scientific methods, research methods, statistics, logical thinking, and systems analysis .................................................. 4

Creative expression courses which explore and develop creativity in the areas of skill in music. (e.g., art, music, design) .................................................. 4

Personal and social behavior courses which deal in some depth with the impact of human relationships in the individual to the interpersonal level (e.g., psychology, sociology, anthropology, literature, communication) .................................................. 8

†Students 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, Raising
   Lecture—4 hours; discussion—1 hour. Introduction to the cultural-historical and traditional life of Native American peoples. Offered in even-numbered years.

2. Native American Art in the U.S. (4)I, Raising
   Lecture—4 hours; discussion—1 hour. Historical and cultural influence of Native American art on the United States. Offered in even-numbered years.

3. American Indian History (4)I, Raising
   Lecture—4 hours; discussion—1 hour. Historical and cultural development of Native American societies. Offered in odd-numbered years.

4. Native American Art Workshop (4)I, Raising
   Lecture—4 hours; discussion—1 hour. Workshop on Native American art creation techniques. Offered in odd-numbered years.

5. Special Study for Undergraduates (1-5)I, II, III, The Staff
   Raising (in charge)
   Prerequisite: consent of instructor.

Upper Division Courses

101. Contemporary Indian Art (4) II, Longfellow
   Lecture—4 hours; discussion—1 hour. Study of contemporary Native American art and its influences. Offered in odd-numbered years.

106. Cultures of the Northern Plains (4) II, Adams
   Lecture—4 hours; discussion—1 hour. Study of the cultures and history of the Native American peoples of the Northern Plains region. Offered in odd-numbered years.

110. Fundamentals of Native American Education (4) II, Adams
   Lecture—4 hours; discussion—1 hour. Study of the education of Native American peoples. Offered in odd-numbered years.

111. Native American Cultural Development (4) II, Adams
   Lecture—4 hours; discussion—1 hour. Study of the cultural development of Native American peoples. Offered in odd-numbered years.

112. History of the Five Civilized Tribes (4) II, Hill
   Lecture—4 hours; discussion—1 hour. Study of the history of the Five Civilized Tribes. Offered in odd-numbered years.

116. Native American Traditional Governments (4) II, Raising
   Lecture—4 hours; discussion—1 hour. Study of the traditional governments of Native American peoples. Offered in odd-numbered years.

124. Contemporary Affairs of Native Americans in California (4) II, Raising
   Lecture—4 hours; discussion—1 hour. Study of the contemporary affairs of Native Americans in California. Offered in odd-numbered years.

130. Native American Ethno-Historical Development (4) II, Forbes
   Lecture—4 hours; discussion—1 hour. Study of the ethno-historical development of Native American peoples. Offered in odd-numbered years.

139. Native American Ethno-Historical Development (4) II, Forbes
   Lecture—4 hours; discussion—1 hour. Study of the ethno-historical development of Native American peoples. Offered in odd-numbered years.

140. Research Analysis in Native American Studies (4) II, Adams
   Lecture—4 hours; discussion—1 hour. Study of research methods and techniques. Offered in odd-numbered years.

155. Americanization: Native American Contributions to World Civilization (4) II, Houston
   Lecture—3 hours; discussion—1 hour. Study of the contributions of Native American peoples to world civilization. Offered in odd-numbered years.

156. Native American Ethics and Value Systems (4) I, The Staff
   Lecture—2 hours; discussion—1 hour. Study of the ethical and value systems of Native American peoples. Offered in odd-numbered years.

161A. Native American Community Development (4) II, Adams
   Lecture—2 hours; discussion—1 hour. Study of the community development of Native American peoples. Offered in odd-numbered years.

161B. Native American Economic Development and Planning (4) I, Adams
   Lecture—2 hours; discussion—1 hour. Study of the economic development of Native American peoples. Offered in odd-numbered years.

161C. Native American Perceptions (4) I, Hill
   Lecture—2 hours; discussion—1 hour. Study of the perceptions of Native American peoples. Offered in odd-numbered years.

169. American Indian Woman (4) II, Hill
   Lecture—2 hours; discussion—1 hour. Study of the role of Native American women. Offered in odd-numbered years.

171. Counseling the Native American (4) II, Hill
   Lecture—2 hours; discussion—1 hour. Study of the principles of counseling for Native American peoples. Offered in odd-numbered years.

190. Seminar in Native American Studies (2) II, III, The Staff
   Discussion—2 hours. Study of critical issues faced by Native American peoples. Offered in odd-numbered years.

195. Field Experience in Native American Studies (1-12) I, II, III, Raising (in charge)
   Field work—48 hours. Study of the cultural and social aspects of Native American peoples. Offered in odd-numbered years.

196. Senior Project in Native American Studies (4) I, II, III, Raising (in charge)
   Student-directed project—4 hours. Study of a specific topic related to Native American studies. Offered in odd-numbered years.

197. Training in Native American Studies (5) I, II, III, The Staff
   Discussion—5 hours. Study of the research methods and techniques used in Native American studies. Offered in odd-numbered years.
Nematology

(College of Agricultural and Environmental Sciences)

David R. Vigliarolo, Ph.D., Chairperson of the Division
Division Office, 488 Hutchison Hall (752-1403)

Faculty
Harry K. Kay, Ph.D., Associate Professor
Benjamin F. Lownesby, Ph.D., Professor
Amrand R. Maggenti, Ph.D., Lecturer
Dewey J. Raski, Ph.D., Professor
David R. Vigliarolo, Ph.D., Lecturer

Related Major Program. 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

100. General Plant Nematology (4) L. Lownesby
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.

110. Introduction to Nematology (2) L. Magnetti
Lecture—2 hours. Prerequisite: Zoology 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.

120. Nematode Ecology (2) I. Vigliarolo
Lecture—2 hours. Prerequisite: course 100 or 110. Behavioral characteristics of nematodes promoting their impact upon plants, animals and microorganisms including responses to natural and artificial changes in environment. Offered in even-numbered years.

121. Nematode Biology (2) I. Vigliarolo
Lecture—2 hours. Prerequisite: course 100 or 110. Life processes and their applications to fields and industries. Functions, mechanisms and processes for coping with environment for survival and sustaining nematode aggressiveness. 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 8B 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

*220. Principles and Techniques of Nematode Taxonomy and Morphology (4) I. Raski
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Analysis and classification 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.

*222. Nematode Pathogenicity to Plants (3) I. Lownesby
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 100. Investigations of problems in proving nematicidal pathogenicity; the role of nematodes in plant diseases. Offered in odd-numbered years.

*225. Nematode Taxonomy and Comparative Morphology (5) I. Magnetti
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. Kay
Lecture—1 hour. Discussion—1 hour. Prerequisites: Entomology 100 and course 110; undergraduate and graduate student standing. Study the relationships between nematodes and invertebrates with emphasis on insects. Biometrics and biological control potential of nematodes of invertebrates, selected invertebrates as intermediate hosts for nematode parasites of animals, and as phytophagous hosts for nematode parasites of plants. Offered in even-numbered years.

290. Seminar (1-3) II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Selected aspects of general nematology. Topics vary from year to year.

298. Group Study (1-3) I, II, III. The Staff (Chairperson in charge)
Selected topics in Nematology (SU grade only)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grade only)

Neurology

See Medicine

Neurosurgery

See Medicine

Nutrition

See Medicine

Nutrition

(College of Agricultural and Environmental Sciences)

Robert B. Rucker, Ph.D., Chairperson of the Department
Department Office, 129 Everson Hall (752-6500)

Faculty
Nemat R. Borhani, M.D., Professor (Nutrition, Medicine)
Andrew J. Clifford, Ph.D., Professor
Kathryn G. Dewey, Ph.D., Assistant Professor
Madeline F. Ferrell, Ph.D., Assistant Professor
Louis E. Grivetti, Ph.D., Associate Professor
(Food Science and Technology)

Frederic W. Hill, Ph.D., Professor
Lucille S. Hurley, Ph.D., Professor (Nutrition, Food Science and Technology)
Bo L. Londerdal, Ph.D., Assistant Professor
Jo Ann Prophete, M.S., Lecturer
Robert B. Rucker, Ph.D., Professor
Barbara G. Scheringer, Ph.D., Associate Professor (Nutrition, Food Science and Technology)
Judith S. Stein, Sc.D., Associate Professor
Haisen S. Swanson, Ph.D., Lecturer
Alois L. Tappel, Ph.D., Professor (Nutrition, Food Science and Technology)
William C. Wei, Ph.D., Professor
Frances J. Zeman, Ph.D., Professor

Related Major Program. See the major in Nutrition Science, page 275.

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.

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.

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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

Courses in Nutrition

Lower Division Courses


Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and nutrition education for students who have taken an upper division course in nutrition.

116AL. Practical in Diet Therapy (2) I. Zeman

Lecture—2 hours; Laboratory—2 hours; extensive written assignments. Preprerequisite: An introduction to Nutrition and current literature. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116A. (Deferral grade only pending completion of 116AL-116BL sequence.)

116BL. Practical in Diet Therapy (1) II. The Staff (Zeman in charge)

Lecture—3 hours; laboratory—11/2 hours; extensive written assignments. Preprerequisite: course 116B (may be taken concurrently). 116AL and 116BL; evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. Continuation of course 116B. (Deferral grade only pending completion of 116AL-116BL sequence.)

117. Experimental Nutrition (5) I, Clifford

Lecture—3 hours; laboratory—6 hours. Preprerequisite: course 111 or 112. Scientific method in nutrition; nutrition of food habits; origins and development of dietary practices. (Same course as Food Science and Technology 20.)

Public Issues in Nutrition and Food Science (111) I, II. Ferril, Schweiger (Food Science and Technology 30)

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. Interdisciplinary as an introduction to Nutrition and Food Science for students new to the campus. (P/N/G grading only.) (Same course as Food Science and Technology 93.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff

Preprerequisite: consent of instructor. To provide opportunity for students to undertake individual projects in library study, laboratory study, field study, and information analysis in nutrition. (P/N/G grading only.)

Upper Division Courses

101. An Introduction to Nutrition and Metabolism (5) I. Lonnerdal

Lecture—5 hours. Preprerequisite: Chemistry 68; Biology 110 or 2. An introduction to the metabolism of protein, fat, and carbohydrate: the role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 119 or 111.

102. Nutrition in the Life Cycle (3) II.

Lecture—3 hours. Preprerequisite: course 101 or a course in equivalent field experience. A practical approach to the problems of meeting the nutritional needs of healthy people throughout the life cycle. Not open for credit to students who have taken courses 119 or 111.

103. Animal Nutrition and Feeding (4) I, Garrett (Animal Science)

Lecture—3 hours; discussion—1 hour. Preprerequisite: Chemistry 68. The basic principles of animal nutrition as they are applied to livestock feeding; the composition and uses of feeds and their relationship to the feeding of farm animals and poultry; the balancing of rations.


Lecture—5 hours. Preprerequisite: Physiological Sciences 101B (previously chosen) or Biochemistry 101B a course in physiological chemistry. Theoretical principles of the nutrition of man and other animals. Physiological basis of nutrient requirements for growth, maintenance and production. Physiological basis of therapeutic disorders.

111. Human Nutrition (4) III. Stem

Lecture—4 hours. Preprerequisite: course 110. Nutrition of man; critical study of nutrition requirements at various phases of the life cycle.

111L. Nutrition Laboratory (1) II, III. Ferril Laboratory—3 hours. Preprerequisite: course 110 or 101. Laboratory study of the chemical and physiological roles of nutrients in metabolism; use of experimental animals in determining the essentiality and function of nutrients.

112. Nutritional Considerations of Food Processing (3) III. Scheneman

Lecture—3 hours. Preprerequisite: Biochemistry 101A-101B or understanding of the biochemical function of nutrients. The medical and physiological roles of nutrients from the viewpoint of food processing. The effect of food processing techniques on the retention of nutrients in foods. Students having had course 102 or 110 may receive credit for this course.

114. Nutrition and Development (4) II. Hurley

Lecture—4 hours. Preprerequisite: course 110 or 102. Role of nutritional factors in embryonic and postnatal development.

116A-116B. Diet Therapy (3-3-3) III, Zeman, Clifford, Stem

Lecture—3 hours. Preprerequisite: course 111 or 102; Physiological Sciences 101 or the equivalent. Biochemical and physiological basics for therapeutic diets. Problems in planning diets for normal and pathological conditions.

192. Internship (1-12) I, II, III. The Staff

Laboratory—3-36 hours. Preprerequisite: one upper division course in nutrition and consent of instructor. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/N/G grading only.)

197. Tutoring in Nutrition (1-2) I, II, III. The Staff

Discussion—5 hours; laboratory—1 hour. Preprerequisite: Nutrition, Dietetics, Community Nutrition 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 for tutoring in different courses. (P/N/G grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Rucker in charge)

(P/N/G grading only.)

Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Rucker in charge)

(P/N/G grading only.)

Graduate Courses

201. Advanced Vitamin and Mineral Nutrition (4) I, Rucker


202. Advanced Animal Energetics and Energy Metabolism (4) II. The Staff (Baldwin, Animal Science, in charge)

Lecture—4 hours. Preprerequisite: course 110, Biochemistry/Physiological Sciences 101A, 101B, Physiology 110. History of nutritional energetic; evaluation of energy transformations associated with food utilization; energy expenditures at cellular and tissue levels; appetite by diet and physiological state; appetite regulation; obesity, lipid transport and metabolism.

203. Advanced Protein and Amino Acid Metabolism (4) III. The Staff (Rogers, Physiological Sciences, in charge)


212. Design and Evaluation of Nutrition Education Programs (2) I.

Lecture—4 hours. Preprerequisite: graduate standing in nutrition. Skills and techniques of planning and evaluating nutrition programs. Emphasis on nutrition education; curricula, instructional strategies and evaluation methods in formal classroom and informal community settings intended for students preparing to administer programs or teach in universities or dietetic institutions.

216. Advanced Diet Therapy (3) III. Zeman


218. Advanced Field Work in Community Nutrition (2-12) I, II, III, extra session summer. The Staff (Zeman in charge)

Discussion—1 hour; field work. Preprerequisite: courses 118, 119; graduate standing; consent of instructor. Directed experience in community nutrition. Organization and implementation of nutrition programs.

231. Single Carbon Metabolism in Nutrition (2) II, Kratzer and VoHra (Avian Sciences)

Lecture—2 hours. Preprerequisite: course 203. Nutritional and metabolic interrelationships important to the transfer of single carbon units in various animals; the involvement of the metabolical function of folic acid, vitamin B12, pyridoxine, choline, methionine and other nutrients. Offered in odd-numbered years.

252. Nutrition and Development (3) III. Hurley

Lecture—3 hours. Preprerequisite: courses 201, 202, 203. Relationships of nutrition to growth and development of human and primate cerebral development. Offered in even-numbered years.

253. Control of Food Intake (3) III. Rogers (Physiological Sciences), Mendel (Animal Physiology)

Lecture—2 hours; discussion—1 hour. Preprerequisite: 201, 202, and 203 (may be taken concurrently), or consent of instructor. The physiological and behavioral effects of flavors, colors, shapes, and the transfer of food intake. Subject matter will be approached through lectures, laboratory demonstrations and discussions where students and staff will critically evaluate the literature. Offered in even-numbered years.
254. Ruminant Digestion and Metabolism (3) I, Morris and Baldwin (Animal Sciences) Lecture—3 hours. Prerequisite: courses 122, 201, 202, 203. Recommended. Qualitative and quantitative aspects of ruminant digestive and metabolic processes; nutrient requirements; rumen microbiology and biochemistry; digestive physiology; nutrient absorption; patterns, rates and mechanisms of nutrient utilization, regulatory processes. Offered in odd-numbered years.

255. Natural Toxins in Foods (2) II. Vohra and Katrner (Avian Sciences) Lecture—2 hours. Prerequisite: courses 201, 202, 203. Occurrence, mode of action and alleviation of several natural toxins in foods and feeds. Offered in even-numbered years.

256. Nutritional and Hormonal Control of Animal Metabolic Function (3) III. Baldiwin (Animal Science), Freeland (Physiological Sciences) Lecture—2 hours. Prerequisite: courses 201, 202, 203; Physiological Sciences 205A, 205B. Significance and interpretation of enzyme, metabolic, in vivo and in vitro isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diets-hormone interactions in carbohydrate, amino acid and lipid metabolism will be discussed. Offered in odd-numbered years.

209. Beginning Nutrition Seminar (1) I, II, III. The Staff (Vohra, Avian Sciences, in charge) Discussion—1 hour. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Limited enrollment.

220C. 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)

211. Advanced Nutrition Seminar (1) I, II, III. Hettman (Animal Sciences) in charge Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (SU grading only.)

278. Supervised Teaching in Nutrition (2) I, II, III. Teaching under supervision of members of Nutrition Graduate Faculty Group—6 hours. Prerequisite: graduate status in nutrition and 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 Adviser with copy to the student.)

295. Group Study (1-5) I, II, III. The Staff

296. Research (1-12) I, II, III. The Staff (SU grading only.)

280. Supervised Teaching in Dietetics (2-12) I, II, III, extra-seat summer. The Staff Laboratory—6-36 hours. Prerequisite: graduate standing in M.S. program in Nutrition with emphasis in dietetics; consent of instructor; satisfactory completion of approved dietetic internships or coordinated program in dietetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

NUTRITION SCIENCE (College of Agricultural and Environmental Sciences)

The Major Program

The Nutrition Science major provides organized study in nutrition and relevant biological and physical sciences as preparation for (1) graduate study in nutrition, including the nutrition of species or groups, such as human, domestic animal, avian and wildlife; (2) professional study of medicine, veterinary medicine, teaching in approved dietetic internships or coordinated program in dietetics; and other health sciences; (3) technical work in nutrition.

NOTE: For key to footnote symbols, see page 128.

In animal, food, and pharmaceutical industries; (4) technical writing; and (5) health education. You should consult with your adviser with respect to additional courses appropriate to your specific interest.

B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Units</th>
</tr>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>52-55</td>
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<tr>
<td>Biochemistry (Physiological Sciences 101)</td>
<td>1011 or Biochemistry 101A, 101B</td>
</tr>
<tr>
<td>Biophysics with laboratory (Biological Sciences 2)</td>
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<tr>
<td>Chemistry, general and organic (Chemistry 1A, 1B, 2A, 2B)</td>
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<tr>
<td>Microbiology with laboratory (Bacteriology 1)</td>
<td></td>
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<tr>
<td>Statistics (Statistics 13 or Agricultural Sciences and Management 150)</td>
<td></td>
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<tr>
<td>Written or oral expression (see College requirement)</td>
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<tr>
<td>Depth Subject Matter</td>
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<tr>
<td>Select from Nutrition 110, 111, 111L, 114, 116A, 116B, 117, 121, 122, 123, 190, 198, and 199</td>
<td></td>
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<tr>
<td>Breadth Subject Matter</td>
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<tr>
<td>Courses in social sciences and humanities</td>
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<tr>
<td>Restricted Electives</td>
<td>40-48</td>
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<tr>
<td>Biochemistry laboratory (Biochemistry 101L)</td>
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<tr>
<td>Calculus or physics (excluding Physics 19)</td>
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</tr>
<tr>
<td>Food and food science</td>
<td></td>
</tr>
<tr>
<td>Physiology with laboratory (Physiology 110, plus an additional physiology course)</td>
<td>70</td>
</tr>
<tr>
<td>Additional nutrition or related biological and physical sciences</td>
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<tr>
<td>Unrestricted Electives</td>
<td>39-42</td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>190</td>
</tr>
</tbody>
</table>

Major Adviser: R.B. Rucker.

Graduate Study: The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For information on graduate study contact the graduate adviser. See page 97.

Graduate Adviser: See Class Schedule and Room Directory.

ORIENTAL LANGUAGES AND CIVILIZATIONS

(College of Letters and Science)

Department Office (Anthropology), 328 Young Hall (572-0745)

Oriental Languages and Civilizations

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 10, Food Science and Technology 100A, Nutrition 110, 111, 111L, 116A, 116B. The following courses must be elected: Agicultural Economics 112; Food Science and Technology 101A, 101B; Food Service Management 120, 121, 122, 123; Applied Behavioral Sciences 173 or Education 110. Students intending to apply for admission to a dietetic internship must consult the Graduate Adviser in Dietetics at least the first quarter of the senior year for information on procedures.

Faculty

Donald Gibbs, Ph.D., Associate Professor Jong S. Kim, B.A., Adjunct Lecturer H. Kim, Ph.D., Associate Professor Janet Shimbamoto, Ph.D., Assistant Professor Benjamin E. Wallace, Ph.D., Professor Yun-Chen Li, M.A., Visiting Lecturer

Related Courses. See East Asian Studies course listing.

Minor Program. Available through consultation with an undergraduate adviser in Oriental Languages and Civilizations.

Courses in Chinese

(See East Asian Studies for courses in Cantonese language.)

Lower Division Courses

1-2-3. Elementary Modern Chinese

1-2-3. Intermediate Modern Chinese

3-3-3. Advanced Modern Chinese

Upper Division Courses

111. Modern Chinese Literature: Reading and Discussion

112. Modern Chinese Literature: Reading and Discussion

Courses in Japanese

Lower Division Courses

1-2-3. Elementary Modern Japanese


Upper Division Courses

121. Literary Style: Japanese

122. Japanese Composition

Faculty

Donald Gibbs, Ph.D., Associate Professor Jong S. Kim, B.A., Adjunct Lecturer H. Kim, Ph.D., Associate Professor Janet Shimbamoto, Ph.D., Assistant Professor Benjamin E. Wallace, Ph.D., Professor Yun-Chen Li, M.A., Visiting Lecturer

Related Courses. See East Asian Studies course listing.

Minor Program. Available through consultation with an undergraduate adviser in Oriental Languages and Civilizations.
Oriental Languages and Civilizations; Orientation; Pathology


121. Modern Japanese: Reading and Discussion (4) I, II, III. Shibamoto
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 coordinate with readings will be used to provide practice relating language to social situations.

122. Modern Japanese: Reading and Discussion (4) II, III. Shibamoto
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.

123. Modern Japanese: Reading and Discussion (4) III K. Kim, Shibamoto
Lecture—3 hours; discussion—1 hour. Prerequisite: course 122. Readings in modern Japanese short stories, newspaper articles, and essays, based on reading skills developed in courses 1 through 122. Television programs selected to coordinate with readings will be used to provide practice relating language to social situations.

Courses in Oriental Languages and Civilizations

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 for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Languages of Eastern Asia (4) III. Wallacker
Lecture—3 hours; discussion—2 hours. Prerequisite: Anthropology 110 (may be taken concurrently) or the equivalent. Survey of languages and language families of Eastern Asia, their histories and distributions.

107. Tutoring in Oriental Languages (1-5) I, II, III. The Staff (Wallacker in charge)
Tutorials—1 to 3 hours. Prerequisite: consent of Department Chairperson. Leading of small discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

201. Proseminar in Sinological Methods (4) III. Wallacker
Seminar—3 hours. Prerequisite: knowledge of classical Chinese.

209. Research (1-12) I, II, III. The Staff
(SU grading only.)

Orientation

(College of Agricultural and Environmental Sciences)

Course in Orientation

Questions pertaining to the following course should be directed to the Instructor or to the Biochemistry Department, 149 Briggs Hall.

Lower Division Course

1. Orientation (no credit) I, II, III. Cheykin (Biochemistry and Biophysics)
Discussion. Exploration of the philosophy, purposes, significance, and mechanisms of university education. (P/NP grading only.)

Orthopaedic Surgery

See Medicine

Otorhinolaryngology

See Medicine

Pathology

Veterinary Medicine, this page; Medicine, see page 264

Pathology

(School of Veterinary Medicine)

Donald L. Dungworth, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 1126 Haring Hall (752-1386)

Faculty

Donald R. Cordy, D.V.M., Ph.D., Professor
Donald L. Dungworth, B.V.Sc., Ph.D., Professor
Robert H. Higgin's, B.V.Sc., M.Sc., Ph.D., Assistant Professor
Thomas G. Kawakami, Ph.D., Associate Adjunct Professor
Peter C. Kennedy, D.V.M., Ph.D., Professor
Linda J. Lowenstein, D.V.M., Ph.D., Professor
Peter F. Moore, B.V.Sc., Ph.D., Assistant Professor
Jack E. Mouton, D.V.M., Ph.D., Professor
Harvey J. Olander, D.V.M., Ph.D., Professor
Bernie L. Osburn, D.V.M., Ph.D., Professor
R. Ray P. Rose, Jr., D.V.M., Ph.D., Professor
Anthony A. Stannard, D.V.M., Ph.D., Professor
Pathology, Medicine

Courses in Pathology

Upper Division Course

108. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Pediatrics

See Medicine
Pharmacology and Toxicology (A Graduate Group)

Keith F. Killam, Jr., Ph.D., Chairperson of the Group
Group Office, 4453 Medical Science 1A
(Deptartment of Pharmacology), (752-3200)

Faculty
Graduate group faculty members are based in the Departments of Environmental Toxicology, Pharmacology, Physiological Sciences and other related laboratories and departments 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 97.

Graduate Advisers. W.W. Kilgore (Environmental Toxicology), S.M. Giri (Physiological Sciences), T.C. West (Pharmacology).

Courses in Pharmacology and Toxicology

Graduate Courses

250. Advanced Topics in Pharmacology and Toxicology (1-39) I, II, III. The Staff
Lecture-discussion-seminar—1 hour each course format can vary at option of instructor. Prerequisite: Pharmacology 200-208. 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.

200. Seminar (1) I, II, III. The Staff
Prerequisite: consent of instructor. Current topics in pharmacology and toxicology. (Bu grading only.)

Philosophy

(College of Letters and Sciences)

Joel I. Friedman, Ph.D., Chairperson of the Department
Department Office, 118 Philosophy Building
(752-0607)

Faculty

'^Ronald A. Arbin, Ph.D., Associate Professor
Fred R. Barger, Ph.D., Professor
'William H. Bossert, Ph.D., Professor
Joel I. Friedman, Ph.D., Professor

NOTE: For key to footnote symbols, see page 128.

Pharmacology and Toxicology; Philosophy

Minor Program Requirements:

In consultation with the minor adviser, students may plan a minor in Philosophy. Students may select a broad range of courses to concentrate their work in a specific field. Examples of specialized areas of study include philosophy and the sciences, philosophy and society, history of philosophy, and logic and language.

Minor Adviser. G.J. Metz

Courses for Non-Majors. The Department offers a range of courses for non-majors. Students pursuing careers in agriculture and engineering might find philosophy 34 and 35 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, 21, 22 and 23. Pre-law students and students planning careers in medicine or the various health sciences may be interested in Philosophy 14 and 114A-114B. The offerings at the upper division level include courses of direct relevance to students in the biological and physical sciences, 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 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 University President David S. Saxton, the department sponsors an essay contest each year which is open to all undergraduates. The David S. Saxton 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 do not need to enter the graduate program. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. F.R. Berger

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.

5. 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; faili.

10A-G. Themes in Philosophy (4) I, II, III. The Staff
Lecture-discussion—4 hours. Papers or written reports. Introductory study of related problems in an area of philosophical interest. Sections to be offered: (A) Knowledge and Existence; (B) Self and Mind; (C) Philosophy and the Arts; (D) Morals and Politics; (E) Philosophy East and West; (F) Philosophy and Myth; (G) Science and Human Nature.

12. Introduction to Logic (4) I, Berger
Lecture—3 hours; discussion—1 hour. Basic concepts and techniques of deductive logic with emphasis on propo.
Physical Education

(College of Letters and Science)

William C. Adams, Ph.D., Chairperson of the Department
Herbert A. Schmalenberger, M.A., Vice-Chairperson of the Department

Department Office, 264 Hickey Gymnasium (752-0611)

Faculty

William C. Adams, Ph.D., Professor
Richard L. Bell, Ph.D., Professor (Chemical Engineering)
*Edmund M. Bernauer, Ph.D., Professor
Robert R. Brooks, M.A., Supervisor
Robert E. Bullis, M.A., Adjunct Lecturer
Joseph E. Carlson, M.A., Supervisor
Stewart E. Cassell, M.S., Adjunct Lecturer
Gary J. Colberg, M.A., Adjunct Lecturer
*Jere H. Cory, M.A., Supervisor
Kathleen M DeYoung, B.A., Assistant Supervisor
Robert L. Foster, M.A., Supervisor
Pamela L. Gill, M.A., Associate Supervisor
Raymond S. Goldbar, M.A., Associate Supervisor
Robert I. Hamilton, M.S., Supervisor
Jerry W. Hindsdale, A.B., Supervisor
Robert G. Holly, Ph.D., Adjunct Lecturer
*Barbara A. Jahn, M.S., Associate Supervisor
Charles R. Kovacic, Ed.D., Professor
William S. Lotter, Ed.D., Professor
Paul A. Molé, Ph.D., Associate Professor
Donald G. Morris, B.S., Adjunct Lecturer
Becky Nyby, B.S., Adjunct Lecturer
*John W. Pappas, M.A., Supervisor
Melvin R. Ramey, Ph.D., Professor (Civil Engineering)
*E. Dean Ryan, E.D., Professor
Herbert A. Schmalenberger, M.A., Supervisor
Atteva E. Short, B.A., Associate Supervisor
Joe L. Singleton, M.A., Supervisor
James L. Sochor, Ed.D., Supervisor
Phillip S. Swinley, M.A., Supervisor
Jon E. Vochatzer, M.S., Associate Supervisor
Mary Welch, Ed.D., Supervisor
Keith R. Williams, Ph.D., Assistant Professor
Suzanne C. Williams, M.A., Assistant Supervisor

The Major Program

The major in Physical Education is designed to effect a broad scholarly understanding of human movement. This is achieved primarily by completion of a core 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 athletic aid, exercise and sports sciences, as well teaching and coaching.

Physical Education

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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<td>Preparatory Subject Matter</td>
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<tr>
<td>Biological Science</td>
<td>5</td>
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<tr>
<td>Physical Education 45</td>
<td>3</td>
</tr>
<tr>
<td>Physics 1A</td>
<td>3</td>
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<td>Psychology 1 or 15</td>
<td>4</td>
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<tr>
<td>Statistics 13</td>
<td>4</td>
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<td>Depth Subject Matter</td>
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<tr>
<td>Human Anatomy 101</td>
<td>4</td>
</tr>
<tr>
<td>Human Anatomy 102</td>
<td>2</td>
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<tr>
<td>Physical Education 101, 102, 103, 104, 105</td>
<td>16</td>
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<tr>
<td>Physiology 110</td>
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<tr>
<td>Minimum of 12 upper division units in physical education chosen in consultation with a major adviser</td>
<td></td>
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<tr>
<td>Major Adviser</td>
<td>12</td>
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<tr>
<td>Biological emphasis Students elected to this emphasis must select a minimum of 9 units from Physical Education 110, 111, 112, or 113.</td>
<td></td>
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<tr>
<td>Psychological emphasis Students elected to this emphasis must select a minimum of 7 units from Physical Education 120, 121, or 125.</td>
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<tr>
<td>Minimum of 8 upper division units in either the biological or the psychological area selected in consultation with a major adviser</td>
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<tr>
<td>Major Adviser</td>
<td>8</td>
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<tr>
<td>Students are expected to elect, in consultation with a major adviser, either the biological or psychological concentration by the end of the sophomore year. Under special circumstances an individualized curriculum may be elected, but only after consultation with and approval by a major adviser.</td>
<td></td>
</tr>
</tbody>
</table>

Total Units for the Major: 71

Recommended

Students interested in the physiological aspects of physical education are strongly urged to take Chemistry 5A, 6B.


Teaching Major. The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

Courses in Physical Education

Lower Division Courses

1. Physical Education for Men and Women (5/4) I, II, III. The Staff (Chairperson in charge)
   Lecture—2 hours. Section in: a) sports, rules and strategy; b) physical fitness and personal health; c) recreation; d) dance, and e) interscholastic athletics. May be repeated for a total of 6 units. (P/NP grading only.)

2. Principles of Basic Exercise Conditioning (2) I, II, III. (Swimmi in charge)
   Lecture—1 hour; laboratory—8 hours. A survey of the basic concepts, facts, and accepted approaches current in selected exercise training regimes, 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.)

3. Foundations of Emergency First Aid (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 requirements for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course the Standard Red Cross Certificate is awarded.

4. Professional Physical Education Activities: Men and Women (1) I, II, III. The Staff (Chairperson in charge)
   Lecture—1 hour, or laboratory—2 hours. Fundamental skills for: a) coaching competitive athletics; b) classroom teaching and coaching, and c) classroom teaching and officiating. May be repeated for a total of six units.

5. Administration of Intramural Sports (2) II, Colberg
   Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

   Lecture—1 hour; laboratory—2 hours. Prerequisite: sound physical condition, no physical handicap that would render student unable to perform the required skills and ability to
pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and saving lives in or on the life of another in an aquatic emergency. (American Red Cross Lifesaving Certificate awarded upon successful completion of necessary requirements.)

27. Training Course for Water Safety Instructors (2) II, III, Hilary
Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming and Senior Life Saving Certificate. This course is practical experience necessary for the organization and teaching of swimming, life saving, and water safety courses. (American Red Cross Water Safety Instructor Certificate awarded upon successful completion of necessary requirements.)

28. Basic Scuba (2) I, III, Morris
Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition; pass preliminary swim test. Introduction to basic knowledge required for SCUBA diving, function and maintenance of equipment, physics and physiology of diving, deep ocean and caribbean, and marine life, and underwater communication. Pool and open water sessions available for certification. (PNNP grading only.)

30. Synchronized Swimming Composition (2) I, Jarino
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 1 (synchronized swimming) or consent of instructor. Principles of choreography for solo, duet, and team composition: style, execution, synchronization. Understanding and appreciation of technical principles of water show productions. Basic tools and equipment, principles of set construction, scene painting, costume construction, lighting, and sound equipment.

35A. Dance Composition (2) I, Short
Laboratory—5 hours. Prerequisite: course 1, modern jazz or ballet movement. Development of instruction and learning phases of movement with a knowledge of elements involved in the choreography of design, dynamics, rhythm, movement, and gesture, vocabulary.

38B. Dance Composition (2) II, Short
Laboratory—5 hours. Prerequisite: course 35A or consent of instructor. To learn the elements of dance production as it applies to creative production, costume design, selection of music, and building of stage props.

35C. Dance Composition (2) II, Short
Laboratory—5 hours. Prerequisite: courses 35A, 36B, or consent of instructor. To encourage the student to create new dance forms and prepare them for a 4-7 minute presentation in a spring concert on stage. Costumes and lighting will be created and created for each dance by the choreographer.

36A-36B. History of Dance (3-3) I-II, Curry
Lecture—3 hours. Study of dance and its relation to culture from the primitive to the Renaissance periods. The development of dance as an art form from the Baroque period to the twentieth century.

44. Principles of Healthful Living (2) I, II, III, Lotter
Lecture—2 hours. Application of scientific and empirical knowledge to promote healthful living, bodily, and community health problems. (PNNP grading only.)

44L. Principles of Teaching Healthful Living (1) I, III, Lotter Discussion—four 2½ hour evening sessions. Prerequisite: course 44L. Students will develop syllabus for specific health classes to be designed by students with an understanding of 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 candidates. (PNNP grading only.)

50. Foundations of Physical Education (3) I, Adams
Lecture—3 hours. An introduction to historical, biomechanical, philosophical, and sociological foundations of physical education.

52. Physical Education Internship (2-5) I-I, III, The Staff (Chairperson in charge)
Laboratory—6-15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physical Education majors. Work-learning experience in appropriate physical activity programs to teach, counsel, organize, clinical or research situations under department faculty supervision. May be repeated for credit once but no more than 6 units will be determined toward Physical Education major. (PNNP grading only.)

97T. Tutoring in Physical Education (1-4) I, II, III, The Staff (Chairperson in charge)
Tutition—5 hours. Prerequisite: lower division standing and consent of Department Chairperson. Tutoring of students in lower division physical activity courses. Weekly meetings with students by charge of course. Instruct on methods and materials required. May be repeated once for credit. (PNNP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson. (PNNP grading only.)

98L. Special Study for Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PNNP grading only.)

Upper Division Courses

100. Field Experience in Teaching Physical Education (2) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour; field work—4 hours. Prerequisite: upper division standing and appropriate course 1 or 7; consent of instructor. Tutoring or teaching aide in physical education type activities, including athletic coaching, in public schools under the guidance of a regular teacher with supervision by a departmental faculty person. (PNNP grading only.)

101. Physiologic Regulation During Exercise (4) I, Bernauer, Mole
Lecture—discussion—1 hour alternate weeks with laboratory 3 hours. Prerequisite: Biological Sciences 11; Physiology 110. A study of muscular/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 for prolonged and vigorous physical activity in maintaining optimal regulatory functions.

102. Physiological Adaptations to Exercise (2) I, II, Adams, Bernauer
Lecture—2 hours. Prerequisite: course 101 or consent of instructor. Sport medicine: adaptation of the human body to exercise in relation to genetic and adaptive aspects. Analysis of physiological adaptations to chronic physical activity and selected environmental stressors.

103. Analysis of Human Movement (4) I, II, Ivanovic
Lecture—4 hours; laboratory—3 hours. Prerequisite: Physi- ology 1A, Human Anatomy 101, and consent of instructor. Analytical and physiological concepts and physical laws as applied to human movement.

104. Introduction to Motor Control and Skill Acquisition (3) I, III, Williams
Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Analysis of variables affecting man's ability to produce, learn, and retain movement skills. Basic neuromuscular and behavioral accounts of motor control processes are examined. Theories of movement retention and motor learning are covered.

105. Psychosocial Factors in Motor Performance (3) I, II, III, Ryan
Lecture—3 hours. Prerequisite: Psychology 11, 15, or 16. Survey of the empirical findings from social psychology and human motivation and their application to motor performance, including sex differences, success and failure, expectancies, anxiety, competition, and aggression.

110. Exercise Metabolism (3) I, II, Mole
Lecture—3 hours; laboratory—4 hour sessions. Prere- quisite: course 101, 102; Chemistry 1A. Focus on energy metabolic pathways and fuels used during different modes of exercise. Exercise-induced adaptations that affect metabolism and performance will be discussed. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise.

111. Environmental Effects on Physical Performance (3) III, Adams, Bernauer
Lecture—2 hours; discussion—1½ hour; laboratory—1½ hours. Prerequisite: courses 101 and 102, or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological limitations and adaptations, will be studied.

112. Clinical Exercise Testing (3) III, Holy
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 101, 102; Physiology 110. Development of human potential from conception to old age, including influence of exercise, athletic participation and prevention of selected diseases and clinical syndromes, and the psychological and body composition, and physiological capacities with aging.

120. Sports in American Society (3) I, III, Gill
Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religion, art, sexism, racism, and education; current trends and problems.

121. Sports Psychology (4) I, Ryan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection in sport psychology through a detailed examination of relevant experimental, clinical, and field data.

125. Human Performance and Motor Learning (3) I, Williams
Lecture—2 hours; laboratory — 2 hours. Prerequisite: course 104 and Psychology 1; Psychology 130 recom- mended. Information processing in skill acquisition, Open and closed-loop theory, attention, feedback and other cur- rent issues are critically examined.

128A. Research Dining: 65 Feet (1) I, Bell, Morris
Lecture—1 hour, laboratory—½ hour. Prerequisite: basic SCUBA Certification from approved agency (course 29 or the equivalent); 10 logged open-water dives since certification; and consent of instructor. Lectures in diver rescue, and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving. Pool and open-water dives required. Certification (contact Department Office for details). (PNNP grading only.)

128B. Research Dining: 65 Feet (II) I, Bell, Morris
Lecture—1 hour; laboratory—1 hour. Prerequisite: course 128A or consent of instructor. Lectures in diver rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving. Pool and open-water dives required. Certification (contact Department Office for details). (PNNP grading only.)

129. Research Dining: 100 Feet (I) I, Bell, Morris
Lecture—3 hours (final five sessions); laboratory—3 hours (final five sessions). Prerequisites: courses 128A-128B or the equivalent; consent of instructor. Lectures in laboratories in the theory and practice of decompression, structure or decompression tables, use of hyperbaric chambers, in- structural and use of deco equipment. Pool and open-water sessions available for certification (contact Department Office for details). (PNNP grading only.)

131. Physical Education for the Handicapped (4) I, Ivanovic, Vochatzer
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103 and consent of instructor. The role of exercise, physical retraining and remedial work in the improvement of movement for handicapped individuals.

132. First Aid Leadership and Accident Management (3) I, II, III, Pappas
Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid. Lecture course in organization and supervision of safety and first aid programs in school and community sports, recreation and all types of group activities. The role of leadership in accident management skills. The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.

133. Conditioning of Athletes: The Prevention and Care of Sports Injuries (2) I, II, III, Pappas
Lecture—1 hour; laboratory—2½ hours. Prerequisite: course 5 or the equivalent. An understanding of the use of various types of exercises prior to participation in conditioning prime injury areas of participants in all activities and how to handle them.

140. Principles and Theory of Physical Education (4) I, II, Lott
Lecture—4 hours. Prerequisite: course 45 or consent of instructor. Critical analysis of the assumptions underlying the physical education program.

141. Design and Program Evaluation in Physical Education (4) I, II, Lott
Lecture—3 hours; laboratory—3 hours. Prerequisite: basic statistics course; consent of instructor. Topics include data reduction and analysis, test construction and administration; grading; and teacher evaluation.

142. Physical Education in The Public Schools (3) II, Smolenberger
Lecture—3 hours. Prerequisite: course 140 and senior status or consent of instructor. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.
150. Recreational In the Community (3) III. Iahn Lecture—2 hours; discussion—1 hour; two Saturday field trips—8 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populous, and isolated communities.

192. Physical Education Internship (1-2) I, II, III. The Staff (Chairperson in charge)
Laboratory—6—36 hours; written project proposal and evaluation—presentation, discussion standing and consent of instructor; enrollment dependent on availability of internship positions, with priority given to Physical Education majors. Work experience at an approved program of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit for a total of 15 units (including course 80), but no internship units will be counted toward Physical Education major. (PINO grading only.)

1971. Tutoring in Physical Education (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—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. (PINO grading only.)

196. Directed Group Study (1-9) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Department Chairperson grading only.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of Department Chairperson. (PINO grading only.)

Graduate Courses

200. Prosemnin in Physical Education (3) I, Bernama, Ryan Seminar—4 hours. Meaning, methods, and techniques of research procedure as applied to physical education; a critical review of selected studies, literature, practices, and procedures in the field; application to a particular problem in the field.

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—1-9 hours. Prerequisite: consent of instructor; division course in systematic physiology and anatomy. Multidisciplinary course introducing the student to pathophysiology of sport injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Orthopaedic Surgery 404A, Physical Medicine and Rehabilitation 201A, 401A.)

201B. Sports Medicine: Physiological Basis of Exercise Testing and Exercise Training (3) I, II. Holley, Bernama, Ryan Lecture—2 hours; two 4-hour laboratory projects; discussion—four 2-hour sessions. Prerequisite: graduate students with upper division course in systematic physiology and anatomy. Course introduces the student to methods and assessment of exercise physiology and exercise testing. Principles of exercise training for normal individuals and patients with various diseases, and weight reduction and control will be discussed. (Same course as Orthopaedic Surgery 401B, Physical Medicine and Rehabilitation 201B, 410B.)

201C. Sports Medicine: Special Problems in Prescribing and Approving Exercise Programs (3) III. The Staff (Chairperson in charge)
Lecture—2 hours; two 4-hour laboratory projects; discussion—four 2-hour sessions. Prerequisite: graduate students with upper division course in systematic physiology and anatomy. Review of special problems related to specific sports and recreational activities. Areas to be covered include SCUBA diving, backpacking, jogging and skiing, as well as specific exercise programs for disabled and aged. (Same course as Orthopaedic Surgery 401C, Physical Medicine and Rehabilitation 201C, 401C.)

220. Kinesiology (4) III. Williams Lecture—4 hours; discussion—1 hour. Prerequisite: course 102; consent of instructor. Review of current literature and research in kinesiology; neuromuscular concepts and physical laws.

221. Anthropometry in Physical Activity (4) III. Adame Lecture—2 hours; laboratory—5—30 hours. Emphasis on anthropometric and body composition changes accompanying prolonged, systematic physical conditioning. Offered in even-numbered years.

222. Metabolic Functions in Exercise (4) III, Ill. Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 102. Physiology 114. Review of the current research literature on the metabolic responses to exercise in man; a laboratory program to examine the effect of environmental conditions.

230. Human Performance: Psychological Aspects (3) III. 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.

231. Seminar In Motor Control of Voluntary Movements (3) III, Seminar—3 hours. Prerequisite: Physiology 112, 214, or the equivalent; Physical Education 104, 105 or consent of instructor. A neurophysiological and behavioral examination of motor control in the human and higher phylogenetic animal. Offered in even-numbered years.

232. Psychological Effects of Physical Activity (3) I. Ryan Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health.

290. Physiological Basis of Physical Fitness (3) II. Bernama Seminar—4 hours. Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 10; or consent of instructor. The methods of measuring various group and individual activities for grades K-12: program planning, class management, organization, and evaluation. (PINO grading only.)

Professional Course

380. Methods of Teaching Physical Education (3) II. Schmausberger Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 10; or consent of instructor. The methods of measuring various group and individual activities for grades K-12: program planning, class management, organization, and evaluation. (PINO grading only.)

Physical Medicine and Rehabilitation

See Medicine, School of

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Physics

(3) College of Letters and Science
William J. Knox, Ph.D., Chairman of the Department
Wendell H. Potter, Ph.D., Vice-Chairperson of the Department
Department Office, 225 Physics-Geology Building (755-1500)

Faculty

Frederick H. Bracy, Ph.D., Professor
Thomas A. Cahill, Ph.D., Professor
Albert C. Cheung, Ph.D., Associate Professor
Lawrence B. Cozierman, Ph.D., Associate Professor
Linton R. Corrigan, Ph.D., Associate Professor

James E. Draper, Ph.D., Professor
Glen W. Erickson, Ph.D., Professor
Ching-Yao Fong, Ph.D., Professor
Milton E. Gardner, Ph.D., Professor Emeritus
Claude Gentile, Ph.D., Professor Emeritus
Kenneth R. Greider, Ph.D., Professor Emeritus
John F. Gunion, Ph.D., Professor Emeritus
James P. Hurley, Ph.D., Associate Professor Emeritus
John A. Jungman, Ph.D., Professor
Joseph E. Klatke, Ph.D., Associate Professor in Residence
William J. Knox, Ph.D., Professor
Winston T. Ko, Ph.D., Associate Professor Emeritus
Richard L. Lander, Ph.D., Professor Emeritus
Douglas W. McColm, Ph.D., Associate Professor Emeritus
Charles G. Patten, Ph.D., Professor Emeritus
Nellie Wedel, Ph.D., Senior Lecturer
David E. Pellett, Ph.D., Associate Professor Emeritus
Wendell H. Potter, Ph.D., Associate Professor Emeritus
Roderick V. Reid, Jr., Ph.D., Associate professor
William W. True, Ph.D., Professor
Philip M. Vager, Ph.D., Professor

The Program of Study

While many people think of Physics as levers and pulleys or space shots and atomic reactors, there is much more to the realm of physics. From the smallest subatomic particles to atoms, molecules, stars, and planets, the study of physics is the study of what makes the universe tick. For example the working of the airplane, the paint sprayer, and the pitcher's curve ball are all understood in terms of the same physical law. Information learned from high-energy particle accelerators and nuclear reactors teaches us not only what holds the nucleus and the atom together but also why stars shine and how radiation therapy fights cancer.

As the world becomes more and more complex, the sciences appear to become more difficult to understand. Yet appearances can be deceiving, and many of the most complex phenomena and devices are easily understood and used by billions 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 the smallest subatomic particles to the largest stars, physicists use their knowledge to understand the world around us.

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 or professional work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, and computer science, materials science and energy.

The Major Programs

The Department of Physics offers three degree programs: The Bachelor of Arts in Physics, and the Bachelor of Science in Physics and in Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education then is possible with the other two programs. Either the B.S. degree in Physics or the B.S. degree in Applied Physics should be followed by the student who plans to enter physics as a profession. The B.S. in
Applied Physics provides the student with a solid introduction to a particular applied physics specialization. For the student who plans to enter the job market completing a B.S. degree, the applied physics concentration would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Both programs are developed in a highly sequential manner, i.e., Physics 8A-8B-8C-8D and Mathematics 21A-21B-21C and 22A-22B-22C are required for most upper division courses and must be taken in the freshman and sophomore years. Some 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 calculus and trigonometry can finish the Physics 8 sequence during the freshman year and begin upper division physics courses in the sophomore year by taking Physics 58A in the first summer session prior to entering the University in the fall. This gives these students extra time in the junior and senior years to be used, for example, to complete a double major, to undertake interdisciplinary studies, to participate in research, or to take graduate courses in physics.

In the junior year the student normally studies mathematical methods, analytical mechanics, electricity and magnetism, and begins quantum mechanics. In the senior year the study of quantum mechanics is continued and courses in 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>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>55</td>
</tr>
<tr>
<td>Physics 8A, 8B, 8C, 8D</td>
<td>17</td>
</tr>
<tr>
<td>Mathematics 29A or Engineering 5</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1A-1B-1C or 4A-4B-4C</td>
<td>15</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>50</td>
</tr>
<tr>
<td>At least 18 units from approved courses within the following specialties (chosen in consultation with a major adviser)</td>
<td>18</td>
</tr>
<tr>
<td>Materials science, physical electronics, energy, applied nuclear physics, chemical physics, astrophysical 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></td>
</tr>
<tr>
<td>Total Units for the Major</td>
<td>106</td>
</tr>
</tbody>
</table>

**Physics**

### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>37</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>Depth Subject Matter</td>
<td>38</td>
</tr>
</tbody>
</table>


At least 6 additional upper division units in physics or astronomy (No more than 4 units in courses numbered 194, 195, 196, and 199 may be applied towards this requirement.)

**Total Units for the Major**: 75

**Recommended Electives**

Chemistry 1A-1B-1C or 4A-4B-4C

### General Physics

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 104A-104B, 105A, 110A-110B, 112A, 115A, plus one 3 or 4 unit course</td>
<td>24</td>
</tr>
</tbody>
</table>

(Physics 104A-104B must precede 115A.)

**Teaching Credential Subject Representative**, R. V. Reid. See page 103 for the Teacher Education Program.

**Graduate Study**. The Department of Physics offers programs of study and research leading to the M.A. and Ph.D. degrees and the Ph.D. degree with an Applied Physics Research Option. Further information regarding requirements for these three degrees, graduate research, teaching assistanatships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, University of California, Davis 95616.

**Astronomy**. There is no major program leading to a degree in Astronomy. Introductory courses are offered in general astronomy and astrophysics. Students who wish to use the observatory or the portable telescopes may do so through the Astronomy Club. The graduate program in physics provides research opportunities in radio-astronomy or microwave astrophysics.

### Courses in Astronomy

**Lower Division Courses**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Introduction to Modern Astronomy and Astrophysics</td>
<td>4</td>
</tr>
<tr>
<td>Lecture—3 hours; laboratory—discussion—2 hours. Prerequisite: good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the laws of modern physics, Modern astronomical instrumentation. Gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, the solar system, galaxies, and the Universe. Not open to students who have received credit for course 10.</td>
<td></td>
</tr>
<tr>
<td>10. Introduction to General Astronomy</td>
<td>4</td>
</tr>
<tr>
<td>III. Cheung Lecture—3 hours; laboratory—discussion—2 hours. A non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, gasses, and the Universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extraterrestrial communications. Not open to students who have received credit for course 2 or any physics course (except 10).</td>
<td></td>
</tr>
</tbody>
</table>

**Upper Division Courses**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>127. Introduction to Astrophysics</td>
<td>3</td>
</tr>
<tr>
<td>II. Cheung Lecture—3 hours. Prerequisite: Physics 8B, Mathematics 21C and knowledge of astronomy or consent of instructor. Celestial mechanics, radiation, astrophysical measurement, electromagnetic processes, the sun, binary and variable stars, stellar structure and evolution, galaxies, cosmology. (Same course as Physics 127.)</td>
<td></td>
</tr>
</tbody>
</table>

**Courses in Physics**

Physics 10 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Physics 7 is a one-quarter descriptive course intended to inform prospective physics majors about the various fields of physics now under intensive study.

Physics 1 is a two-quarter sequence requiring some mathematics (trigonometry). Either 1A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 2 is a three-quarter sequence using some calculus (mostly concepts rather than calculations). The entire sequence is recommended, rather than just 1 or 2 quarters. Physics 3 is a separate laboratory course recommended to accompany Physics 2.
90. Introduction to Applied Physics (I, II, III) The Staff Lecture—1 hour; recitation—1 hour. (Optional laboratory may be taken concurrently.) A series of lectures describing current fields of research in applied physics. Topics covered will include: nuclear physics, chemical physics, atmospheric physics, physical oceanography, and applied mathematical physics. (P.N.P. grading only.)

91. Directed Group Study (1-5) II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor; primarily for lower division students. (P.N.P. grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P.N.P. grading only.)

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics (3-3) I, II, E. Erickson Lecture—2 hours. Prerequisite: course 8B. Mathematics 22C. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

105A. Analytical Mechanics (3) I, II. Ko Lecture—3 hours. Prerequisite: course 8A. Mathematics 22A, 22B, 22C. Principles and applications of Newtonian mechanics.

108B. Analytical Mechanics (3) I, II. Ko Lecture—3 hours. Prerequisites: courses 8C and 105A. Continuation of course 105A; introduction to Lagrange's and Hamilton's equations.


108. Optics (3) I, III. Cahill Lecture—3 hours. Prerequisite: course 8 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astro-physics, material science, and atmospheric science. Study of modern optical instrumentation. Open to non-majors.

108L. Optics Laboratory (1) I, III. Cahill Laboratory—3 hours. Prerequisite: current enrollment in 108. The laboratory fulfills a 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. Jungman Lecture—3 hours. Prerequisite: course 8C. Mathematics 22C. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

112A-112B. Thermodynamics and Statistical Physics (3-4) I, II, Prior Lecture—3 hours (112A); lecture—3 hours plus 9 hours outside work (112B). Prerequisite: course 8B. Mathematics 22C. Thermodynamics, kinetic theory, and introduction to statistical mechanics.

112A-112B. Introduction to Quantum Mechanics (3-4) I, II, III, Draper Lecture—3 hours (112A); lecture—3 hours plus problem sets (112B). Prerequisites: courses 8D, 104B, 105A. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4) II, Ko Lecture—3 hours; laboratory—3 hours. Prerequisite: course 8C. Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) III, I, L. Pfeiffer Lecture—3 hours; laboratory—3 hours. Prerequisites: courses 8D, 116A. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics.

121. Foundations of Atomic and Molecular Physics (4) III, McCool Lecture—3 hours; outside work—4 hours. Prerequisite: course 8D. Mathematics 21C. The phenomena of atomic physics, introduction to quantum phenomena and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state.

122. Advanced Physics Laboratory (I, II) I, II. The Staff (Chairperson in charge) Lecture—1 hour; laboratory—3 hours. Prerequisite: course 116A. Experimental techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated once for credit.

123. Applications of Nuclear Physics (3) III, Jungman Lecture—3 hours. Prerequisite: course 116A. Prerequisite: consent of instructor. Applications to environmental, medical, and energy source problems. Course emphasis is based on limited to experimental programs underway at Crocker Nuclear Laboratory.

127. Introduction to Astrophysics (3) III. Cheung Lecture—3 hours. Prerequisite: 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, stellar structure, the universe, galaxies, cosmology. (Same course as Astronomy 127.)

129A. Introduction to Nuclear and Particle Physics (4) I, Lander Lecture—3 hours; term paper. Prerequisite: course 83; Mathematics 22C. Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.

129B. Nuclear Physics (4) II, Draper Lecture—3 hours; outside work—4 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A.

129C. Elementary Particle Physics (4) I, Ko Lecture—3 hours; term paper. Prerequisite: courses 115A and 129B or consent of instructor. Properties and classification of elementary particles. Strong, electromagnetic, and weak interactions; conservation laws and CP violation; invariance; Quarks.

140A. Introduction to Solid-State Physics (4) II, Corcuchi Lecture—3 hours; outside work—4 hours. Prerequisite: courses 115A or 82, and consent of instructor. Discussion of basic concepts and classification of experimental phenomena in solids. Crystal structure, phonons, simple metals.

140B. Introduction to Solid-State Physics (4) III, Corcuchi Lecture—3 hours; outside work—4 hours. Prerequisite: course 140A. Discussions of the following: energy bands and Fermi surfaces, transport and photoresponse, semiconductors, ferromagnetism, magnetic resonance.

150. Topics in Current Research (2) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour; outside work—5 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in physics. May be taken for credit not more than four times.

153. Introduction to Heat Transfer (2) I, McCollum Lecture—1 hour; outside readings and extensive problem sets. Prerequisites: courses 115A, 105A-105B, 115A, 112A (may be taken concurrently). Fundamentals of conductive convective and radiative heat transfer with an emphasis on the solution of practical problems involving the combined modes of conduction and convection. Viscous fluid dynamics pertinent to convective heat transfer.

181. Special Study for Honors Students (4) I, II, III, The Staff (Chairperson in charge) Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

185. Senior Thesis (5) I, II, III. The Staff (Chairperson in charge) Prerequisite: physics major or senior standing. Preparation of a thesis on a topic of special interest which requires the approval of the department. May be repeated for a total of 10 units and for no more than 5 units in any one quarter without Departmental approval.

197. Tutoring in Physics and Astronomy (1-3) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (P.N.P. grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P.N.P. grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P.N.P. grading only.)

Graduate Courses

200A. Theory of Mechanics and Electrodynamics (3) I, Garlock Lecture—3 hours; outside work—3 hours. Prerequisite: courses 105C and 110C or the equivalent; Mathematics 220A (concurrently). Special theory of relativity, covariant formulation of mechanics and electrodynamics; their foundations; coordinate invariances, variational principles for discrete and continuous mechanical and electromagnetic systems. Courses 200A, 200B, 200C, 200D. The integrated sequence will emphasize physical content as they are coordinated with Mathematics 220A, 220B, 220C.

200B. Theory of Mechanics and Electrodynamics (3) II, Garlock Lecture—3 hours; outside work—3 hours. Prerequisite: course 200A; Mathematics 220B (concurrently). Hamilton's equations. Hamilton-Jacobi theory and contact transformations, action-angle vari-
Courses in Physiological Sciences

Upper Division Courses

101A-101B. Physiology (4-3) I. Hansen, II. Freedland
Lecture—4 hours. Prerequisite: organic chemistry. Recommended: a course in physiology (may be taken concurrently) and quantitative analysis. Chemical and physical properties of substances comprising the animal body, with major emphasis on the changes during metabolism and factors influencing these reactions. Biochemistry of the endocrine glands and other specialized tissues and body fluids; chemistry of respiration, energy metabolism and nutrition.

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINF grading only)

Graduate Courses

200. Cell Physiology: Biophysical Aspects (3) III. Burns Lecture—2 hours. Prerequisite: consent of instructor: Recommended: Physiology 100B or Bacteriology 130B; Biochemistry 101B and Chemistry 101B or 110C. Discussion of modern approaches to understanding the cell as an organized system. Topics include analysis of regulation and coordination in the cell; energetic and statistical relations in the cell; tracer kinetic applied to cells; fluorescence of cells and constituents. Offered in even-numbered years.

205A. Intermediary Metabolism of Animals (3) I. Freedland Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of instructor: General principles and use of biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetic effects. Dynamics of animal metabolism including pools and turnover rates. Offered in even-numbered years.

205B. Intermediary Metabolism of Animals (3) II. Rogers Lecture—3 hours. Prerequisite: course 205A or consent of instructor: Pathways and control in biosynthesis and degradation of amino acids, proteins, nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in odd-numbered years.

223. Comparative Pharmacology (3) III. Giri, Conzelman, Joy Lecture—4 hours; laboratory—3 hours. Prerequisite: biochemistry and mammalian physiology. Action of drugs on the physiological mechanisms of animals.

243A-243B. Use of Isotopes as Tracers in Biological Research (2-3) I-II. Burns Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or consent of instructor: Discussion of the properties of isotopes and their use as tracers in the biochemical sciences.

243L. Laboratory in Use of Isotopes as Tracers in Biological Research (3) II. Burns Laboratory—6 hours. Prerequisite: course 243B (concurrent or prior). Study of radioactive tracer properties, uses and measurement methods relevant to the biological sciences.
Physiology

See below; also Human Physiology (Medicine), Plant Physiology, and Zoology

Physiology

(See 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 preparation for continued study leading to advanced degrees.

Choice of College

The Bachelor of Science degree is offered in both the College of Agricultural and Environmental Sciences and College of Letters and Science.

Students majoring in Physiology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

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.

Preparatory Subject Material

Preparatory Subject Material

Preparatory Subject Material

Chemistry 1A-1B and 5 or 4A-4B-4C; 8A-8B or 129A-129B

Mathematics 140A-140B or 180A-180B

Statistics 13

Physics 2A-2B-2C

Additional requirements as described on page 74.

Breadth Subject Material

College of Agricultural and Environmental Sciences students

Social sciences and humanities (see College requirement)

Unrestricted Electives

Total Units for the Major

Major Adviser, H. W. Colvin

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.

Unrestricted Electives

54-58

Upper Division Courses

100A. General Physiology (3) I. Horwitz

Lecture—3 hours. Prerequisite: Biological Sciences 1 and Chemistry 8B, Physics 2C recommended. Examination of the interaction of various 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) I. Horwitz

Lecture—3 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) I. Horwitz, Horwitz

Discussion—five 2-hour sessions (alternate weeks); laboratory—five 6-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) II. Smith

Lecture—3 hours. Prerequisite: course 110. The nature of the growth of cells, organs, organisms, and population, and their regulatory processes. Emphasis is placed on the quantitative evaluation of growth.

106A. Experiments in Physiology: Design and Execution (3) III. The Staff (Barkeley in charge)

Discussion—total of 6 hours; laboratory—7-8 hours. Prerequisite: course 100A, 100B, and consent of instructor. Allows students to experimentally examine current physiological problems. Following group discussions on approaches to designing experiments, groups of 2-3 students will choose a project and design an experimental protocol that they will then carry out and report upon. (PNN grading only).

106B. Experiments in Physiology: Design and Execution (3) III. The Staff (Barkeley in charge)

Discussion—two 2-hour meetings during quarter, laboratory—9 hours. Prerequisite: course 106A and consent of instructor. Continuation of course 106A. (PNN grading only).

110. Systemic Physiology (5) I., II. Barkley, Colvin, Goldberg, Sillman, 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 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 110.

1114-1115. Advanced Systemic Physiology Laboratory (3) I.-III. Burger, Carstens

Lecture—1 hour, discussion—five 2-hour sessions (to alternate with laboratory); laboratory—five 6-hour sessions. Prerequisite: course 110; courses 112, 113, 114 recommended. Selected experiments in depth on the neural, cardiovascular, respiratory, renal, and endocrine systems. Emphasis on modern conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

112. Neural and Endocrine Control Systems (4) I. Bodz, Horwitz

Lecture—4 hours. Prerequisite: course 110. The nature, functional significance, and integration of neural and endocrine control of physiological processes. Emphasis will be placed on neuroendocrine, neural sensory, and motor systems, higher neural integration, and control of metabolic and reproductive status.

113. Cardiovascular, Respiratory, and Renal Physiology (4) I. Goldberg, Weidner

Lecture—4 hours. Prerequisite: course 110, Chemistry 8B, Physics 2A, 2B, 2C recommended. An advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiology students, graduate students, and others in allied interests.

NOTE: For key to footnote symbols, see page 128.

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114. Gastrointestinal Physiology (2) III. Mendel Lecture—2 hours; prerequisite: course 110, Biochemistry 101A-101B or Physiological Sciences 101A-101B recommended. Advanced gastrointestineal physiology covering absorption, muscular and neural control, endocrine, and motility. Emphasis will be on physiology of the gastrointestinal tract; however, the interface between the tract and metabolic events will be briefly covered.

117. Airlan Physiology (3) III. Burger Lecture—4 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. Airlan Physiology Laboratory (2) III. Burger Discussion—5-6 hour sessions; laboratory—5-6 hour sessions. Prerequisite: course 117 (may be taken concurrently). Laboratory instruction in selected organ systems of the avian body.

120A. Comparative Physiology: Neurointegrative Mechanisms (3) III. Woolley Lecture—3 hours; prerequisite: course 110. Comparisons of physiological functions in the animal kingdom; neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.

120B. Comparative Physiology: Circulation (3) III. Goldberg, Rhode Lecture—3 hours. Prerequisite: course 110. Comparisons of the cardiovascular system in the animal kingdom; circulatory function. 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) III. Colvin Lecture—3 hours; prerequisite: course 110. Comparison of physiological functions in the animal kingdom: animal hormones and their functions.

120E. Comparative Physiology: Respiration (3) III. Smith, Burger Lecture—3 hours; prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: respiration. Offered in even-numbered years.

*120F. Comparative Physiology: Osmoregulatory Mechanisms (2) II. Boda Lecture—2 hours; prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: osmoregulatory mechanisms. Offered in odd-numbered years.

121. Physiology of Reproduction (3) II. Anderson Lecture—4 hours; prerequisite: course 110. Physiology and mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.

121L. Physiology of Reproduction Laboratory (1) II. Anderson Laboratory—3 hours; prerequisite: course 121 (may be taken concurrently) recommended. Experiments on the physiology of the reproductive system of domestic animals including male and female gametes. (P/NP grading only.)

130. Physiology of the Endocrine Glands (5) III. Mogeb Lecture—4 hours; discussion—1 hour. Prerequisite: course 110. Laboratory—6 hours. Prerequisite: course 110. Laboratory—6 hours. Prerequisite: course 110. Physiology and mechanisms related to reproduction, breeding efficiency, and fertility. Emphasis will be on physiology of the endocrine glands.

140. Physiology of the Endocrine Glands (5) III. Smith, Horwitz, Mendel Lecture—5 hours; prerequisite: course 110 and 100A or Biochemistry 101A or the equivalent. Physiological aspects of interactions of organisms and environment at cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure and osmotic environmental variables.

149. Environmental Physiology of Domestic Animals (3) III. Lecture—3 hours. Prerequisite: courses 110-110L, or Zoology 2. Environmental Physiology: an introduction to the environmental factors that influence physiological responses and processes related to animals including man. The nature of environmental factors and the extent to which they influence physiological responses are given emphasis.

190. Prosemair in Physiology (3) III, II, III. The Staff (Woolley 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. Students are presented, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

190C. Introduction to Physiological Research (1) I, II, III. The Staff (Woolley 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 fellows and students. May be used for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and on campus in all subject areas offered in physiology. (P/NP 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 and engineering or consent of instructor. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputers and computer-based techniques. (P/NP grading only, pending completion of courses 196A-196B.)

196B. Voluntary Control of Physiological Processes (1-4) I, II, III. Lorenz Lecture—12 hours; prerequisite: course 196A; consent of instructor. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputers and computer-based techniques. May be repeated for credit with a maximum of 6 units for 196A-196B course sequence. (P/NP grading only, pending completion of courses 196A-196B.)

197T. Tutorials in Physiology (2) II, III, I. The Staff (Woolley in charge). Discussion—1 hour; tutorial—1 hour. Prerequisite: course 110 or 112 (with grade of B or better) and consent of instructor. Extensive review of systemic physiology through leading a weekly tutorial session with a small group of students during course 110. Course format will vary with background of tutors and instructions needed. (P/NP grading only.)

199. Directed Group Study (1-5) I, II, III. The Staff (Woolley in charge). (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Woolley in charge). (P/NP grading only.)

Graduate Courses

200A, 200B. Advanced General Physiology (3-3) III. B. Stillman, Traut (Biological Chemistry) Lecture—2 hours; discussion—1 hour. Prerequisite: courses in undergraduate biochemistry and cell biology, or general physiology, or consent of instructor. Current topics in the physico-chemical basis of living systems with emphasis on regulation of cell processes. Courses 200A and 200B may be taken in either order; may be repeated for credit.

200L. Advanced General Physiology Laboratory (4) I, B. Wilson Discussion—2 hours; laboratory—10 hours. Prerequisite: courses in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Design, performance, and interpretation of experiments in cellular and general physiology with emphasis on somatic cells. Basics of cell culture and study of growth, differentiation, metabolism, morphology, and physiological regulation of animal cells in vitro.

211. Graduate Systemic Physiology Laboratory (5) I. Lecture—4 hours; laboratory—1 hour. Prerequisite: course 110. Advanced systematic physiology, with special emphasis on current developments; laboratory exercises. Illustrating modern physiological concepts and procedures.

212. Gastrointestinal Physiology of Single-Stomached Animals (3) III. Mendel Lecture—3 hours. Prerequisite: course 114 or 120C. Biochemistry 101B or Physiological Chemistry 101B. Consideration of the physiological mechanisms, biochemistry and endocrinology of the gastrointestinal tract, pancreas and liver. They relate to the assimilation of food. Offered in odd-numbered years.

214. Neurophysiology (4) II. Horowitz, Carstens Lecture—4 hours. Prerequisite: courses 112, 111B; consent of instructor. Electrical activity of nervous system: emphasis on neuroreflex functions; physiology of the nervous system as studied by its electrical activity. Offered in odd-numbered years.

215. Neurophysiological Laboratory (3) III. Horowitz, Scoobey Discussion—3 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments based on modern concepts to illustrate in depth, surgical techniques, signal monitoring and recording techniques used in neurophysiology research.

218. Neurophysiology Literature (2) III. Discussion—2 hours. Prerequisite: course 214. Critical reading and group discussion of current and classic original papers in neurophysiology.

217. The Vertebrate Eye (3) III. Silman Lecture—3 hours. Prerequisite: course 112 or the equivalent. The vertebrate eye will be examined from the standpoint of its physiology, biochemistry, and biology. Retinal functions and mechanisms will be stressed, with particular emphasis on the photoreceptors. Offered in even-numbered years.

218. Topics in Circulatory Pathophysiology (3) III. Weidner Lecture—1 hour; discussion—2 hours. Prerequisite: course 111. The circulatory system: selected topics in circulatory pathology will be addressed each offering. Topics will include pathophysiology. Lecture and discussion are emphasized. Research literature will be used in the field. May be repeated with consent of instructor. Offered in even-numbered years.

218. Muscle Growth and Development (3) II. Ashmore, B. Wilson Lecture—2 hours; seminar—I hour. Prerequisite: Biochemistry 101B; Zoology 100, 121A; or consent of instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentia- tion of fiber types. Experimental and hereditary myopathies. Offered in even-numbered years.

220. General and Comparative Physiology of Reproduction (3) I. Ogawa, Asahara, Anderson, Stabenfeldt (Reproduction) Lecture—3 hours. Prerequisite: courses 110, 110L, Biochemistry 101B, Genetics 2. Developmental aspects of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

221. The Ruminant Stomach (3) III. Colvin Lecture—2 hours; discussion—I hour. Prerequisite: course 112 and Zoological Sciences 1018 or Biochemistry 101B. Consideration of the biochemistry, genetic, physiological, nutritional and structural factors determinant of mammary gland development, lactogenesis I and II, milk yields and composition, animal physiological adaptations to lactation; mammary cancer research; and, research perspectives in mammary research.

221L. Neuroendocrinology (4) II. Woolley, Moberg Lecture—4 hours; discussion—I hour. Prerequisite: course 112 or 130, and consent of instructor. Neural-endocrine interactions; neural-regulation of endocrine systems; hormone identification and function; and the role of feedback activity. May be repeated for credit with consent of instructor when subject matter changed substantially.

224. Neurophysiological Basis of Neurotoxicology (3) I. Woolley Lecture—2.5 hours; discussion—I hour. Prerequisite: course 110 (or the equivalent), basic understanding of neurophysiology and concepts and mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides and heavy metals. Experiments with rats may be performed. Techniques and techniques for study of neurotoxicology. (Same course as Environmental Toxicology 234.)

242. Physiological Rhythmology (1) I. Winget Lecture—1 hour. General aspects and characteristics of biological rhythms; rhythms and their rhythmic de-synchronization in areas of pharmacology and space medicine, tele-metry; mathematical methodologies; chronometry, tidal, lunar, and annual periodic, periodic desynchronization. Offered in odd-numbered years.
Plant Pathology

(College of Agricultural and Environmental Sciences)

James E. DeVay, Ph.D., Chairperson of the Department

Department Office, 354 Hutchison Hall
(752-0301)

NOTE: For key to footnote symbols, see page 128.

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Plant Physiology

See Botany for undergraduate majors, and below for graduate study.

Plant Physiology (A Graduate Group)
Victor V. Rendig, Ph.D., Chairperson of the Group
Group Office, 152 Robbins Hall (752-7094)

Faculty
Includes 89 faculty members from eleven departments in two colleges.

Graduate Study. The Graduate Group in Plant Physiology offers programs leading to the M.S. degree with two options, I (Thesis) or II (Comprehensive Examination), and the Ph.D. degree.

Preparatory Work. A level of scholastic development equivalent to a baccalaureate degree in Biological Sciences is required. This includes coursework in general botany, chemistry, physics, mathematics through calculus, including statistics, anatomy (or morphology), biochemistry, genetics, and introductory plant physiology. Limited deficiencies in these areas can be made up after admission to the graduate program.

Units required for the M.S. degree are described in the Announcement of the Graduate Division. Minimum additional required coursework includes two quarters of advanced plant physiology.

General requirements for the Ph.D. degree include graduate-level advanced plant physiology, biochemistry/experimental design/quantitative skills, and physical chemistry. A minimum number of units of seminar and laboratory experience is specified. The subject matter of the required Qualifying Examination includes, in addition to plant physiology, such areas as general botany, plant anatomy and morphology, and plant biochemistry, emphasizing their pertinence to the student's area of specialization. A thesis prepared under the supervision of any faculty member of the Group must be submitted, and the findings must be presented as a seminar.

Graduate Advisers. Adviser information is available from the Group Office or V.V. Rendig (Land, Air and Water Resources).

Related Courses. See course listings for Agronomy, Biochemistry and Biophysics, Botany, Environmental Horticulture, Environmental Toxicology, Food Science and Technology, Land, Air and Water Resources (Atmospheric Science, Resource Sciences, Soil Science, Water Science), Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

Courses in Plant Physiology

Graduate Courses

206. Plant Hormones and Regulators (3) I, Labavitch
Lecture—3 hours. Prerequisite: Botany 111B; familiarity with elementary biochemistry recommended. Focus on the chemistry, biochemistry, and physiological activity of major classes of natural plant growth regulators. Primary consider-

tation given to concepts that are of current research interest. Uses of growth regulators in agriculture are discussed.

206. Faculty Seminar (1) I, Rendig
Seminar—2 hours. Seminars presented by members of Plant Physiology faculty, describing their areas of research. (SU grading only.)

206. Group Study (1-10) I, II, III. The Staff (Rendig in charge)
Prerequisite: graduate standing. Organized group study and discussion of topics relevant to the professional field of Plant Physiology. (SU grading only.)

206. Research (1-12) I, II, III. The Staff (Rendig in charge)
Prerequisite: graduate standing. (SU grading only.)

Plant Protection and Pest Management (A Graduate Group)

David E. Bayer, Ph.D., Chairperson of the Group
Group Office, 367 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. G. Bacon (Entomology).

Courses in Plant Protection and Pest Management

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (3) II. Salt (Plant Physiology)
Lecture—2 hours; discussion—1 hour. 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, the role of pests in these systems, plant protection and pest management methods as modifiers of the systems and their components.

202A-202B. Discovery of Plant Pest Problems and the Control of Causing Agents (3-3-3) I, Norris (Botany); II, Nyland (Plant Pathology), III, Bacon (Entomology)
Fieldwork—5 hours. Prerequisite Entomology 110 or 112, Plant Pathology 120, Botany 120, Nematology 100 (Botany or Nematology may be taken concurrently). Diagnosis of problems and assessment of losses caused by insects, pathogen, 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.

206. Seminar (1-2) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

206. Group Study (1-10) I, II, III. The Staff (Chairperson in charge)

206. Research (1-12) 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 electing the general Plant Science option.

The Master Adviser serves as adviser for all students who are to be the major. Following commitment to one option, the student is assigned to an adviser associated with the department offering expertise in that area.

Upon graduation, students may qualify for a career in their area of specialization or for advanced study leading to the M.S. or Ph.D. degrees. Each of the (UCD) Departments of Agronomy, Plant Pathology, and Vegetable Crops offer an M.S. degree in their respective fields, while the M.S. degree in Horticulture is available through the Departments of Environmental Horticulture, Pomology, and Viticulture and Enology.

Occupational opportunities exist in nursery and green house management, farming, technical and sales positions in agricultural business and associated enterprises, such as banking and equipment and supply companies, as well as in private, state and federal service in consulting and research.

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.

| Units | Common Core Courses | English (1, 2, 20 or 103) | Rhetoric (3, 3, 3) | Economics (Economics 1A or 1B) | Physics (Physics 1A, 1B) | Statistics (Agricultural Science and Management 150) | General chemistry (Chemistry 1A, 1B, 1C) | Organic chemistry (Chemistry 8A, 8B) | Biology (Biological Sciences 1, 2) | Botany (Botany 20) | Plant science (Botany 120) | Entomology (Entomology 110 or 112) | Plant pathology (Plant Pathology 120) | Plant physiology (Botany 111A, 111B) | Genetics (Genetics 120 or 100A-100B) | Plant nutrition (Plant Science 135) | Agriculture (Plant Science 104 or 110A) | Depth Subject Matter |
|-------|---------------------|--------------------------|-------------------|-------------------------|------------------------|--------------------------------|-----------------------------|-----------------------------|--------------------------------|------------------|--------------------------|-------------------------|-------------------|------------------------|--------------------------------|------------------------|-------------------------|---------------------------|-------------------------|
| 45    |                       | 20-21                    | 100                | 100                      | 100                    | 100                           | 100                          | 100                          | 100                           | 100              | 100                      | 100                     | 100                | 100                    | 100                           | 100                     | 100                      | 100                        | 100                     |
Additional courses to be selected with consent of the adviser from the following. 

Agricultural Economics 210, 193, 140, 150; Agricultural Engineering Technology 210, 203, 104, 105; Agricultural Practice 210, 204, 140; Animal Science 2, 114, 116; Atmospheric Science 105; Botany 100, 110; Plant Pathology 103; Plant Science 102, 105, 113, Soil Science 102, 120, 122, 150; Water Science 103, 110B, 172.

Courses offered in other production departments (Agricultural Crops, Pomology, Viticulture and Enology, etc.) or in Range Science may be selected with consent of adviser to satisfy specific individual goals.

Natural sciences electives, not to exceed 8 units, may also be included.

Froliculture/Nursery Management Option

Specific course requirements. 

Environment Horticulture 6, 105, 120, 125, 126, 133, 155. 

Additional courses to be selected with consent of the adviser from the following. 

Agricultural Economics 18, 112, 113, 114; Agricultural Engineering Technology 114; Agronomy 100; Bacteriology 3; Botany 105, 111L; Economics 111, 116; Environmental Horticulture 107, 115, 130A, 130B, 155; Geography 3; Landscape Architecture 401; Plant Pathology 125; Plant Science 101, 112, 112L, 113; Pomology 102; Psychology 144; Soil Science 102; Vegetable Crops 101; Viticulture and Enology 116A.

Courses offered in the natural sciences may be selected in consultation with adviser.

Landscape Horticulture Option

Specific course requirements. 

Additional courses to be selected with consent of the adviser from the following. 

Agricultural Economics 18, 112, 114; Agronomy 100; Botany 105; Economics 111-114; Horticulture 107, 115, 125, 126; Environmental Planning and Management 144; Geography 3; Landscape Architecture 100; Plant Pathology 125; Plant Science 101, 109, 113; Pomology 101; Soil Science 102, 102L, 110; Vegetable Crops 101; Wildlife and Fisheries Biology 10.

Courses offered in the natural sciences may be selected in consultation with adviser.

Plant Pathology Option

Specific course requirements. 

Bacteriology 3. 

Additional courses to be selected with consent of the adviser from the following. 

Agricultural Economics 13, 114, 116; Agronomy 100; Botany 105; Economics 111-114; Horticulture 107, 115, 125, 126; Environmental Planning and Management 144; Geography 3; Landscape Architecture 100; Plant Pathology 125; Plant Science 101, 109, 113; Pomology 101; Soil Science 102, 102L, 110; Vegetable Crops 101; Wildlife and Fisheries Biology 10.

Courses offered in the natural sciences may be selected in consultation with adviser.

Additional courses to be selected with consent of the adviser from the following. 

2. Production of Cultivated Plants (4) (3, 3, Howard (Vegetable Crops), Linder (Viticulture and Enology)) 

Lecture—1 hour; laboratory—2 hours; V AeS—2 hours. Principles of plant production, improvement, propagation, harvesting, processing, and marketing will be presented by the Video-Audio-Self-Tutor method with students making use of the learning facilities at their own convenience.

10. Plants and Man (3) (3). The Staff 

Lecture—3 hours. Principles of fundamental anatomy, chemistry, and physiology of plants and their relationship to the environment.

12. Plant Science Internship (1-6) (2, 2, summer. The Staff (Department Chairperson in charge) 

Laboratory—3 to 6 hours. Consent of instructor. Work experience offered or on campus in all subject areas pertaining to plant science. Internships supervised by a member of the faculty. (PNN grading only)

NOTE: For key to footnote symbols, see page 128.

98. Directed Group Study (1-5) (1, 2, 3, III, The Staff (Department Chairperson in charge) 

Group study under selected instructors. Reserved to lower division students. (PNN grading only).

Upper Division Courses


Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 and Soil Science 106, or consent of instructor. The consequences of the processes governing the structure and behavior of managed ecosystems. Emphasis on mechanistic and systems views of the physical environment, crop productivity, competition, adaptation, nutrient cycling, energy relations and contemporary issues such as climate change.

122. Physiology of Cultivated Plants (4) (I). Bach (Environmental Horticulture), Martin (Plant Pathology) 

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. The plant as a dynamic unit; physiological processes in the vegetative growth, flowering, and fruiting of cultivated plants.

103. Evolution of Crop Plants (3) (I, Jain (Agronomy and Range Science) 

Lecture—2 hours; discussion—1 hour (a few sessions will be used for laboratory work on plant materials). Prerequisite: course 1; introduction to genetics (e.g., Genetics 100B). Diversity and domestication of economic plants; principles of plant evolution; centers of origin, genetic diversity and germ plasm collections; implications in new agricultural developments.

107L. Plant Cell, Tissue, and Organ Culture (5) (III). Kuniyuki (Pomology), Hackett (Environmental Horticulture) 

Lecture—2 hours and laboratory—6 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 one-week methodology section will be conducted before Spring Quarter, but can extend into the first week of instruction. Application of methodology will extend throughout the quarter with weekly seminars and individual research projects.

109. Plant Propagation (4) (II, Kester (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) (I, Kader (Pomology), Reid (Environmental Horticulture), (Vegetable Crops) 

Lecture—3 hours. Prerequisite: Botany 111B or consent of instructor; course 112L (recommended to be taken concurrently). Physiological processes involved in the maturation and senescence of fruits and vegetables, fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres.

112L. Postharvest Physiology and Handling Laboratory (2) (I, Kader (Pomology), Reid (Environmental Horticulture), (Vegetable Crops) 

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

113. Plant Breeding (4) (II, Orton (Vegetable Crops)) 

Lecture—3 hours; demonstration-discussion—2-3 hours. Prerequisite: Genetics 100B or 120 or enrollment in both concurrently. The principles of plant breeding applied to economic crops.

*121A-121B-121C. Applied Crop Physiology (3-3-3) (II-II-II). Bloom and Hewitt (Vegetable Crops) 

Lecture—1 hour; laboratory—6 hours. Prerequisite: basic knowledge of plant biology, chemistry, and physiology. Course and consent of instructor, elementary plant physiology advisable, and courses 101, 103 recommended (may be taken concurrently). Introduction to processes involved in plant physiology with examples drawn primarily from agronomic and vegetable crops. Field and laboratory projects, data reduction and preparation of suitable reports. Limb, root, leaf formation.

122. Physiological Genetics of Crop Plants (3) (II, Jones (Vegetable Crops) 

Lecture—3 hours. Prerequisite: Genetics 100A or 120; Botany 111A, 111B; or consent of instructor. Principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels: genetic control, biochemical regulation and the impact of the environment on development of plants.
126. Physiology of Environmental Stresses in Plants (3) II. Lauchli (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.

130. Plant Growth Kinetics (4) III. Silk (Land, Air and Water Resources) Lecture—2 hours, laboratory—4 hours. Prerequisite: Botany 2, Mathematics 16A, 16B. Botany 100 recommended. Topics include: growth curves, developmental indices, growth of plant units, leaf expansion, phytotomy, and growth of the apex. In laboratory, students plant seeds and use methods described in lecture to analyze quantitative aspects of plant development.

135. Mineral Nutrition of Plants (4) III. Epstein (Land, Air and Water Resources, Botany) Lecture—3 hours, laboratory—2 hours. Prerequisite: Botany 111A or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. (Same course as Botany 135.)

192. Internship (1-12) II, III, summer. The Staff (Department Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 unit minutes toward graduate work; instructor work experience as intern on campus in all subject areas pertaining to Plant Science. Internship supervised by a member of the faculty. (P/NP grading only.)

196. Postharvest Technology of Horticultural Crops (3) III, extra-session summer. Kader (Pomology) in charge Lecture—3 hours, discussion—5 days; field trip—5 days. An intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. (P/NP grading only.)

197. Tutoring in Plant Science (1-4) I, II, III. The Staff Prerequisite: upper division standing; completion of course being tutored is equivalent. Leading discussion sections, conducting laboratory exercises or proctoring in personalized-system-of-instruction-formal classes under faculty supervision, as required once for credit if different course is tutored. (P/NP grading only.)

198. Directed Group Study (1-5) II, III, IV. The Staff (Department Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

202. Advanced Physiology of Cultivated Plants (3) III, Sachs (Entomology, Horticulture, Labovitz (Pomology) Lecture—1 hour; discussion—1 hour; term paper. Prerequisite: courses 101 and 102, Botany 111A-111B. Selected physiological topics affecting crop production and quality. (P/NP grading only.) Offered in even-numbered years.

210. Advanced Topics in Mineral Nutrition (4) III. Lauchli (Land, Air, and Water Resources) Lecture—3 hours; discussion—1 hour. Prerequisite course 116 or consent of instructor. Cellular compartmentation of mineral elements, new methods and results: selected topics in absorption, translocation, metabolism and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments.

221A-221B-221C. Crop Physiology (3-3-3) II, III. Bloom and Hewitt (Vegatable Crops) Lecture—1 hour; laboratory—6 hours. Prerequisite: basic knowledge of botany, chemistry, and horticulture and consent of instructor. Elementary plant physiology and courses 101, 102 recommended (may be taken concurrently). Introduction to research in applied plant physiology. Material is equally important from agronomic and vegetable crops. Field and laboratory projects, data reduction, and presentation of suitable reports. Limited enrollment.

221A. Seminar in Postharvest Biology (1) I, II, III. The Staff (Romaine) in charge Lecture—1 hour; discussion—1 hour. Prerequisite: consent of the instructor; open to advanced undergraduates. Intensive study of selected topics in the Postharvest Biology of fruits, vegetables and ornamentals. (SU grading only.)

226. Group Study (1-5) I, II, III. The Staff To be arranged.

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### Political Science

(Registrar of Letters and Science)

Randolph M. Silverton, Ph.D., Chairperson of the Department

Department Office, 227 Voorhis Hall (752-0966)

#### Faculty

- Lawrence Berman, Ph.D., Associate Professor Edmond Costantini, Ph.D., Professor
- William K. Domke, Ph.D., Assistant Professor
- George W. Downs, Jr., Ph.D., Associate Professor (Political Science, Administration)
- Philip L. Dubois, Ph.D., Assistant Professor Richard W. Gable, Ph.D., Professor
- Alexander J. Groth, Ph.D., Professor
- Charles E. Hardin, Ph.D., Professor Emeritus
- Stuart L. Hill, N.A., Acting Assistant Professor
- Clyde E. Jacobs, Ph.D., Professor
- Joyce K. Kalgren, Ph.D., Associate Professor
- Dale Rogers Marshall, Ph.D., Professor
- Lloyd D. Musil, Ph.D., Professor
- John R. Owens, Ph.D., Professor
- Larry L. Peterson, Ph.D., Associate Professor
- Donald S. Rohich, Ph.D., Professor
- Randolph M. Silverton, Ph.D., Professor
- Advin D. Sokolow, Ph.D., Professor
- Larry L. Wade, Ph.D., Professor
- Geoffrey A. Wadsworth-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 change and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

The Department of Political Science offers two major programs: Political Science and Political Science—Public Service. Both provide students with preparation for subsequent careers as well as with a better understanding of politics in general and of the political systems in which they live.

The major in Political Science aims to provide a broad exposure to political concepts and values, institutional politics, and political processes. It offers excellent preparation and background for later careers in government, politics, law, journalism, business, urban planning, administration and teaching.

The Political Science—Public Service major is designed for students who have a specific interest in a career or other activities in or around government. This undergraduate program can also serve as preparation for enrollment in graduate and professional schools. The major combines regular coursework in political science and related fields with two quarters of public affairs internship for which academic credit is granted. It differs from the regular Political Science major in having the internship as a requirement and in emphasizing upper division coursework in functional and substantive policy areas of American Government. The functional areas are policy formulation, implementation, and interpretation and the substantive policy areas are national, environmental, or others designed by the student and faculty counselors. Courses taken in other departments, for example, Economics, Environmental Studies, Environmental Planning and Management, may also be used to satisfy the major.

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### Political Science

#### A.B. Major Requirements:

- **Preparatory Subject Matter**
  - **UNITS**
  - Course may be taken only if course 5 or 101 is taken.

#### Depth Subject Matter

- **UNITS**
  - Select two courses in each of three fields, listed below.
  - Fields must be chosen from at least two groups: A, B, or C.

  - **Group A**
    - Political theory: Political Science 110-119
    - Political science: Political Science 110-119
    - Political science: Political Science 110-119
    - Political science: Political Science 110-119
    - Public law: Political Science 110-119
    - Public law: Political Science 110-119
    - Public administration: Political Science 110-119
    - Public administration: Political Science 110-119
    - International relations: Political Science 120-139
    - Additional upper division units in political science to achieve a total of 36
    - 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:

- **Preparatory Subject Matter**
  - **UNITS**
  - One course from Political Science 1, 5, 5D or 7
  - Two courses from Political Science 2 or 2D, 3 or 3D, 4 or 4D
  - Recommended: Economics 1A-1B

- **Depth Subject Matter**
  - **UNITS**
  - Core program
    - Two courses chosen from Political Science 100, 102, 104, 106, 113, 160, 161, 163, 181; and one course from Political Science 108, 109, 114.
    - Internship, Political Science 192A, 192B
    - Research paper, Political Science 193
    - Fields of concentration
  - 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

1. **Policy formation:** Political Science 103, 105, 106, 108, 109, 163, 165, 166, 166, 167, 168, 169, 170, 171, 173, 190, Economics 130
2. **Policy implementation and evaluation:** Political Science 156, 160, 182, 183, 186, 187, 188, 189, Economics 131
3. **Policy interpretation—Substance and procedures (public/private law):** Political Science 151, 152, 153, 156, 157A-157B, 158, 159
conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

2D. Seminar in International Relations (4) II. The Staff Seminar—2 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit for course 23. Selected problems in international relations. Individual or team research projects will be required.

4. Basic Concepts in Political Theory (4) [I]. Peterman, Zetterbaum Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 4D. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers.

4D. Seminar in Basic Concepts of Political Theory (4) [II]. Peterman, Zetterbaum Seminar—2 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit for course 4A. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers.

5. Contemporary Problems of the American Political System (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 4D. In-depth treatment of selected problems in American politics: political institutions, and policies.

SD. Seminar in Contemporary Problems of the American Political System (4) II. The Staff Seminar—3 hours; seminar sections or student-faculty conferences—2 hours. Prerequisite: open to lower-division students with consent of instructor; not open to students having credit for course 5. In-depth treatment of selected problems in American politics, political institutions, and policies. Individual or group research projects will be required.

7. The American Legal System (3) II. Jacobs Lecture-discussion—3 hours. Prerequisite: sophomore standing recommended. The law, the courts, the procedures, and the lawyers. The organization and power of American courts. Public and private law as instruments of policies. The role of lawyers in the American legal system. Offered in even-numbered years.

9. Introduction to Contemporary Problems of Asia (4) II. Kaligren Lecture—3 hours; discussion—1 hour. Introduction to modern diplomatic history. Problems and issues of treated as discussed. National liberation and Marxism, as reflected in Asia.

98. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

100. Local Government and Politics (4) II. Slocokow Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing required. Political representatives and government of local communities in the United States, including cities, counties, and special districts. Emphasizes sources and varieties of community conflict, legislative and executive, patterns, expertise, decision making, and the politics of structure. Observation of local governing boards.

101. Urban Political Economy (4) I. Marshall Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Historical development of urban political economies. Focuses on how in which different groups have been able to achieve their objectives and why they succeeded or failed.

102. Urban Public Policy (4) [II]. Marshall Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political and economic relationships among central cities, suburbs, and states, and federal government. Focuses on policy areas such as poverty, transportation, welfare, and housing, and on who governs and who benefits from the policies in these areas.

103. Comparative State Government and Politics (4) II. Slocokow Lecture—3 hours; discussion—1 hour. The comparative study of the governments and politics of American states, including their constitutional frameworks, their participation in the federal system, the dynamics of governmental institutions, and the behavior of political groups.

104. California State and Local Government (4) II. The Staff Lecture-discussion—4 hours. California's constitution, party system, legislature, executive agencies, administration, courts, major public programs and problems, state-local relations, county, city, school and special district government.

105. The Legislative Process (4) I, II. Owens Lecture—3 hours; discussion—1 hour. An analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies.

106. The Presidency (4) I. Bermann Lecture—3 hours; discussion—1 hour. Optional term paper. The American presidency's origins and development; presidential power and influence; recent trends in relations with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and policy making.

107. Environmental Politics and Administration (4) I. Wadesmith Lecture—3 hours; discussion—1 hour. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, the courts in environmental policy formulation and implementation.

108. Policy Making in the Public Sector (4) III. Downs Lecture—3 hours; research paper. The theoretical rationale for major governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improvement in policy making.

109. Public Policy and the Governmental Process (4) I. Wade Lecture—3 hours; research paper. The processes of formulating public policy, including policy making, policy formulation, policy execution, competition, bargaining, coalition formation, and the allocation of public goods, resources and opportunities.

110. Contemporary Political Science (4) II. Downs Lecture-discussion—4 hours. History, nature, and methodology of the discipline; the problems, schools of thought, and trends within the field at present. Offered in even-numbered years.

111. Systematic Political Science (4) II. Downs Lecture-discussion—4 hours. Philosophical basis of modern political science; major systematic approaches relevant to modern political concerns; and research design and execution.

112. Contemporary Democratic Theory (4) II. Zetterbaum Lecture—3 hours, discussion—1 hour. The major contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered in odd-numbered years.

113. American Political Thought (4) I. Peterman Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present.

114. Quantitative Analysis of Political Data (4) II. The Staff Lecture—3 hours; term paper. Logic and methods of analyzing quantitative political data. Topics covered include correlation, probability, regression, and other parametric and non-parametric statistics. Particular emphasis will be placed on the understanding of the use of statistics in policy science research. Offered odd-numbered years.

115. Medieval Political Thought (4) I. Peterman Lecture—3 hours; term paper. Prerequisite: course 114B. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history.

116. Foundations of Political Thought: A Study in Depth of a Major Political Thinker (4) I, II. Peterman, Zetterbaum Lecture-discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

117. Marxism (4) I. Zetterbaum Lecture—3 hours; discussion—1 hour. Examination of the political and social philosophy of Karl Marx, with reference to the revolution of Marxism in the nineteenth and twentieth centuries.

118A. History of Political Theory (4) I. Peterman Lecture—3 hours; term paper. Critical analysis of the works of the major political philosophers. Classical and modern political philosophy—Plato, Aristotle, Cicero, St. Thomas.

118B. History of Political Theory (4) II. Zetterbaum Lecture—3 hours; special assignments. Critical analysis of the major political philosophers—Michaëli, Hobbes, Locke, Rousseau, Burke.

119. Modern Political Thought (4) I. Zetterlund Lecture—3 hours, term paper. Prerequisite: upper division standing or consent of instructor. Study in depth of philosophers considered central to modern political thought, especially nineteenth and twentieth century political thought, from Machiavelli to the contemporary. Theory, systems, and decision-making analysis.

120. Theories of International Politics (4) II. Siverson Lecture—4 hours, discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Major contemporary approaches to the study of international politics, including realism, constructivism, Marxism, neoliberal theory, systems theory, and decision-making analysis.

121. War (4) III. Siverson Lecture—3 hours, discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare.

122. International Law (4) II. Jacobs Lecture—4 hours. Selected topics in international law, treaties, and international organizations. Offered in even-numbered years.

123. The Politics of Interdependence (4) II. Domke Lecture—3 hours, term paper. Prerequisite: upper division standing or consent of instructor. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with different elements of interdependence and its implications on national policies and politics.

124. The Politics of Global Inequality (4) III. Domke Lecture—3 hours, term paper. Prerequisite: upper division standing or consent of instructor. Contemporary global inequality poses many important problems in international political economy, including a theoretical background to North-South issues and analyses of current problems in economic and political relations.

127. Nationalism and Imperialism (4) II. Kaligren Lecture—4 hours. Prerequisite: upper division standing; consent of instructor. Theory of nation building illustrated by Western and non-Western experience. Offered in even-numbered years.

128. International Communism (4) II. Zinner Lecture—4 hours. Prerequisite: upper division standing; consent of instructor. A survey of international communism, from its formation in the 1920s to its dissolution in the 1990s. Offered in even-numbered years.

129. Special Studies in International Politics (4) II, III, III. The Staff Lecture—3 hours, term paper. Prerequisite: upper division standing or consent of instructor. Special topics, e.g., apartheid in South Africa, world order in 1990s and the future of international politics.

130. Recent U.S. Foreign Policy (4) I. Domke Lecture—4 hours, term paper. Prerequisite: upper division standing or consent of instructor. Broad survey of the development of U.S. foreign policy in twentieth century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues.

131. Analysis of U.S. Foreign Policy (4) II. The Staff Lecture—4 hours, term paper. Prerequisite: upper division standing or consent of instructor. Detailed presentation and examination of the formulation of execution of U.S. foreign policy toward a number of critical areas, including security and defense, economic cooperation, and nuclear issues.

132. National Security Policy (4) III. The Staff Lecture—3 hours, term paper. Prerequisite: upper division standing or consent of instructor. Critical examination of the formulation of national security policy since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, arms control, and international law. Prospects of security and stability through arms control.

133. The American Role in East Asia (4) I. Kaligren Lecture—4 hours, term paper. Prerequisite: upper division standing or consent of instructor. Survey of the role of the United States in East Asia. Influence on Asian modernization. An analysis of U.S. government policies toward East Asia, major powers in the region, and the future of the region.

134. Africa and U.S. Foreign Policy (4) I. Rochold Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Overview of American foreign policy toward Africa. Relationship to global adversities. Legacies of colonialism. Challenges of democracy, war, and peace. Policies of nonalignment, producer cartels, multinational corporations, internal integration, and trade and aid relations.

135. Soviet Foreign Policy (4) I. Zinner Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Course on Soviet foreign relations in contemporary and historical perspectives. Emphasis on power and as main springs of policy: foreign policy as an instrument of revolution; the role of diplomacy, economic and nuclear armaments.

137. International Relations in Western Europe (4) III. The Staff Lecture—4 hours. Prerequisite: upper division standing. Analysis of European political economy, Europe’s position in the world, and the role of the European Union. Offered in even-numbered years.

138. International Relations: East Asia (4) III. Kaligren Lecture—4 hours. Prerequisite: upper division standing; consent of instructor. Survey of international relations and diplomatic history of East Asia. Emphasis on twentieth century security problems with examples from China, Japan, Korea, and Southeast Asia.

139. Special Studies in Foreign Policy (4) II, III, III. The Staff Lecture—4 hours, term paper. Prerequisite: upper division standing or consent of instructor. Special topics, e.g., European politics, U.S. foreign policy in the Middle East, U.S. foreign policy in Africa.

140. Comparative Public Policy (4) I. Groth Lecture—3 hours, discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Comparative analysis of political, administrative, and legal systems of different countries or sub-systems in the U.S. and other nations. Emphasis on the political context of policy implementation and the influence of political culture on policy outcomes.

141. Communist Political Systems (4) III. Zinner Lecture—4 hours. Prerequisite: course 2 or 2D or consent of instructor. Systematic comparative analysis of the origin, structure, and politics of communist political systems, with emphasis on the Soviet Union and the states of Eastern Europe.

142. Revolution and Political Change (4) I. Groth Lecture—3 hours, term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Emphasis on the political, economic, and social aspects of revolution, and the role of revolutionaries and revolution in the formation of political institutions.

143. Latin American Politics (4) II. The Staff Lecture—4 hours. Prerequisite: course 4 or consent of instructor. A survey of major issues in Latin American politics today. Emphasis on the role of political parties, religion, and economic development in Latin American countries.

144. British Government and Politics (4) II. The Staff Lecture—4 hours, term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Political system, party and pressure group politics, political culture, and political stability in the United Kingdom.

145. Government and Politics in Emerging Nations (4) III. Zinner Lecture—4 hours. Prerequisite: course 2 or 2D. Conceptual study of the political systems of emerging nations. Emphasis on the political, economic, and social factors that shape these systems. Offered in odd-numbered years.

146. Government and Politics in East Asia (4) I. Kaligren Lecture—4 hours. Prerequisite: course 4 recommended. An orientation to the political systems of the East Asian countries. Emphasis on the political, economic, and social factors that shape these systems. Offered in odd-numbered years.

147. Politics and Policy in Western Europe (4) III. The Staff Lecture—4 hours. The evolution, politics, and contemporary problems of selected political systems of Western Europe.

148A. Government and Politics in East Asia (4) II. Kaligren Lecture—4 hours. Prerequisite: course 146 recommended. The structure and evolution of political institutions in China, Japan, and Korea since World War II, with emphases upon political modernization, ideology, and nationalism. Some attention to foreign relations.

148. Political Development in East Asia (4) III. Rochold Lecture—3 hours; discussion—1 hour. Prerequisite: course 135 recommended. Analysis of the developmental process in the political system of East Asia. Emphasis on colonial impact, socio-economic environment, strategies of development, party system, and political participation. Cross-disciplinary course. Considered a part of a year-long interdisciplinary sequence of courses on East Asia, including Anthropology 159B and History 119B.

150. Jurisprudence (4) II. The Staff Lecture—4 hours. An introduction to the nature and functions of law. Particular attention will be directed to law as an instrument of social control and the relationship between law and morality. Offered in even-numbered years.

151. Civil Rights and the Constitution (4) I. Dubois Lecture—4 hours, discussion—1 hour. Criminal and political justice in America with emphasis upon such problems as legal representation for the poor, control of law enforcement processes, and problems in imprisonment and rehabilitation.

152. Due Process of Law and the Constitution (4) II. Dubois Lecture—4 hours, discussion—1 hour. Study of the procedural and substantive meaning of the concept of “due process of law” under the U.S. Constitution. Major focus on the protections of the Bill of Rights and the Due Process Clause of the 14th Amendment in the area of criminal procedure.

155. Administrative Law (4) II. Musoff Lecture—4 hours, discussion—1 hour. The political-legal factors in the decision-making processes of administrative legislation, adjudication and discretion; legal coercion as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

157. American Constitutional Law (4) I. Jacobs Lecture—4 hours, discussion—1 hour. Prerequisite: courses 5 or 5D or consent of instructor. Legal history from the Bill of Rights to the present. Judicial review, jurisdiction of the federal courts, interstate and foreign commerce, and taxation.

158. American Constitutional Law (5) II. Jacobs Lecture—5 hours, discussion—1 hour. Prerequisite: consent of instructor. Legal history from the Bill of Rights to the present. Judicial review, jurisdiction of the federal courts, interstate and foreign commerce, and taxation.

159. American Legal Thought and Institutions (4) II. The Staff Lecture—4 hours. Prerequisite: course 4 or consent of instructor. Historical and contemporary trends in the legal thought and institutions: reception of the common law, church-state controversies; the role of judge and jury; federalism and individual rights; the natural law and economic regulation; law and the frontier. Offered in even-numbered years.

169. American Political Parties (4) II. Owens Lecture—4 hours, discussion—1 hour. Prerequisite: consent of instructor. Analytical study of political parties. Political Parties and government. The nature and relationships between political parties especially in Great Britain and France but with some reference to other Western European countries.

168. Elections and Voting Behavior (4) III. Owens Lecture—4 hours, discussion—1 hour. Prerequisite: consent of instructor. Analytical study of political parties. Political Parties and government. The nature and relationships between political parties especially in Great Britain and France but with some reference to other Western European countries.

168. Elections and Voting Behavior (4) III. Owens Lecture—4 hours, discussion—1 hour. Prerequisite: consent of instructor. Analytical study of political parties. Political Parties and government. The nature and relationships between political parties especially in Great Britain and France but with some reference to other Western European countries.

169. American Political Parties (4) II. Owens Lecture—4 hours, discussion—1 hour. Prerequisite: consent of instructor. Political Parties and government. The nature and relationships between political parties especially in Great Britain and France but with some reference to other Western European countries.

176. Group Politics (4) I. Wade Lecture—4 hours, discussion—1 hour. Groups, organizations, and individuals, especially in American political history. Historical and analytical treatment of group theories as applied to
184. Political Socialization (4) II. Costantini
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 164 or consent of instructor.
 The study of the impact of culture, socialization, and family life on political behavior.

185. Mass Media and Politics (4) III. Costantini
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 163 or consent of instructor.
 The study of the role of the mass media in politics, including the impact of the media on public opinion and political behavior.

186. Women in Politics (4) III. The Staff
 Lecture—1 hour per week. Prerequisite: upper division standing in political science.
 The role of women in politics, including their participation in the political process and the factors that influence their political behavior.

187. Political Socialization (4) II. Costantini
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 164 or consent of instructor.
 The study of the impact of culture, socialization, and family life on political behavior.

188. Political Organizations (4) II. Riddell
 Lecture—3 hours; discussion—1 hour. Prerequisite: political science 101.
 The study of political organizations, including political parties, interest groups, and pressure groups.

189. Politics and Personality (4) I. Berman
 Lecture—3 hours; discussion—1 hour. Prerequisite: political science 101 or consent of instructor.
 The study of the relationship between personality and politics, including the role of individual differences in political behavior.

190. Community Power and Change (4) I. The Staff
 Lecture—3 hours; discussion—1 hour. An examination of the relationship between community characteristics and the distribution of political power and policy outputs in the United States.

191. Government and the Economy (4) I. Wade
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of the role of government in the economy, including the fiscal and regulatory policies of government.

192. Politics Through the Novel (4) I
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor.
 An examination of the use of literature in political science, including the portrayal of political leaders and events in political fiction.

193. Race, Ethnicity and Conflict Management (4) II. Roth
 Seminar—2 hours; term paper. Prerequisite: consent of instructor. Compare relations between racial, ethnic, and cultural or religious groups. Group dynamics and conflict resolution are analyzed in comparative perspective.

194. Political institutions in Local Government and Politics (4) II. The Staff
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of the political institutions and processes at the local level, including the structure and functioning of local government agencies.

195. Political Science (4) III. Gable
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of the political science discipline, including the methods and approaches used in the field.

196. Special Studies in Comparative Politics (4) I, II, III. The Staff
 Seminar—4 hours. Prerequisite: consent of instructor and upper division standing.
 The study of selected topics in comparative politics.

197. Comparative Administration (4) II. Gable
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of the administrative processes and structures of governments around the world, including the role of bureaucracy in the political process.

198. The Politics of Money (4) I. Smith
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of the role of money in politics, including the influence of economic factors on political outcomes.

199. The Politics of War and Peace (4) II. Gable
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of the political factors that influence the conduct of international relations and the role of international organizations.

200. International Relations (4) II. Swanson
 Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in political science or consent of instructor.
 The study of international relations, including the role of international organizations and the processes of conflict and cooperation in the international system.

201. Political Science (4) I. Wade
 Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.
Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy.

21. 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.

22. Research in International Relations (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of International relations.

23. 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.

24. 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.

Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

26. Research in Public Administration (4) I, II, III. The Staff
Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

27. Seminar in American Constitutional Law (4) I, II, III. Jacob Seminary—3 hours. Prerequisite: course 1678 or consent of instructor.

28. Seminar in Internships in Political Science (2) I, II, III. The Staff
Seminar—2 hours. Prerequisite: open only to persons who have completed or are in the process of completing a major or minor in political science, with approval of the Department chairman. This course provides supervised work in governmental agencies, political parties, etc., including participants in the State and Local Government Internship Program. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit.

29. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only)

30. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only)

31. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only)

32. The Teaching of Political Science (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (S/U grading only.)

Pomology

(Pomological and Genetics)

Don J. Durzan, Ph.D., Chairperson of the Department
Department Office, 1045 Hickson Hall
(752-0122)

Faculty

James A. Beutel, M.S., Adjunct Lecturer
Muriel V. Bradley, Ph.D., Lecturer Emeritus
Royce S. Bringham, Ph.D., Professor
Dillion S. Bridge, Ph.D., Professor Emeritus
Robert M. Carleton, Ph.D., Lecturer
Peter B. Cattin, Ph.D., Lecturer
Lawrence L. Claypool, Ph.D., Professor Emeritus
Julian C. Crane, Ph.D., Professor Emeritus
Luther D. Davis, Ph.D., Professor Emeritus
Theodore M. DeJong, Ph.D., Lecturer
Don J. Durzan, Ph.D., Professor
William H. Griggs, Ph.D., Professor Emeritus

Paul E. Hansche, Ph.D., Professor (Pomology and Genetics)
Hudson T. Hartmann, Ph.D., Professor Emeritus
Claron O. Hesse, Ph.D., Professor Emeritus
Adel A. Kafadar, M.S., Chairperson
Dale E. Kester, Ph.D., Professor
Andrew H. Kunzluky, Ph.D., Assistant Professor
John M. Labavitch, Ph.D., Associate Professor
Eugene Lilleland, Ph.D., Lecturer
George C. Martin, Ph.D., Lecturer
Warren C. McKe, M.S., Adjunct Lecturer
F. Gordon Mitchell, M.S., Lecturer
Vito S. Pizzit, Ph.D., Associate Professor
E. Louis Prosobling, Ph.D., Professor Emeritus
David E. Ramos, Ph.D., Lecturer
Roger J. Romani, Ph.D., Professor
Kay Ryugo, Ph.D., Professor
H. Noel S. Sommer, Ph.D., Lecturer
Eileen G. Sutter, Ph.D., Assistant Professor
Kyung-Ur J. Sutro, Ph.D., Professor
Steven A. Weinbaum, Ph.D., Lecturer

Related Courses. See Plant Science 109, 112, 112L.

Courses In Pomology

Lower Division Courses

3. Citrus and other Subtropical Fruits (3) II. Bringham Lecture—3 hours (includes 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 as applied to these fruits.

10. Fruit and Nut Crop Production and Utilization (3) I, Martin, Sommers Lecture—2 hours; discussion—1 hour; one all-day Saturday field trip in lieu of discussion last 5 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; protecting from cold, quality, storage, transport and marketing.

12. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—3-12 hours. Prerequisite: consent of instructor. Work-semester experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

Upper Division Courses

101. Tree Growth and Development (4) I. Urio Lecture—4 hours; laboratory—4 hours. Prerequisite: Botany 2 or Plant Science 102 or consent of instructor. Physiology of fruit plant growth and maintenance; species adaptation; responses to environment and cultural modification (pruning, soil and water management, etc.).

102. Principles of Fruit Production (4) II. Ryugo Lecture—4 hours; laboratory—4 hours. Prerequisite: Botany 2 or Plant Science 102. The course covers principles underling cultural practices associated with fruit and nut production, including morphology and physiology of the developing fruit, flowers and fruits. The course emphasis is on commercially important temperate zone species.

107. Small Fruit Production (2) II. Bringham Lecture—2 hours; two field trips arranged at mutual convenience. Prerequisite: Botany 2 or the equivalent. Strawberries (Fragaria), blackberries and raspberries (Rubus), blueberries-cranberries (Vaccinium), and currants-gooseberries (Ribes) as important nutritional resources; their origin, production and utilization with an emphasis on recent progress in integrated management. Offered in even-numbered years.

174A-178B; 170C. Applied Pomology (2-2-2) I-III. Kester, Mitchell, Ramos, and Urio in charge Lecture—seven 2-hour sessions; two all-day field trips. Prerequisite: introductory course in pomology or consent of instructor. Overview of the production and handling of major pomological crops including a clinical study of important cultural and harvesting activities and problems associated with commercial fruit growing.
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 64 quarter units of credit must be completed with a grade-point average of 2.0 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 Muddford Hall, Berkeley 94720. See also page 106.

Preforestry Adviser. C.C. Delwiche (Land, Air and Water Resources).

### Psychiatry

**See Medicine**

### Psychology

**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. Acredolo, Ph.D., Associate Professor

Junius R. Bastian, Ph.D., Associate Professor

Lori M. Chalupa, Ph.D., Associate Professor

Richard G. Cos, Ph.D., Associate Professor

Wayne F. Dukes, Ph.D., Professor Emeritus

Alan C. Elms, Ph.D., Professor

Ronald A. Finke, Ph.D., Assistant 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

Robert M. Murphy, Ph.D., Professor

Thomas Natsoulas, Ph.D., Professor

Donald H. Owings, Ph.D., Associate Professor

Karen E. Paige, Ph.D., Associate Professor

Theodore E. Parks, Ph.D., Associate Professor

Stephanie A. Shields, Ph.D., Assistant Professor

Dean K. Simonot, 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 UC assembly program has several objectives: It presents an introduction to the study of individual and group behavior; it provides a liberal arts major for students looking for employment in business, government, personnel work, or other fields directly after obtaining their bachelor's degree; and it prepares students for graduate study in various areas of psychology, leading to teaching, research, and applied work. (Counseling and other careers in psychology require graduate-level training.)

The Psychology program at UC Davis is extremely broad and represents a wide variety of interests. The courses are organized around three focal points: Personality/Social emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. Psychobiology emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. 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 what we are.

The Psychology program offers both the Bachelor of Arts degree for students 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:

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Units</th>
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<td>17-21</td>
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Psychology 1

Psychology 41, Statistics 13, or 102

Biological Sciences 1, or a combination of Biological Sciences 10 and one course from Anthropology 1, Physiology 10, Genetics 10

One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units

Recommended: both Statistics 13 and Psychology 41

**Depth Subject Matter**

<table>
<thead>
<tr>
<th>Units</th>
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Two courses from two of the following three groups, and one course from the remaining group

Group A: Psychology 130, 131, 133

Group B: Psychology 136, 139, 134

Group C: Psychology 112, 145, 147, 148

Additional units to achieve a total of 40 upper division units in psychology

<table>
<thead>
<tr>
<th>Units</th>
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<td>16-19</td>
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**Total Units for the Major**

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### Psychology

B.S. Major Requirements:

**Biological Emphasis**

**Preparatory Subject Matter**

<table>
<thead>
<tr>
<th>Units</th>
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<tr>
<td>47-53</td>
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</tbody>
</table>

Psychology 1

Statistics 13 or 102

Mathematics 16A, 16B, or 11 (or high school equivalent), 21A, 21B

Physics 10

Biological Sciences 1, Physiology 2, Zoology 2, 2L

Chemistry 1A, 1B

One course in sociology or cultural anthropology (may be lower or upper division), minimum of 4 units

**Depth Subject Matter**

<table>
<thead>
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<th>Units</th>
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<td>47-50</td>
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Seven Psychology courses distributed as specified

Group A: two courses from 130, 131, 132, 133

<table>
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<tr>
<th>Units</th>
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<tr>
<td>8-9</td>
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**Total Units for the Major**

<table>
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<tr>
<th>Units</th>
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<td>125</td>
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Portuguese

See Spanish

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**Preforestry**

(College of Agricultural and Environmental Sciences)

Preforestry students who intend to major in either General Forestry or Wood Science and Technology may be admitted to the School of Forestry and Conservation located on the Berkeley campus, for
Psychology

Group B: three courses from 108, 129, 134, 150
Group C: two courses from 112, 145, 147, 150
Additional units to achieve a total of 40 upper division units in psychology 8-9
Genetics 100A-100C or 116 4-6
Zoology 125 or 148 3-4
Total Units for the Major (Biology Emphasis) 101

Recommended
Psychology 41, 54, 180B, 180K, and 199 (on a psychological topic); Zoology 105, 106, Anthropology 154, Environmental Studies 110.

Mathematics Emphasis

Preparatory Subject Matter

<table>
<thead>
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<th>Subject</th>
<th>Units</th>
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<tbody>
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<tr>
<td>Statistics 13 or 102</td>
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<tr>
<td>Mathematics 11 (or high school equivalent)</td>
<td>3-4</td>
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<tr>
<td>Mathematics 21A, 21B, 21C, 29A</td>
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<tr>
<td>Chemistry 10</td>
<td>4</td>
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<tr>
<td>Physics 10</td>
<td>4</td>
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One course in biological anthropology (may be lower or upper division), minimum of 4 units.
Recommended: Psychology 141.

Depth Subject Matter

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>Psychology 42</td>
<td>47-49</td>
</tr>
</tbody>
</table>

Five Psychology courses, distributed as specified.

Group A: two courses from 130, 131, 132, 135 | 8-9 |
Group B: two courses from 108, 129, 134, 150 | 10 |
Group C: one course from 112, 145, 147, 168 | 4 |
Psychology 103 | 5 |
One course from Psychology 105, 206, 207 | 4 |
Additional units to achieve a total of 40 upper division units in psychology | 9-9 |
One course sequence from Statistics 106-108, 130A-130B, 131A-131B | 7-8 |
Total Units for the Major (Mathematics Emphasis) 94

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

Graduate Adviser. See Class Schedule and Room Directory.

Courses in Psychology

Lower Division Courses

1. General Psychology (4) I, II, III. The Staff Lecture-4 hours. A general introduction emphasizing empirical approaches with particular focus on the area of perception and cognition, personality and social psychology, and biological aspects of behavior. Not a prerequisite for Psychology 15.

2. Introductory Psychology (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 relevance of biological and biosocial mechanisms to an understanding of people and their interaction with their environment will be emphasized.

3. 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.


5. 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/NP grading only.)

6. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)

By prior arrangement with individual instructor. (P/NP grading only.)

Upper Division Courses

7. Advanced Quantitative Description of Behavior (5) I, Kroll, Johnson Lecture-5 hours. Prerequisite: Statistics 13 or 102 or course 130. Five hours of laboratory-to-base principle course in college psychology, or consent of instructor. Prerequisites: college 13 or 112 or consent of instructor. Principles of sensation and perception, of learning and memory, of personality and social psychology. (P/NP grading only.)

8. Psychological Statistics (5) I, II, III. Chalupa, Henry Lecture-4 hours; laboratory-2 hours. Prerequisite: college 150. One hour in a laboratory in psychology courses I or II; consent of instructor. Relationship of brain and function to emotion, motivation, perceptions, consciousness, language, learning, and memory in humans and other animals; introduction to methods of psychological physiology.


11. Maturity and Aging (4) I, Lyons Lecture-4 hours. Prerequisite: course 112. Biological, cognitive, and social aspects of aging. The human life span between early maturity and death, in its theoretical, methodological, and empirical aspects.

12. History of Psychology (4) I, Kroll, Murphy, Leis Lecture-3 hours. Prerequisite: course 1; upper division standing or consent of instructor. A survey of the development of psychological thought and research.

13. Sensory Processes (5) I, II, Henry Lecture-4 hours. Prerequisite: course 15 or 112. One hour in psychology courses I or II; consent of instructor. Study of sensory systems in man and other animals. Relations of behavior to physical, physiological, and psychological functions.

13. Human Learning and Memory (4) I, II, III. Kroll, Parks Lecture-3 hours. Discussion—1 hour. Prerequisite: course 1 and either Statistics 13 or 102 or course 41; consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.

131. Perception (4) I, II, III. Natsoulas, Bastian, Finke, Parks Lecture-4 hours. 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, III. Bastian Lecture-5 hours. Prerequisite: course 1, and 6 units of upper division work in psychology or linguistics. Psychological, biological, and individual perspectives of linguistic actions: their production, perception, cognitive significance, and their roles in human conduct, enculturation, and cognitive development.

133. Animal Learning and Motivation (5) II. Cos Park Lecture-5 hours. Prerequisite: course 1 or 15 or consent of instructor. General theories of phyletic differences in learning and motivation drawing upon laboratory and field observations. Innate physiological mechanisms, developmental changes, effects of conditioning and other constraints on these processes are examined.

134. Psychology of Consciousness (4) I, II. Natsoulas Lecture-4 hours. Prerequisite: course 1. Consideration of major theories of consciousness, with critical examination of relevant experimental data.

135. Cognitive Psychology (4) II. Finke Lecture-3 hours; term paper. Prerequisite: course 1. Introduction to human information processing, mental representation and transformation, attention, concept formation, problem solving, and computer simulation.

137. Altered States of Consciousness (4) I, III. Tart Lecture-4 hours. Prerequisite: course 1. Characteristics, uses, and abuses of altered consciousness from experiential, behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, meditation, hypnosis, marijuana intoxication, psychedelic drugs and mystical experiences.


144. Environmental Awareness (4) I, II, III, Sommer, Cos Park Lecture-4 hours. Prerequisite: course 1. Interactions of people with built environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology.

145. Social Psychology (4) I, II, III. Simonton, Johnson Lecture-4 hours. Prerequisite: course 1. The behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm enforcement, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, III. The Staff Lecture-4 hours. Prerequisite: course 1. The theories of Freud, Erikson, and other major twentieth-century approaches to personality.

148. Psychology of Sex Differences (4) I, II. Paige, Mitchell Lecture-4 hours. Prerequisite: upper division standing and enrollment in one of the courses 108, 145 or 147. Extensive review of theory and research related to 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) I, II, III. Mason, Owings, Miller Lecture-4 hours; discussion or project—1 hour. Prerequisite: courses 1 or 15 or consent of instructor. Perspectives in animal behavior: physiological, ethological, and social systems, with an emphasis on functional behavioral categories from the standpoint of adaptation and evolution.

154. Primate Psychology (5) I. Mitchell Lecture-4 hours. Prerequisite: course 15 or 150 or an equivalent course in biological sciences; consent of instructor. Comparative study of primate psychology, based primarily on laboratory evidence. Learning, communication, cognition, sensation, motivation, emotion, perception, and effects of early experience in many species of primates.
Graduate Courses

200. Current Research Topics in Psychology (1) I. The Staff Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (SU grading only.)

201. Research Preceptorship (4) I, II, III. The Staff Laboratory-clinical—6 to 8 hours. Prerequisite: consent of instructor. (SU grading only.)

202. Advanced Statistical Inference from Psychological Experiments (5) II. The Staff Lecture—5 hours; project and term paper. Prerequisite: graduate student standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and hypothesis testing. A term paper will be required which develops a research proposal with a detailed discussion of the statistical techniques to be employed.

203. Statistical Analysis of Psychological Experiments (4) III. Firke Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of variance and covariance, factor and repeated measures, Latin square designs, and tests of trends.

204. Multivariate Analysis of Psychological Data (4) III. Simonton Lecture—4 hours. Prerequisite: course 105 or 205 or consent of instructor. The application of multiple regression, factor analysis and related correlational techniques to non-experimental, quasi-experimental and experimental data. Techniques implemented using computer multivariate statistical packages.

205. Physiological Psychology (4) III. The Staff Seminar—4 hours. Prerequisite: graduate standing in psychology and consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

206. Developmental Psychology (4) II. A. C. Reed, Shields Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A course-seminar on selected topics in the history of psychology and neurodevelopment and its implications on the early history of psychology and research to contemporary investigations.

208. Sensory Processes (4) III. Calaprice, Henry, Owings Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A lecture-seminar on selected topics in the history of psychology and on the biological correlates of sensory processes.

230. Learning (4) I. Parks, Kroll Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A course-seminar on selected topics in the history of psychology and on the biological correlates of sensory processes.

231. Perception (4) I. Natsoulas Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of perception in experience and its effects on behavior.

245. Social Psychology (4) III. Johnson Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

247. Personality (4) I. Paige Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

250. Comparative Psychology (4) I. Mason Seminar—4 hours. Prerequisite: consent of instructor. A course-seminar on selected topics in the history of psychology and on the biological correlates of sensory processes.

251. Genetic Correlates of Behavior (4) II. Murphree Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A course-seminar on selected topics in the history of psychology and on the biological correlates of sensory processes.

252. Seminar in Psychobiology (4) II. Chalmers, Owings Seminar—4 hours.

253A-253B-253C. Topics in Cognitive Psychology (4) I, II, III. The Staff Seminar—4 hours. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes.

Radiological Sciences

254. Psycholinguistics (4) III. Basistn Seminar—4 hours.

255. Psychology of Consciousness (4) I. Natsoulas Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Theory and research in the psychology of consciousness.

272. Experimental Study of Personality (4) II. Seminar—4 hours.

273. Environment and Behavior (4) III. Semnotes—4 hours. The social psychology of the environment. Research into the use of space and its design implications.

275. Attitude Formation and Change (4) III. Elm Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Development of attitudes; theories of attitude change; relationships between attitudes and behavior.

290. Seminar (4) I, II. The Staff Seminar—4 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter may vary depending on interests of instructor and students.

298. Group Study (1-5) I, II, III. The Staff Seminar—4 hours. (SU grading only.)

299. Research (2-9) I, II, III. The Staff Seminar—4 hours. (SU grading only.)

300. Dissertation Research (1-9) I, II, III. The Staff Prerequisite: consent of instructor. (SU grading only.)

Professional Course

300A-300B-300C. The Teaching of Psychology (4-2-4) I-II-III. The Staff Seminar—4-2-4 hours. Prerequisite: graduate standing in psychology and consent of instructor. Practical experience in teaching methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (Deferred grading only, pending completion of sequence.)
Courses in Radiological Sciences

Professional Course
413. Nuclear Medicine (2) III. Honors and staff
Lecture—2 hours. Prerequisite: A D.V.M. 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 third year.

Radiotherapy

See Medicine

Range and Wildlands Science

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, ranch managers, or ranchers. They may also qualify for the position of Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired it is recommended that training or apprenticeship experience with that agency be included 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.

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, 16)</td>
<td>6</td>
</tr>
<tr>
<td>Physics (Physics 1A, 1B)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (Agricultural Science and Management 150; either Mathematics 15-16A or 16A-16B recommended)</td>
<td>4-10</td>
</tr>
<tr>
<td>Computer science (Mathematics 19, or Engineering 5)</td>
<td>3</td>
</tr>
<tr>
<td>Economics (Agricultural Economics 1, Economics 1A, or 1B)</td>
<td>4-5</td>
</tr>
<tr>
<td>Geology (Geology 1-1L, Geology 2, 3L, recommended)</td>
<td>4-8</td>
</tr>
<tr>
<td>Soil science (Soil Science 100)</td>
<td>4</td>
</tr>
<tr>
<td>Animal science (Animal Science 2)</td>
<td>3</td>
</tr>
</tbody>
</table>

Range Science

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 Master’s degree in Range Management. Detailed information can be obtained from the graduate adviser and the Graduate Division.

Graduate Adviser. W.A. Williams (Agronomy and Range Science).

Related Courses. See Agronomy 112, 112L, 112L; Nutrition 103, Resource Sciences 100, Soil Science 105, 120, 121, Wildlife and Fisheries Biology 151.

1 Units earned in satisfactory of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.
Courses in Range Science
Questions pertaining to the following courses should be directed to the instructor or to the Teaching Services, 258 Hunt Hall.

Lower Division Courses
1. Principles of Range Management (4) L. Phillips Lecture—3 hours; discussion—1 hour. Basic principles of range management and their applications to the management of wildlands for livestock production, wildlife, water, recreation, and timber.

2. Range Science Internship (1-12) II, III, summer. The Staff (Department Chairperson in charge) Laboratory—32-336 hours. Prerequisite: consent of instructor. Work-learning experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses
100. Range Plants (4) L. Crampton Lecture—2 hours; field trips—6 hours; two Saturday field trips. Prerequisite: Botany 2. Systematic relationships and identification of grasses, legumes, forbs, and shrubs, their distribution, environment requirements, and use.

105. Field Course (2) III, Menke, Crampton Lecture—10 hours total; laboratory—30 hours total. Prerequisite: consent of instructor. Field studies of range conditions in various parts of the state. To be given between winter and spring quarters. Considered a spring course for preenrollment.

133. Grassland Ecology (5) L. Ruggles Lecture—3 hours; field work—1 hour. Prerequisite: A course in plant ecology or consent of instructor. Structure, function, and environment of North American grasslands, with emphasis on the California annual-type. Concepts and problems in measuring primary and secondary productivity. Principles of grassland and management including vegetation and wildlife interactions, soil and water, and population and community dynamics. Offered in odd-numbered years.

134. Comparative Ecology of Major Rangeland Systems (4) II, Menke Lecture—3 hours; one weekend field trip to Nevada; term paper. Prerequisite: course 100 or the equivalent; or consent of instructor. Study of the characteristics and adaptations of plants and animals to their environments in various rangeland types. Offered in even-numbered years.

142. Rangeland Improvements (2) II, Jones, George Lecture—3 hours. Prerequisite: courses 1 and 100. Improvements of rangeland and their environment and their environmental impacts on rangeland communities, including vegetation-type conversion, range animal and grazing management, and interrelationships of reseeding, water supply, and management. (SU grading only.) Offered in odd-numbered years.

150. Principles of Rangeland Vegetation Measurement, Inventory and Evaluation (4) III, Menke Lecture—2 hours; laboratory—3 hours; one weekend field trip. Prerequisite: course 100, Agricultural Science and Management 150, intended for senior and graduate students. Principles and techniques of sampling grassland and shrubland vegetation cover, frequency, density, and height. Methods and procedures for inventorying rangeland vegetation resources. Data analysis and evaluation of vegetation survey results. Emphasis on range site potential, range condition, range trend, and proper utilization. Offered in odd-numbered years.

160. Range Livestock Production (4) II, Morris, Ruggles Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 133, or 134; Nutrition 103, 110, or 122; upper division standing. Application of principles of animal and range science to the extensive production of livestock and related products from range. Emphasis on beef and sheep production systems from perennial and annual range types. (Same course Animal Science 160.)

194. Multiple Use of Rangelands (3) III, The Staff Lecture—3 hours; two optional Saturday field-trips. Prerequisite: course 1 or 104 and upper division standing. Multiple use of rangelands with emphasis on North America.

170. Range Ecosystem Planning (4) III, Menke Lecture—3 hours; laboratory—3 hours; one (weekend) 3-day field trip. Prerequisite: Animal Science 160/Range Science 160 (may be taken concurrently); Mathematics 19 or Engineering 5 recommended. Planned of rangeland management at local and regional levels, including current planning efforts of governmental agencies. Site-specific rangeland planning based on land capabilities, estimated forage production, and "multiple use" requirements. Plans will be developed for a particular range ecosystem using linear programming techniques. Offered in even-numbered years.

192. Range Science Internship (1-12) II, III, summer. The Staff (Department Chairperson in charge) Laboratory—32-336 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learning experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

193. Directed Group Study (1-5) I, III, The Staff (Rugwro in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, III, The Staff (Rugwro in charge) Prerequisite: senior standing and consent of instructor. (P/NP grading only.)

Graduate Courses
202. Computer Modelling in Range Management (3) I, Williams, Menke Lecture—1 hour; discussion—1 hour; computer programming and analysis—2 hours. Prerequisite: Agronomy 200 or the equivalent experience. Workshop on use of computer models including dynamic simulation (CYNOVA and CRAFT), time-series analysis and systems analysis. Offered in odd-numbered years.

206. Seminar in Range Management (1-2) II, Menke, III, Clawson Seminar—1 hour. Topics of current interest in grassland ecology, range and wildlife management, and related modeling and system analysis.

208. Group Study (1-5) I, III, III. The Staff (Wills in charge) Selected topics from current world literature in range science.

209. Research (1-12) I, II, III. The Staff (Williams in charge) Original research involving plant physiology, plant genetics, plant population studies, and soil-plant relationships of range and wildlands. (SU grading only.)

Religious Studies
Religious Studies
(Range Science; Religious Studies)

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), 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 cultural matters such as family life, issues of right and wrong, sexual roles and relations, relations between individuals and society, relations between one society and another, and artificial repressions. 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 good teaching skills in reading critically and analytically, and encourages speculative thought, on such primal questions as the purpose and meaning of human existence. Courses of study of the Religious Studies faculty emphasize close analysis of text and thus 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 religious traditions.

Religious Studies
A.B. Major Requirements:

Preparatory Subject Matter ................................................................... 34-36
History 2, 4A, and 2A or 9A ................................................................. 12
Philosophy 21 or Religious Studies 75 ................................................. 3-4
One course from Art 1B, 1D, or 20, Comparative Literature 1, 6, 15, 53A, 53B ................................................................. 3-4
Religious Studies 4A, 4B, 21, 40 .......................................................... 16

Depth Subject Matter ........................................................................ 45-47
Religious Studies 193 ........................................................................ 5
Additional upper division units of religious studies courses ............... 24-26

Religious Studies (College of Letters and Science)
R. David Friedman, Ph.D., Program Director
Program Office, 912 Sproul Hall (752-1219)

Committee in Charge
Paul A. Castelfranco, Ph.D. (Biology), Committee Chairperson
Richard T. Curley, Ph.D. (Anthropology)
R. David Friedman, Ph.D. (Religious Studies)
Neil W. Gilbert, Ph.D. (Philosophy)
Olto J. Helweg, Ph.D. (Civil Engineering)
Seymour Howard, Ph.D. (Art)
Whalen W. Lai, Ph.D. (Religious Studies)
Edward J. Tully, Jr., Ph.D. (Mathematics)

Faculty
R. David Friedman, Ph.D., Associate Professor
Neil W. Gilbert, Ph.D., Professor (Philosophy)
Whalen W. Lai, Ph.D., Associate Professor
Irene Lawrence, Ph.D., Visiting Lecturer

Religious Studies
(b) historical area, at least 4 units (Religious Studies 102, 124) .......... 4
(c) 4 units each from Jewish studies, Christian studies, Oriental religious, and general religious studies (Religious Studies 100, 110, 122, 189) ................................................................. 16
Philosophy, one course from Philosophy 100, 105, 114A, 114B, 143, 145, 146, 151, 159
Society's approach to study of religion, one course (Anthropology 124, Sociology 146) ................................................................. 4

Total Units for the Major .................................................................. 78-93
Courses and Religious Studies

Courses Equivalent

Religious Studies 110, 111, 112, 124, 146, 167, 172 .... 20
Oriental Religions 20
Religious Studies 70, 168, 172, and two courses from Religious Studies 110, History 191A, 198A .... 20
Judaeism 20
Religious Studies 23, 162, 124 .... 12
Two additional courses from Religious Studies 110, History 143A, 144C .... 20
(Religious Studies 122 and 124 may be repeated for credit in a different subject area, and the second election can replace one of the above three courses.)

Christian Studies 20
Religious Studies 40, 146, and two courses from Religious Studies 110, Philosophy 145, History 130A, 130B, 130C, 151B .... 20

Preministerial Training

Seminarists 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 comprising the Preparatory Subject Matter for the A.B. degree in Religious Studies, with one of the A.B. degree curricula in the humanities and social sciences is an excellent preparation for most seminarists 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 a preministerial adviser.

Preministerial Adviser: P. A. Castelfranco (Botany), O. J. Helweg (Civil Engineering).

Courses in Hebrew

1. Elementary Modern Hebrew (5) I, II, III. The Staff (Chairperson in charge)
   Recitation—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 non-credit 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 PNP petition is filed.)

2. Intermediate Modern Hebrew (4) I, II, III, IV. The Staff (Chairperson in charge)
   Discussion—1 hour; laboratory—8 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 PNP 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 PNP petition is filed.)

3. Intermediate Modern Hebrew (4) I, II, III, IV. The Staff (Chairperson in charge)
   Discussion—1 hour; laboratory—8 hours. Introduction to modern written and spoken Hebrew. (Parallel material of course 2. Individualized instruction by videotape.

4. Intermediate Modern Hebrew (4) I, II, III, IV. The Staff (Chairperson in charge)
   Discussion—1 hour; laboratory—8 hours. Introduction to modern written and spoken Hebrew. (Parallel material of course 3.

5. Intermediate Modern Hebrew (4) I, II, III, IV. The Staff (Chairperson in charge)
   Discussion—1 hour; laboratory—8 hours. Introduction to modern written and spoken Hebrew. (Parallel material of course 4.

Courses in Religious Studies

Lower Division Courses

1. Survey of Religion (3) I, II, III. The Staff (Chairperson in charge)
   Lecture—3 hours. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, heresies, reformation, renaissance, etc.) readings from the Bible, Bhagavad Gita, Koran, and selections from Plato and early Buddhist writings.

2. World Religions (4) I, II. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism and Taoism from their origins to the present.

3. World Religions (4) II, III. The Staff (Chairperson in charge)
   Lecture—3 hours; discussion—1 hour. Western religions including ancient Near Eastern and Mediterranean religions, Judaism, Christianity, Islam, selected aspects of contemporary religious life.

4. 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. An introduction to the problems and methods of religious studies. May be repeated for credit in a different subject area.

5. Religion of the Hebrew Bible (4) I, II. The Staff (Chairperson in charge)
   Lecture-discussion—4 hours. General overview of the traditional laws and customs of Judaism, with an introduction to the history and development of Judaism. Course requires no prior knowledge of Judaism.

6. New Testament (4) I, II. The Staff (Chairperson in charge)
   Lecture—4 hours. Basic beliefs and institutions of Islam. Topics include: Qur'an; Islamic law, theology, and mysticism; relationship to Judaism and Christianity; Islamic sects; position of women; Islam and politics. Offered every other year.

7. Introduction to Buddhism (4) I, II. The Staff (Chairperson in charge)
   Lecture—3 hours; term paper (30 hours minimum preparation). Lectures, readings, and discussions on the development of Buddhism in India, China, and Japan; its influence on various Far Eastern art forms.

8. Chinese Philosophy: An Introduction (3) I, II. The Staff (Chairperson in charge)
   Lecture—2 hours; discussion—1 hour. Introduction to Chinese philosophy from classical to modern times: emphasis on basic metaphysics and its change over time, including Confucian humanism, Taoist cosmology, the hank synthesis of Tao, Yin, Yang, and Five Phases; its impact on Buddhism, Sun's new synthesis and conflict with the West. Offered in odd-numbered years.

98. Directed Group Study (1-3) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. Offered in odd-numbered years.

99. Special Study for Lower-Division Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor. Offered in odd-numbered years.

Upper Division Courses

100. Study of Religion: issues and Methods (4) I, II. The Staff (Chairperson in charge)
   Lecture-discussion—4 hours; term paper. Principal issues and methods of Religious Studies and associated fields.

101. Christian Origins (4) I, II. The Staff (Chairperson in charge)
   Lecture-discussion—4 hours; term paper. Prerequisite: one lower division Religious Studies course (except 108, 99, 98). Course intended primarily for Religious Studies majors, with others admitted. Historical and critical analysis of selected mystical traditions, and of selected key figures; readings of representative mystical authors. Offered every 3 or 4 years.

122. Studies in Biblical Texts (4) I. The Staff (Chairperson in charge)
   Lecture—3 hours; term paper. Prerequisite: course 21. Study of a book from the Prophets or Writings from critical, historical, and religious perspectives. May be repeated once for credit in different subject area.

123. Topics in Biblical Texts (4) I, II. The Staff (Chairperson in charge)
   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.

125A-125B. Talmud: Introduction (2-2-2) I-II. The Staff (Chairperson in charge)
   Lecture—2 hours; term paper. Prerequisite: course 25. Reading knowledge of Hebrew helpful. Examination of excerpts from the Talmudic order Zeraim (agriculture) from critical, historical, and religious perspectives. (PNP grading only.)

125A-125B. Talmud: Moed (2-2-2) I-II. The Staff (Chairperson in charge)
   Lecture—2 hours; term paper. Prerequisite: course 25. Reading knowledge of Hebrew helpful. Examination of excerpts from the Talmudic order Moed (festivals) from critical, historical, and religious perspectives. (PNP grading only.)

127A-127B. Talmud: Nashim (2-2-2) I-II. The Staff (Chairperson in charge)
   Lecture—2 hours; term paper. Prerequisite: course 25. Reading knowledge of Hebrew helpful. Examination of excerpts from the Talmudic order Nashim (women) from critical, historical, and religious perspectives. (PNP grading only.)

128A-128B. Talmud: Nezikin (2-2-2) I-II. The Staff (Chairperson in charge)
   Lecture—2 hours; term paper. Prerequisite: course 25. Reading knowledge of Hebrew helpful. Examination of excerpts from the Talmudic order Nezikin (bats) from critical, historical, and religious perspectives. (PNP grading only.)

128A-128B. Talmud: Gitin (2-2-2) I-II. The Staff (Chairperson in charge)
   Lecture—2 hours; term paper. Prerequisite: course 25. Reading knowledge of Hebrew helpful. Examination of excerpts from the Talmudic order Gitin (marriage) from critical, historical, and religious perspectives. (PNP grading only.)

130A-130B. Talmud: Tohorot (2-2-2) I-II. The Staff (Chairperson in charge)
   Lecture—2 hours; term paper. Prerequisite: course 25. Reading knowledge of Hebrew helpful. Examination of excerpts from the Talmudic order Tohorot (purify) from critical, historical, and religious perspectives. (PNP grading only.)

140. Christian Theology (4) I. The Staff (Chairperson in charge)
   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.

141A. New Testament Literature (4) I. The Staff (Chairperson in charge)
   Lecture-discussion—4 hours. Prerequisite: course 40. Life and thought of the early Church as reflected by the Synoptic Tradition—Matthew, Mark, Luke. Offered every third year beginning Winter 1984 to alternate 141B, 141C.

300
Religious Studies; Reproduction; Resource Sciences

Resource Sciences
(College of Agricultural and Environmental Sciences)

Faculty
See under departments of Agricultural Economics, Agronomy and Range Science, and Land, Air and Water Resources.

The Major Program
The Resource Sciences major is a program for study of the physical, chemical and biological features of renewable natural resources, and the economic and social considerations associated with their use, protection, and management. Students who choose this major include those with interest in careers associated with resource utilization and management, in (2) in pursuing post-baccalaureate and academic or professional training, or (3) in contemplating a career focusing on the resource sciences but uncertain regarding the selection of a specific major.

The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. But, at the same time, certain courses are required in the basic physical and biological science areas, and in the subject matter area. An upper division general resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses are required for all students in the major. Selection of resource-oriented courses shall be done in consultation with and approved by the student’s advisor. Considerable care should be taken to insure effective utilization of the flexibility of the major, to meet individual academic and career objectives. In addition, supportive courses to acquire additional knowledge and skills are specified.

Positions now held by graduates in Resource Sciences are quite varied, but many are employed as resource analysts and planners as well as technical staff specialists with government agencies, municipalities and private firms. A significant number of graduates have undertaken further studies leading to advanced degrees in resources, environment and related fields.

Resource Sciences

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.)

434. Theriogenology of Farm Animals (11/2 per week) I, II, III. The Staff (BonDuran and Hughes in charge)
Seminar-laboratory—50 hours. Prerequisite: professional standing, intern or resident in Veterinary Medical Teaching Hospital, graduate students, or consent of instructor. Emphasis placed on preventive medicine aspects of repro-
Resource Sciences; Rhetoric

UNITs
Preparatory Subject Matter .......................... 73
English or English and rhetoric
(see college requirements, page 74) .............. 8
Chemistry (1A, 1B) .................................... 10
Physics (Physics 2A, 2B, 3A, 3B) .................. 8
Mathematics and statistics
(Mathematics 146, 161, 162, 166, 168, 241,
and computer science) .......................... 10
Biology (Biological Sciences) ...................... 5
Animal and plant science ............................ 6
Soil and/or water science .......................... 5
Atmospheric science (Atmospheric Science 20) 3
Geology or physical geography .................... 3
Additional courses in
biological/physical sciences and
mathematics, to be selected with
adviser's approval (e.g., Botany 2,
Zoology 2, Chemistry 1A, 1B, 2A,
Mathematics 168, Physics 2C) ............. 14

Depth Subject Matter .............................. 47-49
Resource Sciences 100 ................................ 4
Agriculture 100 ....................................... 4
Resource-oriented courses selected with
adviser's approval .................................. 24
Supportive courses ................................. 15
Written expression (in addition to
College requirement) ....................... 3
Quantitative delinquent ............................. 3
Agricultural Science and Management 160,
Environmental Studies 123, Geology 106) ... 4
Social-political awareness in
resource sciences (e.g., Environmental
Studies 160, 161, Environmental
Toxicology 136, Geography 161,
Geology 134, Water Science 150,
Wildlife and Fisheries Biology 151) ........ 3-4
Plant or animal ecology (e.g., Botany 117,
Entomology 104, Environmental Studies 100,
Plant Science 101, Zoology 125) .......... 3-4
Special study or internship (Resource
Sciences 190, 192, 198, 199) ............... 3

Breadth Subject Matter ............................. 21
Social sciences and humanities electives .......... 12
At least one upper division
course from three of the
following areas: ................................. 9
Agricultural economics or economics,
arithmetic, animal science,
botany, civil or
civil engineering, environmental
culture, environmental planning,
management, environmental
studies, environmental toxicology,
biology, geology, plant science,
agricultural science, resource
sciences, soil science, wildlife and
fisheries biology, zoology, or others
with adviser's approval. .......................... 3
Electives ............................................ 37-39
Total Units for the Major ................. 180

Related Courses
For courses that are related to the area see course listings for
Agricultural Economics, Agricultural Science and Man-
agement, Animal Science, Botany, Entomology, Environ-
mental Planning and Management, Environmental Studies,
Environmental Toxicology, Geography, Geology, Range
Management, Wildlife and Fisheries Biology, and Zoology.

Major Adviser. R.G. Burau (Land, Air and Water Resources).

Advising Center for the major is located in 122
Hogland Hall (752-1669).

Courses in Resource Sciences

Questions pertaining to the following courses should be
directed to the instructor or to the Re-
source Sciences Teaching Center, 122 Hogland Hall
(752-1669).

Lower Division Courses

2. Concepts in Forestry (2) II. Delichio.
Lecture—2 hours. An introduction to the concepts of
forestry as illustrated by current issues in the western United
States. 

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.

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 to resource character and utilization
potential. Mid-quarter study of topics via a "flying class-
room" enhances a unique learning experience. (Flight fee
approximately $50). Limited enrollment. (P/NP grading only.)

92. Resource Sciences Internship (1-12) I, II, III.
The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: lower division stand-
ing and consent of instructor. Work-learning experience off
and on campus in resource sciences. Internship supervised by
a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraders (1-12) I, II, III.
The Staff (Chairperson in charge)
(P/NP grading only.)

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, wa-
ter, air, energy, plants, animals and society. Role of man in
resource management; preservation and improvement for
provision of food, fiber, environmental enhancement and
recreation.

101. Agriculture and Wildlife (3) III. Crampton
Lecture—3 hours; two Saturday 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 recre-
atation—the conflicts and harmonies; lectures by distin-
guished biologists of the University, and the State Depart-
ment of Fish and Game.

103. Solar Energy Applications (3) I. Pochinco
Lecture—3 hours. Prerequisites: Mathematics 168 and At-
mospheric Science 20. Characteristics of solar energy;
energy balance and analysis of systems for heat-
ing water and air; air conditioning systems; electricity from
the sun; biomass conversion; wind power.

105. Windflowers of the Central Valley of California (3) III.
Crampton
Lecture—3 hours. Prerequisites: Botany 2. Study of the
resident plants in and around the Central Valley of California;
growth forms, plant communities; identification and sys-
tematic relationships, food collections; land use and average
influence on wildflower communities.

118. Mineral Cycling in Agriculture and Nutrition (2) II.
Bura, Epstein, Rending
Lecture—2 hours. Prerequisites: Chemistry 1B, and one
course each in biological science and earth science or
consent of instructor. Sources of mineral nutrients, their
progression through food chains, and their importance in
plants, animals, and human life support systems; effects of
man's activities on mineral nutrient cycling and utilization.
Guest lectures for some topics. (Same course as
Environmental Science 118.)

130. Seminar on Alternatives in Agriculture (2) II. The Staff
(Chairperson in charge)
Seminar—2 hours. Seminar on alternative points of view
regarding agricultural economic and public policy aspects of
current and future agricultural systems. (P/NP grading only.)

132. Resource Sciences Internship (1-12) I, II, III. The Staff
(Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: completion of 84 units
and consent of instructor. Work-learning experience off
and on campus in resource sciences. Internship super-
vised by a member of the faculty. (P/NP grading only.)

186. Directed Group Study (1-5) I, II, III. The Staff (Chair-
person in charge)
(P/NP grading only.)

199. Special Studies for Advanced Undergraduates (1-12) I,
II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

203. Solar Energy Conversion Processes (3) I. Pochinco
Lecture—3 hours. Prerequisite: course 103, Mathematics
16C. Forms of solar energy; solar energy climateology; heat
transfer; analysis of systems for space heating and cooling.

Rhetoric

(1) James R. Murphy, Ph.D., Chairperson of the Department
Department Office, 224 AOB-IV (752-1221)

Faculty

Don Abbott, Ph.D., Assistant Professor
A. DeSouza, M.A., Visiting Lecturer
Martin J. Medhurst, Ph.D., Assistant Professor
Gerald P. Mohrman, Ph.D., Professor
Michael T. Motley, Ph.D., Associate Professor
James J. Murphy, Ph.D., Professor
Ralph S. Pomery, Ph.D., Associate Professor
Mark Shaw, Ph.D., Visiting Lecturer
Susan B. Shmarioff, Ph.D., Assistant Professor
Michael J. Sunnfrankh, Ph.D., Assistant Professor
John L. Vols, 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 com-
munication process, from interpersonal
communication through the rhetoric of film, and from
major theories through the close analysis of par-
ticular 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 orga-
1191
nizing principle, and in reporting research, stu-
dents 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. Stud-
ents who have major 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 chosen to do gradu-
ate work in the field, others in studies ranging from
business administration to law and even medi-
cine. 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 them-
theirselfs with special attention to the uses of
communication.

A.B. Major Requirements:

UNITs
Preparatory Subject Matter ......................... 8
Rhetoric 1, 3 ....................................... 8

302
Minor Program Requirements:

There are no study emphases offered through the minor program in Rhetoric.

Rhetoric

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhetoric 103</td>
<td>Upper division units in rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Rhetoric 111</td>
<td>Critical thinking emphasis</td>
<td>1</td>
</tr>
<tr>
<td>Rhetoric 112</td>
<td>Upper division units in rhetoric</td>
<td>4</td>
</tr>
<tr>
<td>Rhetoric 121</td>
<td>Two additional courses from Rhetoric 110, 120, or 123</td>
<td>8</td>
</tr>
<tr>
<td>Rhetoric 130</td>
<td>Preferred preparation: Rhetoric 3, 10, 51</td>
<td></td>
</tr>
<tr>
<td>Rhetoric 131</td>
<td>Two additional courses from Rhetoric 105, 114, 123, 130, 134, 140</td>
<td>8</td>
</tr>
<tr>
<td>Rhetoric 151</td>
<td>Preferred preparation: Rhetoric 3, 10, 51</td>
<td></td>
</tr>
<tr>
<td>Rhetoric 152</td>
<td>Communication Skills emphasis</td>
<td>4</td>
</tr>
<tr>
<td>Rhetoric 153</td>
<td>Additional courses from Rhetoric 110, 120, or 123</td>
<td>16</td>
</tr>
</tbody>
</table>

Minor Advisor: Contact Departmental Office.

Graduate Study: The Department of Rhetoric offers programs of study and research leading to the M.A. degree in Rhetoric. Detailed information may be obtained from the Graduate Advisor, Department of Rhetoric.

Graduate Advisor: See Class Schedule and Room Directory.

Courses in Rhetoric

Lower Division Courses

1. Introduction to Public Speaking (4) I, II, III. The Staff
   Lecture—4 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism. (2 semester hours credit toward Public Addressing free.)

2. Group Communication (4) I, II, III. The Staff
   Lecture—4 hours. Study of communication in small groups. Role of communication in various group processes, including leadership and decision-making. Participation in group activities and simulation exercises.

3. Communication Studies (3) II, III. Mohr
   Lecture-discussion—4 hours. Study of communication in small group processes. Role of communication in various group processes, including leadership and decision-making. Participation in group activities and simulation exercises.

   Lecture—2 hours; discussion—2 hours. Study of rhetorical concepts and procedures affecting the news function of television, radio, newspapers, and mass circulation periodicals. Discussion, lectures, and group projects on problems of media bias, objective reporting, factfinding, writing, and editorial responsibility. Critical analysis of journalistic styles.

51. Introduction to Advocacy (4) I, II, III. The Staff
   Lecture—4 hours. Introduction to the rhetoric of advocacy, with emphasis upon the nature of public debate, the analysis of issues, and the logical presentation of evidence in support of arguments.

52. Special Study for Undergraduates (1-5) I, II, III. The Staff
   Chairperson (in charge): Prerequisite: consent of instructor. (PHN grading only.)

53. Upper Division Courses

106. Rhetorical Research (4) I, II, III. The Staff (Chairperson in charge)
   Lecture—2 hours; discussion—2 hours; term paper. Required of majors in Rhetoric. Methods of reporting research into various aspects of human communication. Assignments in organization and writing of research reports.

103. Analysis of Messages Systems (4) I, III. Shimanoff
   Lecture—4 hours. Examination of elements of the communication process, including sources, messengers, media, and receivers. Study of the role of these elements as they are influenced by various communicative situations.

104. Semantic and Pragmatics Functions of Language (4) I, II, III. Murphy
   Lecture—4 hours. The role of language in shaping attitudes and perceptions of self and others. The use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse.

107. Conversational Analysis (4) II, III. Shimanoff
   Lecture—4 hours. Examination of research studies on conversations. Methods for collecting, transcribing and recording naturally occurring conversations for analysis. Study of social impact of rule observation and discourse.

110. Classical Rhetorical Theory (4) I, Murphy
   Lecture—4 hours. Origins of Greek and Roman oratorical theory, with emphasis upon the contributions of Isocrates, Plato, Aristotle, Cicero, and Quintilian.

111. Medieval and Renaissance Rhetorical Theory (4) II, Murphy
   Lecture—2 hours; discussion—2 hours. Development of the European rhetorical tradition from St. Augustine to A.D. 1700. Attention to the three medieval rhetorical genres, the medieval universe, the impact of printing, changes in Renaissance concepts of knowledge as they affected rhetorical art.

112. Early Modern Rhetorical Theory (4) III. Pomeroy
   Lecture—4 hours. Development of rhetorical art to 1900, with reference to developments in psychology, philosophy, and aesthetics. Emphasis upon the works of Ward, Priestley, Blair, and Whately.

   Lecture—4 hours. Contemporary developments in traditional rhetorical concepts such as style, meaning, theory of argument, and persuasion.

114. Contemporary Theories of Human Communication (4) III. Abbott
   Lecture—3 hours; discussion—1 hour. Rhetoric as a social science, characteristics of social theories, components of theory, development and testing of hypothesis, general models, theories, and research.

116. Rhetorical Criticism (4) I, Mohrman
   Lecture—4 hours. Survey of critical methods and their use in the interpretation of and response to speech events.

121. Public Addresses in Western Culture (4) I, II, III. Pomeroy
   Lecture-discussion—4 hours. Notable and representative speeches from antiquity to the present. Speeches are examined both as dynamic and significant events in their historical contexts, and as noted instances of rhetorical art.

122. Public Discourse in American Culture (4) I, II, Mohrman
   Lecture—4 hours. Major discourses, movements, and mass media. Case studies of rhetoric as it has contributed to and has been influenced by American culture. Variable content; may be repeated once.

123. The Persuasive Campaign (4) III. Mead
   Lecture—4 hours; class project. Study of selected political and political campaigns, illustrating organized efforts to change opinion, or to influence or change behavior in a given audience through the use of a variety of media and influences.

130. Group Communication Processes (4) I, II, Vohs
   Lecture—4 hours. Examination of contemporary theories of group formation, structure, and leadership, as they relate to communication processes.

134. Interracial Communication (4) I, II, III. Sunnakrak, Vohs
   Lecture—4 hours. Prerequisite: course 3, 10, or the equivalent. Communication between individuals in social and task settings. One-to-one communication, verbal and nonverbal. In developing relationships. Consideration of theory and research on relevant variables such as shyness, self-disclosure, reciprocity, games, and conflict.

136. Organizational Communication (4) I, II, Vohs
   Lecture—4 hours. Examinations of communication in various organizational situations. Focuses on the use of effective communication strategies for achieving organizational and individual goals. Emphasis is placed on enhancing ineffective communication within organizations.

140. Mass Communication and the Public (4) I, II, Muhr
   Lecture—4 hours. Current issues in mass communications examined, with a focus on the broadcast media. Emphasis on 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, Sunnakrak
   Lecture—4 hours. Prerequisite: course 153, or the equivalent course in Social Science research methods. Recent developments in the study of mass communications content and effects, with an emphasis on broadcast media. Consideration of the nature 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; discussion—3 hours; one or two major writing assignments. Analysis of role of broadcasting in society, including development and editing of the news in the broadcast medium, as examined by a practicing professional.

142B. News Policies and Practices in the Press (2) III. The Staff (Chairperson in charge)
   Lecture—2 hours; discussion—3 hours; one or two major writing assignments. Analysis of role of newspaper in society, including development and editing of the news in the print media, as examined by a practicing professional.

143. Media Criticism: Broadcast (4) III. DeSousa
   Lecture—1 hour; discussion—3 hours; one or two major writing assignments. Analysis of role of broadcast media content, employing various critical frameworks including genre studies, mythological and dramatical criticisim, linguistic analysis, iconographic criticism, and theories of popular culture. Course requirements include one or two major writing assignments.

151. Methods of Advocacy (4) I, II, Pomeroy
   Lecture—4 hours. Prerequisite: course 114 or 153 recommended. The theory and research on the effectiveness of various communication techniques used to influence the perceptions and behaviors of others. Focuses on science of communication in terms of the processes or persuasion and resistance to persuasion in various contexts.

   Lecture—4 hours. Prerequisite: consent of instructor. Consideration of contributions derived from sociometric and psychometric approaches to analysis of rhetorical process.

159. Current Topics in Rhetoric (4) I, II, III. The Staff
   Lecture—4 hours. Prerequisite: consent of instructor. Lecture-discussion meeting with a major in Rhetoric or consent of instructor. Group study of a special topic in Rhetoric. May be repeated once for credit. Enrollment limited.

191. Senior Seminar (4) I, III. The Staff (Chairperson in charge)
   Lecture—3 hours; seminar—1 hour. Prerequisite: course 153. Individual research on a special topic approved by faculty committee.

192. Internship in Rhetoric (1-12) I, II, III. The Staff
   Laboratory—3, 6, 12 semester hours. Prerequisite: 12 semester units in rhetoric and consent of instructor. Work experience projects at off-campus sites under departmental supervision. (PHN grading only.)

197T. Tutoring in Rhetoric (2-4) I, II, III. The Staff (Chairperson in charge)
   Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in rhetoric and consent
Rhetoric; Russian

 Graduate Courses
Seniors may take graduate courses with consent of instructor.

200. Current Scholarship (3) I. Shimanoff
Lecture—3 hours. Examination and evaluation of research issues and principles in the study of human communication.

210. Theories of Rhetorical Criticism (3) I. Mohrman
Lecture—1 hour; discussion—2 hours. Exploration of various approaches to the art of criticism, including dramatism, fantasy theme analysis, phenomenology, genetic studies, and psycho-social criticism. Philosophical assumptions, limitations, and potentials of each approach is assessed.

212. Advances in Communication Theory (3) III. Sunntrakik Lec-ture—3 hours. Introduction to current theories in the field of communication. Various theoretical approaches including covering law, rules, axiomatic, and causal, and systems will be discussed. Examination of current theories which exemplify each of these approaches will be examined.

220. Descriptive Methods in Communication (3) II. Motley
Lecture—3 hours. Prerequisite: course 153 or the equivalent. Recommended: introduction to the use of descriptive research methods in communication research. Topics include survey research, interviewing, participant observation and content analysis.

222. Practicalism in Rhetorical Criticism (3) I. Medhurst
Seminar—1 hour; individual conferences—2 hours. Prerequisite: course 200 or the equivalent. Intensive analysis of selected persuasive messages. Particular attention to the rhetorical situation and to elements in the metatextual processes.

240. Advocacy in Contemporary Society (3) II. Abbott
Seminar—3 hours. Rhetorical and communication theories of argumentation and persuasion. These theoretical perspectives are employed to analyze the persuasive impact of argumentation occurring in current public controversies. Offered in even-numbered years.

242. Discourse Analysis (3) III. Shimanoff
Seminar—3 hours. Prerequisite: course 153 or consent of instructor. Examination of language in planned and unplanned messages with particular emphasis on oral discourse. Analyses may include investigation of stylistic variables, speech acts, syntactical patterns, topic management, argumentative structures, and communication rules. Offered in even-numbered years.

244. Communication Processes and Problems in Organizations (3) III. Vohs
Seminar—3 hours. Prerequisite: course 130, or the equivalent. Recommended: consent of instructor. Advanced study of theory and research on communication processes in organizations. Offered in odd-numbered years.

246. Oral and Written Modes of Communication (3) III. 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. Analysis of contemporary views including those of linguistics, mythological and literary critics, and social scientists. Offered in odd-numbered years.

248. Theo of Film (3) III. Medhurst
Lecture—1 hour; discussion—2 hours. Prerequisite: a course in criticism. Explores the relationship between cinematic forms and the perception and interpretation of these forms by viewers. Films are treated as texts intentionally designed to elicit responses from an audience. Offered in odd-numbered years.

250. Special Topics (3) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours. Selected topics in rhetoric and communication. May be repeated once for credit.

260. Communication Applications (3) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—6 hours; field work under faculty supervision. Field work in communication may be repeated once for credit. (SU grading only.)

284. Group Study (1-3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours.

289. 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 Rancourt-Lafrenière, Ph.D., Associate Professor
Valerie A. Tumins, Ph.D., Professor

The Major Program
The Department offers a major in which students may elect to complete one of 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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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<tr>
<td>Russian 1 through 6 (or the equivalent)</td>
<td>6-30</td>
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<td>Russian 41, 42</td>
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<td>Recommended, Linguistics 1</td>
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Depth Subject Matter

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<th>Russian Literature emphasis</th>
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<tbody>
<tr>
<td>Russian 101A, 101B, 101C</td>
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<tr>
<td>Russian 102 or 103 or 105</td>
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<tr>
<td>Russian 121, 123</td>
</tr>
<tr>
<td>Additional upper division units chosen in consultation with adviser</td>
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<table>
<thead>
<tr>
<th>Russian Language emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian 101A, 101B, 101C</td>
</tr>
<tr>
<td>Russian 103 or 104</td>
</tr>
<tr>
<td>Russian 160</td>
</tr>
<tr>
<td>Additional upper division units chosen in consultation with adviser</td>
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</table>

Total Units for the Major

44-74

Major Adviser: J. 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 95.

Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The Literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

<table>
<thead>
<tr>
<th>Units</th>
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<tbody>
<tr>
<td>Russian Language</td>
</tr>
<tr>
<td>Russian 6</td>
</tr>
<tr>
<td>Russian 101A, 101B, 101C</td>
</tr>
<tr>
<td>One course from Russian 102, 103, 104, 105, 160</td>
</tr>
<tr>
<td>Russian Literature</td>
</tr>
<tr>
<td>Russian 41 or 42</td>
</tr>
<tr>
<td>Russian 121, 123, and 140 or 141</td>
</tr>
<tr>
<td>One course from Russian 120, 126, 150, 154</td>
</tr>
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</table>

Teaching Credential Subject Representative. J. Gallant. See page 103 for the Teacher Education Program.

Graduate Study. The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser, V. A. Tumins.

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, III. 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.

1A1TA-1ATB-1ATC. Individualized Russian (2-2-2) I-II-III
Grant
The three segments of course 1AT correspond to course 1. Student-instructor contact consists of individual tutoring and testing periods. Students may start at any time and complete one or more two-unit segments in a given quarter. (Students who have successfully completed the second or more advanced year of high school level work in Russian 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.)

1SC. Individualized Scientific Russian (6) I, II, III. Gallant and staff
Individual tutorials with faculty. Students work at their own pace and may arrange their lessons according to their own schedules. Students must meet with a tutor once a week and must complete all work within three consecutive quarters. (Deferred grading only pending completion of course.) (Students who have had course 1SC may not receive credit for this course.)

2. Elementary Russian (6) I, II, III. Grant and staff
Recitation—5 hours; language laboratory—1 hour. Pre-requisite: course 1. Elementary grammar, reading, and conversation.

2AT-A2TB-2ATC. Individualized Russian (2-2-2) I-II-III
Grant
The three segments of course 2AT correspond to course 2. Student-instructor contact consists of individual tutoring and testing periods. Students may start at any time and complete one or more two-unit segments in a given quarter.

3. Elementary Russian (6) I, II, III. Grant and staff
Recitation—5 hours; language laboratory—1 hour. Pre-requisite: course 2. Elementary grammar, reading, composition and conversation.
Scandinavian; Sociology

Scandinavian
(Offers of Letters and Science)
Department Office (German and Russian), 416 Sproul Hall (752-2114)

Faculty
Fritz Sannem-Frakenegg, Ph.D., Associate Professor (Swedish, German)

Course in Scandinavian
Upper Division Course
110. Masterworks of Scandinavian Literature in Translation
4 (3) I. Sannem-Frakenegg
Lecture—3 hours; written reports. Readings in English translation from Icelandic Sagas to the present, treating such major authors as Ludwig Holberg, Sten Kierkegaard, Henrik Ibsen, Sigrid Undset, August Strindberg, Selma Lagerlof, Pär Lagerkvist. Credit varies from year to year. May be repeated twice for credit.

Courses in Swedish
Lower Division Courses
1. Elementary Swedish (6) I. Sannem-Frakenegg
Discussion—5 hours; language laboratory—two 1-hour sessions. Students who have successfully completed C- or better, Swedish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.

2. Elementary Swedish (6) I. Sannem-Frakenegg
Discussion—5 hours; language laboratory—two 1-hour sessions. Prerequisite: course 1.

3. Intermediate Swedish (6) I. Sannem-Frakenegg
Discussion—5 hours; laboratory—two 1-hour sessions. Prerequisite: course 2.

4. Intermediate Swedish (4) I. Sannem-Frakenegg
Discussion—3 hours; weekly reports. Prerequisite: course 2.

5. Spoken Swedish (2) I. Sannem-Frakenegg
Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. May be taken concurrently with course 3. (P/NP grading only.)

98. Directed Group Study (1-3) I, II, III. Sannem-Frakenegg
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-3) I, II, III. Sannem-Frakenegg
Prerequisite: consent of instructor. (P/NP grading only.)

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 degrees 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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Subject Matter (General Major)</td>
<td>13</td>
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<tr>
<td>Sociology 1, 46A, 46B (or the equivalent)</td>
<td>15</td>
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<tr>
<td>Select 12 units from Anthropology 1, 2, Economics 1A, 1B, History 3, 48, 4C, 17A, 17B, Philosophy 1, 12, 21, 22, 23, Political Science 1, 2, 3, 4, Psychology 1, 15</td>
<td>12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>36</td>
</tr>
<tr>
<td>Sociology 165A, 165B</td>
<td>20</td>
</tr>
<tr>
<td>Select 8 units from Sociology 126, 140, 180</td>
<td>6</td>
</tr>
<tr>
<td>At least 20 additional units in upper division sociology courses to achieve a minimum of 38 units</td>
<td>20</td>
</tr>
</tbody>
</table>

Total Units for the Major | 81

Recommended
Anthropology 102, 118, 119, 124, 126; History 101, 102, Philosophy 12, 21, 22, 23, 100, 151, 156; Political Science 150, 161; Psychology 145, Statistics 106, 108.

Sociology
A.B. Degree Requirements:

<table>
<thead>
<tr>
<th>Option</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law and Society Option</td>
<td>8</td>
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<tr>
<td>Sociology 152, 156</td>
<td>4</td>
</tr>
<tr>
<td>At least 8 but not more than 8 units of Sociology 109A, 109B, 109C</td>
<td>4</td>
</tr>
<tr>
<td>At least three courses from Sociology 123, 130, 140, 143, 186</td>
<td>12</td>
</tr>
<tr>
<td>At least 12 additional units in upper division sociology courses to achieve a minimum of 40 units</td>
<td>12</td>
</tr>
<tr>
<td>Social Welfare Option</td>
<td>12</td>
</tr>
<tr>
<td>Sociology 131, 140, 186</td>
<td>8</td>
</tr>
<tr>
<td>At least 6 but not more than 8 units of Sociology 109A, 109B, 109C</td>
<td>4</td>
</tr>
<tr>
<td>At least one course from Afro-American Studies 100, American Studies 124, 126, 170, 171, Asian American Studies 110, 111, Native American Studies 124, 126, 170, 171, Spanish 124, Sociology 129, 143, 186</td>
<td>4</td>
</tr>
<tr>
<td>At least three courses from Sociology 127, 132, 143, 152, 154, 156, 165B, 180</td>
<td>12</td>
</tr>
<tr>
<td>At least 8 additional units in upper division sociology courses to achieve a minimum of 40 units</td>
<td>8</td>
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Total Units for the Major | 65-67

Recommended
Anthropology 1, 118, 119A, 119B, 124, 128; History 101, 102, Philosophy 12, 21, 22, 23, 100, 151, 156; Political Science 150, 161; Psychology 145; Statistics 106, 108.

Major Adviser. Consult the Department Office.

Minor Program Requirements:
The Department of Sociology has established the following minor programs of study which are open to Letters and Science students.

<table>
<thead>
<tr>
<th>Minor Program</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology</td>
<td>20</td>
</tr>
<tr>
<td>Select 8 units from Sociology 129, 140, 165A, 170, 171, 180</td>
<td>8</td>
</tr>
<tr>
<td>Additional upper division units in Sociology</td>
<td>12</td>
</tr>
<tr>
<td>Social Welfare</td>
<td>20</td>
</tr>
<tr>
<td>Sociology 185, plus 4 units selected from Sociology 109A, 131, 140</td>
<td>8</td>
</tr>
<tr>
<td>Four units from Sociology 143, 154, 156, 165B, or 180</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units selected from Sociology 120, 123, 127, 130, 132, 156</td>
<td>8</td>
</tr>
<tr>
<td>Law and Society</td>
<td>20</td>
</tr>
<tr>
<td>Sociology 152, 154, plus 4 units selected from Sociology 109A, 120, 150, 180</td>
<td>8</td>
</tr>
<tr>
<td>Four units from Sociology 126, 143, 165B, 180</td>
<td>4</td>
</tr>
<tr>
<td>Additional upper division units selected from Sociology 123, 130, 156, 165, 180</td>
<td>8</td>
</tr>
</tbody>
</table>
| Minor Adviser. Consult the Department Office.

Teaching Credential Subject Representative. J. Reith. See page 103 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 Adviser. See Class Schedule and Room Directory.

Courses in Sociology
Lower Division Courses
1. Introduction to Sociology (5) I. Hackett; III. Ramirez 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. L. Lofland Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociological social psychology. Includes the study of the character of the self, identity roles, socialization, identity change, emotion and social interaction.

Soil and Water Science

(College of Agricultural and Environmental Sciences)

The Major Program

Soil and Water Science is concerned with the use and protection of our land and water resources. The major is designed to provide preparation for 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, 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 on resource allocation and land-use planning would include more courses in the social, political, and economic areas.) The flexibility of this major makes possible a wide variety of career opportunities which includes managerial and technical positions with agri-businesses such as equipment and supply companies, farm management, and positions involving advising, planning, land appraisal, research, and teaching with private, district, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

Soil and Water Science

B.S. Major Requirements:

(For convenience in program planning the usual course 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

- 62-65

Biological Sciences 1: 5
Botany 2: 5
Mathematics, including calculus, statistics, and computer programming: 13
Chemistry, including Chemistry 1A-1B or 4A-4B and a more advanced course: 13
Physics (Physics 2A-2B or 2A-2B-2C): 9-12
Geology (Geology 2): 3
Economics or agricultural economics: 3
Written expression (see College requirement): 7
Oral expression (see College requirement): 4

Depth Subject Matter

- 51

Physical sciences, biological sciences and agriculture with emphasis on an 18
Soil Science 100: 4
Water Science 100: 4
Additional upper division units in soil science and water science: 22
Special study or experience (199 or Soil Science 192 in the major area): 3

Breadth Subject Matter

- 22

Social sciences and humanities: 13
At least one upper division course from each of the following areas, with approval of adviser, (1) resource management, (2) environmental science, (3) economic and decision making: 9

Restricted Electives

- 21-24

To supplement or expand areas of student interest selected with approval of adviser.

Total Units for the Major

180

Specific Courses of Instruction

For specific courses of instruction in this major, see course listings under Atmospheric Science, Plant Science, Resource Sciences, Soil Science, and Water Science.

Major Adviser: M.J. Singer (Land, Air and Water Resources)

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 97.

Related Courses: See courses in Agricultural Economics, Agricultural Science and Management, Agromony, Botany, Chemistry, Engineering: Agricultural, Engineering: Civil, Environmental Studies, Environmental Toxicology, Geology, International Agricultural Development, Range Science, and Vegetable Crops.

Note: For key to footnote symbols, see page 128.

Soil Science

(College of Agricultural and Environmental Sciences)

Faculty

See under the Department of Land, Air and Water Resources.

Graduate Study: Programs of study leading to the M.S. and Ph.D. degrees in Soil Science are available. Information regarding these programs can be obtained from the graduate adviser and the Announcement of the Graduate Division.

Course in Soil Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (752-1669).

Lower Division Courses

16. Concepts of Soil Science (3) I. Whitlatch

Lecture: 3 hours; laboratory: 3 hours. Prerequisite: second-year high school biology. This course is a comprehensive introduction to the basic principles of soil science, emphasizing the importance of soil quality and its relationship to the environment.

92. Soil Science Internship (1-12) I, II, III. The Staff

Laboratory: 3-12 hours. Prerequisite: lower division standing and consent of instructor. Work experience on a campus or off campus in soil science. Internship supervised by a member of the faculty. (RNIP grading only.)

Upper Division Courses

100. Principles of Soil Science (3) I, II. Della Cava

Lecture: 3 hours; laboratory: 3 hours. Prerequisite: Chemistry 1A-1B, Physics 1A-1B, Biological Sciences 1, and consent of instructor. The fundamentals of soil science with emphasis on the chemical and physical processes that occur in the soil. The role of the farmer and the role of the soil scientist in managing the soil resource.

101. Soil and Water Chemistry (3) I. B. Bell

Lecture: 3 hours; laboratory: 3 hours. Prerequisite: course 100 or equivalent. This course covers the chemistry of soils and water with emphasis on the chemical processes that occur in soil and water.

105. Field Studies of Soil Resources (8) Extra-summer session

Begg, Huntington, Singer

On-campus—daily 1 week; study tour—daily 5 weeks. Prerequisite: consent of instructor; course 120 recommended. The purpose of the course is to study soil resources in their natural and economic environments. The course includes field trips to locations in various parts of the United States.

107. Transfer Processes in Soil (4) I. Delaune

Lecture: 2 hours; discussion: 1 hour; laboratory: 3 hours. Prerequisite: course 100; Water Science 100; Mathematics 15A or 21A; or the equivalent preparation in elements of soil and water, and calculus. Principles of water, gas, heat, and solute movement in soil with selected examples related to agricultural and urban uses of land. The role of soil physical properties on transfer processes and root growth.

109. Soil Fertility and Fertilizers (4) I. Reisener

Lecture: 3 hours; laboratory: 3 hours. Prerequisite: course 100 or the equivalent preparation in elements of soil science. The course covers the biological and chemical processes that occur in soil and the role of soil in the production of crops. The course includes an introduction to the principles of soil chemistry and the use of fertilizers.

111. Geomicrobiology (4) I. Broadbent

Lecture: 3 hours; laboratory: 3 hours. Prerequisite: general chemistry or an introductory course in biology. The course covers the role of microorganisms in the environment and their response to environmental changes. The role of microorganisms in relation to water pollution, soil fertility, and plant disease.

118. Soils in Land Use and the Environment (4) I. Singer

Lecture: 3 hours; discussion: 1 hour; two 1-hour field trips. Prerequisite: course 100 or consent of instructor. The course covers the role of soils in land use planning and environmental quality. The role of soils in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, and soil reclamation.
120. Soil Genetics and Morphology (2) II. Begg Lecture—2 hours. Prerequisite: course 100; 1 or 2, or consent of instructor. Soil forming factors and how 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 Genetics and Morphology Laboratory (1) II. Begg Laboratory—3 hours (including 4 Saturday field trips). Prerequisite: course 120 (may be taken concurrently). Identification and description of soil morphological characteristics. Use of the thin sections and the petrographic microscope to identify micropedological features. Field trips to study soil parent materials and their climates, 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 broader understanding of soils on the landscape and 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. Soil-Atmosphere Interaction (3) II. The Staff Lecture—3 hours. Prerequisite: consent of instructor; a course in soil chemistry and either plant physiology or plant nutrition recommended. Soil problems in salt-prone and zone climates; origin and significance of soil macro and microbe interactions with soil minerals under alkaline situations; salinity control and its bearing on environmental quality; physicochemical characteristics of native and crop plant species governing salt tolerance and sensitivity. Offered in even-numbered years.

123. Soil Taxonomy (3) III. Huntington Lecture—11 hours; discussion—11 hours. Prerequisite: 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 Survey of the United States. Practical class. 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, Reissauer, Carson (Pomology) Lecture—3 hours. Prerequisite: course 109, an upper division crop production course, and consent of instructor. Procedures, conduct, and use of soil and plant tissue analysis in management of soil fertility, in diagnosis of crop nutritional program, and in crop quality assessment.

162. 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-earn experience off and on in soil science. Internship supervised by a member of the faculty. (PNNP grading only.)

186. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Directed group study in soil science for advanced undergraduates. (PNNP grading only.)

189. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PNNP grading only.)

Graduate Courses

207. Soil Physics (3) I. Rolston Lecture—3 hours. Prerequisite: Mathematics 229 or consent of instructor. Course 107 recommended. Physical processes occurring in soils with emphasis on heat flow, diffusion of gases and solutes, the movement of soluble material during leaching and irrigation, and the applications of physics and mathematics to soils systems. Offered in even-numbered years.

208. Soil-Plant Interactions (3) II. Rendig Lecture—3 hours. Prerequisite: course 100; Botany 111B; or consent of instructor. Processes and reactions involved in the acquisition by plants of nutrients 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 68, course 122 or the consent of instructor. A study of the activities of some important groups of soil microorganisms, metabolism of organic substances in soil including pesticides; influence of microbial activities on soil properties, microbial activities in soil in relation to some environmental problems.

214. Soil Mineralogy (3) I. Whitig Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: 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 characterization of mineral systems, and in the study of the properties of soils and weathering of minerals. Offered in even-numbered years.

215. Physical Chemistry of Soils (3) III. Burau Lecture—2 hours; laboratory—1 hour. Prerequisite: course 110, 110B, or consent of instructor. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

218. Soil Erosion and Conservation (3) II. Singer Lecture—1 hour; discussion—1 hour. Prerequisite: courses 110A, 110B, and 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in even-numbered years.

220. Special Topics in Soil Science (1) I. Lutich, Munns, III, Singer, Whittig Seminar. Offered. Prerequisite: graduate standing. Oral presentation and discussion of scientific material and procedures for review and critique of publications. (SU grading only.)


298. Research (1-12) II, III. The Staff (Chairperson in charge) Offered. (PNNP grading only.)

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Spanish

Spanish (College of Letters and Science)

Robert M. Scari, Ph.D., Chairperson of the Department
Department Office (Spanish and Classics), 616 Sproul Hall (752-0635)

Faculty

Samuel G. Armistead, Ph.D., Professor
Donald G. Castanien, Ph.D., Professor Emeritus
Mariano González, Ph.D., Lecturer
Didier T. Judd, Ph.D., Professor
Daniel S. Keller, Ph.D., Associate Professor
Guillermo Rojas, Ph.D., Associate Professor
Fabián A. Samaniego, M.A., Lecturer
Antonio Sánchez-Romeralo, Ph.D., Professor
Robert M. Scari, Ph.D., Professor
Gonzalo Sobijano, Ph.D., Professor
*Maximo Torreblanca, Ph.D., Professor
Hugo J. Verani, Ph.D., Professor

The Major Program

The major in Spanish is designed to develop competence in the written and spoken language to provide the possibility of emphasis either on language or on literature, depending upon each student's professional goal. The program, alone or in combination with other major programs, may lead to advanced study of the language or literatures of Spain and Spanish America, and to careers not only in teaching but also in other professions such as library science, journalism, and government service, social service, or business. Spanish majors are strongly encouraged to complement their work in the department through studies in related areas such as Mexican-American studies, international relations, linguistics, comparative literature, art, history, and philosophy.

Spanish

A.B. Major Requirements:

Preparatory Subject Matter

Spanish 1 or 1AT, 2 or 2AT, 3 or 3AT, 4 or 7A, 5 and 6 or 7B, 28 or TC (or the equivalent)...

Depth Subject Matter

Spanish 103A-103B...

Spanish 110A or 110B...

Spanish 134, 135, or 136...

Any two courses from Spanish 104A, 104B, 105A, or 105B...

Additional upper division units...

Total Units for the Major

40-75

Recommended

The following recommendations should be taken into account: Majors who are interested in a concentration in Spanish are advised to take Spanish 110C (Advanced Spanish composition, literary analysis),

(a) literature are advised to take Spanish 110C (Advanced Spanish composition, literary analysis),

(b) language are advised to take Spanish 110C (not a major toward major). This course is prerequisite to Linguistics 115 (Chicanos sociocultural development) and Spanish 110C (contrastive analysis of Spanish) which may be counted toward the 16 additional upper division units.

(c) a teaching career are advised to take Spanish 300 (the teaching of Spanish).

(d) graduate work in Spanish are advised to take Latin 10 or the equivalent.


Minor Program Requirements:

Spanish

22-24

One course in Spanish...

One course in culture from Spanish 134, 135, 136...

One course in advanced composition from Spanish 104A, 104B, 110C...

Two elective courses acceptable for the Spanish major...

Note: Students majoring in Linguistics or Mexican-American (Chicana) Studies and minors are strongly urged to bear in mind that if Spanish courses are used to satisfy the major requirements, only one or these courses may be applied to the minor.

Teaching Credential Subject Representative. D. S. Keller. See page 103 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 in Spanish, or the 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.

The Degree of Doctor of Philosophy. The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

Graduate Adviser. D.T. Jäen (M.A. degrees); A. Sánchez-Romeralo (Ph.D. degrees).
Courses in Portuguese
Lower Division Courses
1. Elementary Portuguese (5) I, II, III. The Staff
   Discussion—1 hour; laboratory—1 hour; recitation—3 hours. Portuguese grammar, conversation, and reading. Students may receive a grade unless 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/N 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/N petition is filed.

2. Elementary Portuguese (5) II, III. The Staff
   Discussion—1 hour; laboratory—1 hour; recitation—3 hours. Pre-requisite: course 1 or consent of Instructor. Continuation of course 1.

3. Elementary Portuguese (5) III. The Staff
   Discussion—1 hour; laboratory—1 hour; recitation—3 hours. Pre-requisite: course 2 or consent of Instructor. Continuation of course 2.

Upper Division Courses
104. Survey of Brazilian Literature: Prose Fiction (4) II. 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 (Samaniego in charge)
   Laboratory—two 1½-hour sessions; recitation—6 hours. An introduction to the fundamentals of Spanish grammar, listening, and writing. 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/N 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/N petition is filed.

1ATA-1BAT=1ATC. Individualized Instruction in Elementary Spanish (2-2-2) I-II-III. (Samaniego in charge)
   The three segments of course 1AT correspond to course 1. Students are registered in this section. This course consists of individual tutoring, conversation practice and testing periods. 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 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/NP option, no petition is required. All other students will receive a letter grade unless a P/N petition is filed.

2. Elementary Spanish (6) I, II, III. The Staff (Samaniego in charge)
   Laboratory—two 1½-hour sessions; recitation—6 hours. Pre-requisite: course 1. Continuation of course 1.

2ATA-2BAT=2ATC. Individualized Instruction in Elementary Spanish (2-2-2) I-II-III. (Samaniego in charge)
   The three segments of course 2AT correspond to course 2. Student-instructor contacts consisting of individual tutoring, conversation practice and testing periods. Students may start at any point and complete one or more two-unit segments in a given quarter.

3. Intermediate Spanish (6) I, II, III. The Staff (Samaniego in charge)
   Laboratory—1 hour; recitation—5 hours. Pre-requisite: course 2 or 2AT. Conversational practice based on everyday vocabulary of modern spoken Spanish. Review of grammatical principles and expansion of vocabulary through readings of modern texts.

3ATA-3BAT=3ATC. Individualized Instruction in Spanish (2-2-2) I-II-III. (Samaniego in charge)
   Awarded Pre-requisite: course 2 or 2ATA-2BAT=2ATC. Continuation of course 2ATA-2BAT=2ATC.

Upper Division Courses
103A-103B. Hispabian Literature I: Medieval and Golden Age (4-4) I-II, III. The Staff (Chairperson in charge)
   Lecture—3 hours; discussions—2 hours. Prerequisite: course 28 or 7C. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age Literature of Spain, and of Spanish-American colonial literature.

104A. Hispanic Literature II: Modern Peripenier (4) II. The Staff (Chairperson in charge)
   Lecture—3 hours; written reports. Prerequisite: 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.

105A. Hispanic Literature III: Modern Spanish American (4) II. The Staff
   Lecture—3 hours; written reports. Prerequisite: course 28 or 7C. Introduction to the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries.

105B. Hispanic Literature III: Modern Spanish American (4) II. The Staff
   Lecture—3 hours; written reports. Prerequisite: course 28 or 7C. Introduction to the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries. Continuation of course 104A.

106A. Literature of Colonial Spain (4) II. Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Study of the most important authors and movements in the various regions of Spanish America to 1610.

107. Spanish-American Literature of the Eighteenth Century (4) II. Lecture—3 hours; individual or group conferences. Prerequisite: course 28 or 7C. The literary development of Spanish America between independence and Modernismo. Modernismo.

108A. Spanish-American Prose of the Twentieth Century (4) III. Verach
   Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Emphasis on development of the novel. Offered in odd-numbered years.

108B. Spanish-American Prose of the Twentieth Century (4) III. Jalen
   Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Emphasis on the essay. Offered in even-numbered years.

109. Spanish Drama of the Golden Age (4) III. Sánchez-Romero
   Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Offered in even-numbered years.

109A. Spanish Composition (4) I. The Staff
   Lecture—3 hours; discussions—2 hours. Prerequisite: course 28 or 7C. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

109B. Advanced Spanish Composition (4) II. The Staff
   Lecture—3 hours; discussions—2 hours. Prerequisite: course 28 or 7C. Practice in writing critical essays based on textual analysis of selected works from Spanish literature.

111. Don Quijote (4) II.
   Lecture—3 hours. Prerequisite: course 28 or 7C.

114. Spanish Romantic Literature (4). Scafi
   Lecture—3 hours; conferences and reports. Prerequisite: course 28 or 7C. Practice in writing critical essays based on textual analysis of selected works from Spanish literature.

115. Lyro Poetry of the Golden Age (4) III. Sánchez-Romero
   Lecture—3 hours. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

119. Spanish Novel of the Nineteenth Century (4) III. Scafi
   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.

120B. Twentieth-Century Spanish Drama (4) III.
   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. Prerequisite: course 28 or 7C. Offered in odd-numbered years.

124. Chicano Culture (3). Rojas
   Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Study of Chicano culture in the Southwest from 1899 to the present, emphasis on the period after 1948. Lecture and discussion to be in English, readings in English and/or Spanish. May not be counted as part of major in Spanish. Offered in odd-numbered years.

Note: For key to footnote symbols, see page 126.
The major programs in statistics are designed to make possible a wide variety of career choices. 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 interdependence of statistical theory and the applications of statistics.

The concurrent study of statistics and a field of applications at an advanced level will serve students well either in preparing for a career or in preparing for graduate study. Students with a strong interest in a quantitative discipline are encouraged to pursue a double major combining statistics and this discipline.

Statistics and Computer Science. These two fields interact in many ways, with each discipline having applications to the other. Applied statistical work relies on computer science areas such as database management, numerical analysis, algorithm optimization and graphics, while computer science uses statistics in areas such as pattern recognition, evaluation of operating systems and simulation. Thus advanced courses in computer science are recommended for all students in statistics. In particular the degree program, Statistics—Computer Science, is designed as an integrated package combining statistics and computer science.

Statistics

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cullus, Mathematics 21A, 21B, 21C</td>
<td>12</td>
</tr>
<tr>
<td>Linear algebra, differential equations,</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics 22A, 22B</td>
<td></td>
</tr>
<tr>
<td>Computer science, Engineering 5 or Mathematics 29A (or the equivalent)</td>
<td>3</td>
</tr>
<tr>
<td>Statistics through computer science, Statistics 32</td>
<td>3</td>
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</tbody>
</table>

Depth Subject Matter

| Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent | 7 |
| Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C | 12 |
| Two courses in Statistics 131 as a prerequisite | 6 |
| Statistical computing, Statistics 141 | 3 |
| Discrete-event simulation, Electrical and Computer Engineering 186 | 3 |
| Data structures, Mathematics 129A | 3 |
| Computer structure and assembly language, Electrical and Computer Engineering 170 | 4 |
| File systems, Electrical and Computer Engineering 185 or Mathematics 129B | 3 |
| Numerical analysis, Mathematics 128A, 128B | 3 |
| One course from Mathematics 108B, Electrical and Computer Engineering 181, 185A | 3 |

Total Units for the Major 60-61

Statistics

B.S. Major Requirements:

| Option: Statistics—general; Statistics—Computer Science | UNITS |
| Preparatory Subject Matter | 24-30 |
| Calculus, Mathematics 21A, 21B, 21C | 12 |
| Linear algebra, differential equations, | 6 |
| Mathematics 22A, 22B | |
| Computer science | |
| Statistics (general) option | 3 |
| Mathematics 29A or Engineering 8 (or the equivalent) | |
| Computer Science courses | 3 |
| Mathematics 29A-29B or Electrical and Computer Engineering 8 and 80, 131A, 131B | |
| Statistics through computer science, Statistics 32 | 3 |

Total Units for the Major 60-61

Certificate in Statistics

Lower Division Courses

12. Introduction to Discrete Probability (3) T. The Staff Lecture—3 hours. Prerequisite: two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; con-
**Statistics**

13. **Elementary Statistics** (4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: two years of high school algebra. Measuring and analyzing data; descriptive statistics and graphical representations of data; correlation and regression; elementary probability and sampling distributions; estimation and hypothesis testing; inference for means and proportions; chi-square goodness-of-fit; confidence intervals for proportions; one-way analysis of variance; multiple comparisons; contingency tables. Offered in even-numbered years.

13A. **Introduction to Probability** (4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: Mathematics 168 or 169. Probability measures, random variables and their distributions, expectations and moments, the laws of large numbers and the central limit theorem. Offered in odd-numbered years.

13B. **Introduction to Mathematical Statistics** (4-4) II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions and their moments and moment-generating functions, laws of large numbers and the central limit theorem. Offered in odd-numbered years.

13C. **Advanced Regression Analysis** (3) II. The Staff

Lecture—2 hours. Prerequisite: course 13B. Multiple regression and correlation, analysis of variance, generalized linear models, repeated measures ANOVA, mixed-effects models, and statistical computing packages. Offered in odd-numbered years.

13D. **Design of Experiments** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 13C. Topics from balanced and partially balanced incomplete block designs, fractional factorial designs, and response surfaces. Offered in odd-numbered years.

13E. **Statistical Methodology and Analysis** (3-3) II-III. The Staff

Lecture—3 hours. Prerequisite: course 231C. Statistical theory of inference, robustness, sequential analysis, non-parametric statistics. Offered in odd-numbered years.

13F. **Time Series Analysis** (3) II. The Staff

Lecture—2 hours. Prerequisite: course 13A or Mathematics 131C or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations. Linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in odd-numbered years.

13G. **State Analysis** (3) II. The Staff

Lecture—3 hours. Prerequisite: courses 131B-131C and 237B. Multivariate normal processes, spectral estimation, tests of hypotheses, regression, discrimination filtering, spectral analysis of variance, ARIMA processes, state space models, and maximum likelihood estimation. Offered in even-numbered years.

13H. **Theory of Multivariable Analysis I** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 231C or consent of instructor. Review of measure theory; standard multivariate normal distribution theory; multiple, partial, and canonical correlation; maximum likelihood estimation; properties of the Wishart distribution; Hotelling's T² test; union intersection principle; simultaneous linear compounds; likelihood ratio testing procedure; multivariate regression analysis. Offered in odd-numbered years.

13I. **Theory of Multivariable Analysis II** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 238A. Multivariate analysis of variance; profile analysis; growth curve analysis; principal component analysis; inference on variances; factor analysis. Classification and discrimination; distribution of characteristic roots. A Bayesian approach to multivariate analysis. Testing independence of sets of variables, canonical correlations, cluster analysis. Offered in odd-numbered years.

13J. **Seminar in Statistics** (1-8) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)

13K. **Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Special topics in statistics appropriate for study at the graduate level. (S/U grading only.)

13L. **Dissertation Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (S/U grading only.)

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**Subject A**

See under University Requirements, page 64; 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
(752-3569)

Faculty
Clara S. Bailey, D.V.M., Ph.D., Assistant Professor
Eugene M. Breznock, D.V.M., Ph.D., Associate Professor
Ned Buyukmihci, V.M.D., Assistant Professor Robert M. Cello, D.V.M., Professor
I. M. Gourley, D.V.M., Ph.D., Professor Steve C. Hasskins, D.V.M., M.S., Associate Professor Terrell A. Holdiday, D.V.M., Ph.D., Professor Andrew D. Kelly, Jr., D.V.M., Assistant Professor Robert L. Leighton, V.M.D., Professor Bruce R. Madewell, V.M.D., Associate Professor Susan V. Manley, D.V.M., Assistant Professor Deirdre M. Malloy, D.V.M., Ph.D., Professor Harold R. Parker, D.V.M., Ph.D., 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. Thelien, D.V.M., Professor Philip Vasseur, D.V.M., Assistant Professor John D. Wheat, D.V.M., Professor Allida P. Wind, D.V.M., Lecturer

Part-Time Clinical Faculty

Courses in Surgery
Upper Division Course
109. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Steffey in charge) (RNP grading only)

Graduate Courses
206. Clinical Oncology (3) II. Thelien, Ung Lecture—4 hours; rounds—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A study of neoplastic diseases of animals.
225. Veterinary Anesthesia (1) I. Hasskins Lecture—1 hour; demonstrations. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Advanced course in veterinary anesthesia emphasizing patient management and anesthesia for specific diseases and surgical procedures. Discussions will include the relation between pathophysiology and the anesthesia given.
228. Anesthesia in Research (1) 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 (1) I, II, III. The Staff (Steffey in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Advanced course in scientific foundations of animal anesthesia and critical care. Format is directed by discussion following reading of assigned material and emphasis on foundations in pharmacology and physiology. (SU grading only.)
303. Anesthesia/Critical Care Case Management Conference (1) 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.)
268. Group Study (1-5) I, II, III. The Staff (Steffey in charge)
269. Research (1-12) 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 reperoperative 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, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for care of pet animal patients in the hospital including physical examinations, preoperative and 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, preoperative work-up, assistance at operations, surgical post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)
414. Veterinary Anesthesia (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 anesthesia 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. The Staff (Steffey in charge) 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 outpatients including history taking, neurologic examinations and special diagnostic and therapeutic procedures under the direction of the staff neurologist. (SU grading only.)
422. Veterinary Ophthalmology (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 examinations, special diagnostic techniques, assistance at ophthalmologic surgery and medical and post-surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (SU grading only.)
402. Large Animal Grand Rounds (1-2) 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 ambulatory clinics. (SU grading only.)

Textiles and Clothing
(College of Agricultural and Environmental Sciences)
S. Haig Zeronian, Ph.D., Chairperson of the Division
Division Office, 129 Everson Hall (752-6650)

Faculty
You-ho Hei, Ph.D., Assistant Professor Susan B. Kaiser, Ph.D., Assistant Professor Emory Menefee, Ph.D., Adjunct Professor Mary Ann Morris, Ph.D., Professor Howard Newell, Ph.D., Professor Allen G. Pittman, Ph.D., Adjunct Professor Margaret H. Rucker, Ph.D., Assistant Professor Howard G. Schultz, Ph.D., Professor S. Haig Zeronian, Ph.D., Professor

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 and chemical 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 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, technical service, textile journalism, and design. Those interested in careers in extension service and teaching 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.)

UNITs
Preparatory Subject Matter .................................................................................................................. 74-76
Cultural anthropology (Anthropology 2) ......................................................................................... 4
Introductory psychology (Psychology 1) ............................................................................................ 4
Sociology (Sociology 1) ....................................................................................................................... 5
Economics, including general principles and accounting (Economics 1A-1B, 1A-11B) ....... 17
Written expression, two courses (see College requirements) ......................................................... 8
Oral expression, one course (see College requirements) ................................................................. 4
Chemistry, including organic (Chemistry 1A, 1B, 8A, 8B) ............................................................... 16
Statistics, one course (Statistics 13 or Economics 12) ................................................................. 4-5
Physics (Physics 1A, 1B) ................................................................................................................... 6
Computer Science (Mathematics 19) ................................................................................................. 3
History of art or design, one course ................................................................................................. 3-4

NOTE: For key to footnote symbols, see page 128.

Swedish
See Scandinavian
Textiles and Clothing

Major Adviser, M.H. Rucker.

Minor Program Requirements:
The Division of Textiles and Clothing offers two minor programs for non-major interested in satisfying secondary career objectives.

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.

(Note—Each course is listed under one of three groups: a. Clothing; b. Textiles; c. Field, Group, and Special Study.)

a) Clothing

7. Social and Psychological Aspects of Dress (3) I, II, 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 Industries (3) I, II, Kaiser
   Lecture—3 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods.

17A. Clothing Structure (4) I, II, Hieh
   Lecture—3 hours. Laboratory—3 hours. Prerequisite: clothing construction skills; courses 6 and 7 recommended. Principles of clothing design through the medium of drafting and flat pattern. Construction principles are applied.

17B. Clothing Structure (4) I, II, Hieh
   Lecture—2 hours; laboratory—6 hours. Prerequisite: course 17A. Principles of clothing design through the medium of draping in various textile fabrics.

173. Principles of Fashion Marketing (3) II, Rucker
   Lecture—3 hours. Prerequisite: course 8. Economics 1A, Agricultural Economics 100, or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization, merchandising, pricing, promotion and personnel.

b) Textiles

5. Introduction to Textiles (4) I, II, Morris
   Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textile. Consumer use and fabric characteristics are emphasized.

100. Principles of Polymer Materials Science (3) I, II, Zeonerian
   Lecture—3 hours. Prerequisite: Chemistry 1A-1B or 4A-4B. Chemistry 8A-8B or Engineering 45. Introductory physics. The basic principles of polymer science are presented including polymer structures and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, morphology, and characterization; polymer processing. (Same course as Engineering 147.)

161L. Structure and Properties of Fibers (3) I, II, C. Zeonerian
   Lecture—3 hours. Prerequisite: course 162. The structure, properties and reactions of natural and man-made fibers; the relations between molecular structure of fibers and their physical properties, interactions of fibers and detergent.

161L. Textile Chemical Analysis Laboratory (1) I, II, Zeonerian
   Laboratory—3 hours. Prerequisite: course 161. Textile laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries.

162. Textile Fabric (3) I, II, Morris
   Lecture—3 hours; laboratory—2 hours. Course 6. Properties of fabrics as related to serviceability, comfort, and appearance.

162L. Textile Fabrics Laboratory (1) I, II, Morris
   Laboratory—3 hours. Prerequisite: course 162. Textile lab methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.

163. Textile Coloration and Finishing (3) I, II, Zeonerian
   Lecture—3 hours; laboratory—2 hours. Course 162, Chemistry 66, Physics 15. Basic principles of dyeing, printing, and finishing of textiles: color theory, structure and properties of dyes and finishes; the effects of variables and auxiliaries on dyeing, printing, and finishing, dye and finish fixation and fastness.

163L. Textile Coloration and Finishing Laboratory (1) I, II, Zeonerian
   Laboratory—3 hours. Prerequisite: course 163. Demonstrates various aspects of dyeing, printing, and finishing of textile substrates including the effects of variables and auxiliaries on dyeing, printing, and finishing properties of the finished textile.

164. Principles of Apparel Production (3) I, II, Hieh
   Lecture—3 hours. Prerequisite: course 167. Agricultural Economics 113. Overview of research, theoretical basis, technology, and processes in the apparel manufacturing industries including study of product design, materials utilization and fabrications, management controls, mechanism, production design.

165. Textile Processes (3) I, II, Zeonerian
   Lecture—3 hours. Prerequisite: courses 163, 165. Theoretical aspects of physical and chemical treatment of textile fiber yarns and fabrics. Textile pre- and post-treatment, physical processing, chemical finishing, and dyeing. Effect of processes on textile and end-use properties and on the environment. Offered in odd-numbered years.

220. Textile Product Quality and Standards (3) I, II, Zeonerian
   Lecture—3 hours. Prerequisite: course 161. Principles involved in establishing standards for implementation of government laws and regulations concerning textiles and clothing and quality controls for textile products. Offered in even-numbered years.

   Lecture—3 hours. Prerequisite: course 7, upper division or graduate course in social sciences. (Agricultural Science and Management 150 and one in a behavioral science, e.g., Psychology 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables.

c) Field, Group, And Special Studies

47. Field Study (1) I, II, Kaiser, Rucker
   Seminar—5 to 8 hours; field trips—2 days. Prerequisite: consent of instructor. Registration in advance required. Field trip to observe commercial aspect of the design, production, development, distribution and maintenance of textiles and clothing. To be given between winter and spring quarters. Considered a spring course for pre-enrollment, Zeonerian (c) charge.

90. Challenges and Opportunities in Textiles and Clothing (1) I, II, Kaiser, Rucker
   Seminar—1 hour. One semester per week at which specialists in selected areas of textiles and clothing survey their part in today's industry, indicating challenges, opportunities and prospects for the appropriately trained university graduate. May be repeated for credit. (P/N grading only.)

92. Internship in Textiles and Clothing (1-4) I, II, III.
The Staff (Zeonerian in charge)
   Laboratory—3-45 hours. Prerequisite: consent of instructor. Work-experience off-campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/N grading only.)

98. Special Study for Lower Division Students (1-5) I, II, III.
The Staff (Zeonerian in charge)
   Laboratory—0-36 hours. Prerequisite: consent of instructor. Work-experience off-campus in a fields or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/N grading only.)

100A-100X. Introduction to Research in Textiles (2-2) I, II, III.
The Staff (Zeonerian in charge)
   Laboratory—6 hours. Prerequisite: senior standing with a textile-related major and consent of instructor. Senior thesis on independent problem selected begins in course 100A and will be continued and completed in course 100X. (Deferred grading only, pending completion of sequence.)

192. Internship in Textiles and Clothing (1-12) I, II, III, IV.
The Staff (Zeonerian in charge)
   Laboratory—3-12 hours. Prerequisite: consent of instructor. Work-experience off-campus in a textiles or clothing-related area. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutor another textiles course. (P/N grading only.)

196. Directed Group Study (1-2) I, II, III, IV.
The Staff (Zeonerian in charge)
   (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV.
The Staff (Zeonerian in charge)
   Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.)

292. Research Conference (1) I, II, III, IV, V.
The Staff (Zeonerian in charge)
   Discussion—1 hour. Prerequisite: graduate standing, consent of instructor. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (S/U grading only.)

293. Recent Advances in Textiles (3) III.
The Staff (Zeonerian in charge)
   Lecture—3 hours. Prerequisite: two upper division courses in Textiles and Clothing or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. Multidisciplinary aspects of the topics selected will be stressed. May be repeated for credit.

298. Group Study (1-5) I, II, III, IV.
The Staff (Zeonerian in charge)
   (S/U grading only.)

299. Research (1-12) I, II, III.
The Staff (Zeonerian in charge)
   (S/U grading only.)
Textile Science: Vegetable Crops

of the more important vegetable cultivars, their origin, morphology, reproducibility, and diet—vegetable species, minor and exotic vegetables, and trends in development of new cultivars.

115. Seed Physiology and Production (3) III. 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) I, II. Howard
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2; course 101 recommended. Survey of vegetables of the world with emphasis on topiary, subtropical, and exotic vegetables. Principles topics considered are botany, origin, geographic distribution, ecology, culture physiology, current research, and use. Written and oral reports are made on vegetable production of a region or country on selected vegetables.

132. Internship in Vegetable Crops (1-12). I, II, III. The Staff
Department Chairperson in charge.
Laboratory—3-36 hours. Prerequisite: consent of instructor. Work experience or on-campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (P/N grade only.)

155. Field Study of Vegetable Insects (1) I, II. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research institutions, farm operations, field conditions,extension service, marketing, processors, equipment, etc. To be given between winter and spring quarters. Considered a spring course for preenrollment. (P/N grade only.)

177. Tutoring in Vegetable Crops (1-3). I, II, III. The Staff
Laboratory—3-3 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and autoclave instruments, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units.

183. Directed Group Study (1-5). I, II, III. The Staff
Max. 15 units. (P/N grade only.)

199. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Rappaport in charge) (P/N grade only.)

Graduate Courses

212. Postharvest Physiology of Vegetables (4) II, Yang
Lecture—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Comparative physiological importance of harvested vegetables representing diverse plant structures; emphasis on experimental studies of maturation, contamination and postharvest physiological disorders; lecture stresses species responses and research procedures.

220. Vegetable Genetics and Improvement (4) I. R. L. Rappaport
Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; course 105 and Plant Science 113 recommended. Breeding systems of vegetable species as affected by self-incompatibility, flower structure, pollen vectors, and other reproductive factors. Problems of chromosome number and structure heterogeneous resistance, and species hybrids peculiar to vegetable improvement.

230. Selected Methods in Vegetable Research (3) III. Orton
Laboratory—1 hour; laboratory—4 hours. Prerequisite: one course from Plant Science 102, Botany 111A, 111B, Biology 102A, 101A, or 101B. 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.

265. Seminar (1) I, II, III. The Staff (Rappaport in charge)
Discussion—1 hour. (S/U grade only.)

269. Special Topics in Vegetable Crops (2) I, II, III. The Staff
Rappaport in charge.
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate student standing. In-depth coverage of selected topics in vegetable crops and related disciplines. Topos and
Veterinary Medicine, School of Edward A. Rhode, D.V.M., Dean of the School Robert J. Hansen, Ph.D., Associate Dean—Student Services Donald G. Low, D.V.M., Ph.D., Associate Dean—Instruction Bennie I. Ostlund, D.V.M., Ph.D., Associate Dean—Research William J. Winchester, D.V.M., Assistant Dean School Office, 1024 Haring Hall (752-1380)

Courses in Veterinary Medicine

Upper Division Course

192. Work-Study Experience in Veterinary Science—12 I, II, III, Rhode Work-experience—3-3.5 hours: final report. Prerequisite: upper division standing; approval of project prior to period of internship by supervisor. Supervised work-study experience in Veterinary Medicine. (PRN grading only.)

Graduate Courses

228. Advanced Small Animal Cardiology (119) II, Thomas Lecture—16 hours total. Prerequisite: course 425B or the equivalent. Cardiovascular diseases of canine and feline species.

230. Hemolyticemic Abnormal (6) II, Jain Lecture—36 hours total. Laboratory—42 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Abnormal function of the hemolyticemic system and diseases affecting the blood, blood forming organs and lymphatic system in animals. The manifestation of these diseases, pathology, pathogenesis, diagnosis and medical and surgical treatments of hemolyticemic disease will be discussed.

248. Summer Clinics (5 or 16) Extra-session summer. Hiepe Active participation in clinic—40 hours (either four or six weeks). Prerequisite: completion of first-year of study in School of Veterinary Medicine. Diagnosis and treatment of animal diseases. Students responsible for case records, care of patient, physical examinations, and participation in surgery. Graded determined by the teaching faculty by observation of student's performance of assigned duties, by rounds and discussions, the preparation of case records, and competence and responsibility shown in the care 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

400A. Veterinary Medicine Orientation (3) I. Low Discussion—eight 2-3 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.)

400B. Veterinary Medicine Orientation (1.5) I. Low Discussion—eight 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Record of student's capabilities, breed characteristics and purpose in animal species of veterinary importance. Introduction and practice of procedures of animal handling and restraint and selection of diagnostic examination and therapy. (SU grading only.)

401. The Normal Animal, Examination and Topographic Anatomy (3) I, Kitchell Lecture—10 hours discussion—ten 2-hour sessions; laboratory—ten 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Anatomical structures, features and landmarks fundamental to an integrated study of organ systems, the performance of physical examination, routine diagnostic and therapeutic procedures. (SU grading only.)

402A. Cell Biology (3.5) I, Popper Lecture—22 hours: discussion—five 2-hour sessions; laboratory—five 3-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine. A functional and structural study of cells and their organelles with emphasis on the organization and specialization of cells to form the primary tissues of the body.

403A. Principles of Pharmacology (1.7) III, Joy Lecture—17 sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Designed to provide veterinary medical students with a basic foundation for understanding how drugs are used to restore diseased animals to normal health. Course introduces principles of pharmacology and begins a consideration of drugs by pharmacological class.

403B. Principles of Pharmacology (3.3) I, Giri Lecture—3 hours; laboratory—3 hours: discussion—five 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Course examines the interactions and effects of drugs on various organ systems from a comparative, animal oriented viewpoint. The laboratories are designed to demonstrate the application of such material to therapeutics.

404. Fundamentals of Radiography (2.7) III, Hornof, Tunnel Lecture—24 one-hour sessions; laboratory—three 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Ionizing radiation and its interaction with and biological systems; instrumentation and principles of diagnostic radiology; radiotherapy and nuclear medicine; diagnostic applications of x-rays and basic principles of veterinary radiology.

405A. Parasitology (3.8) II, Wong, Baker Lecture—24 hours: discussion—ten 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Course is intended to serve as an introduction to the study of parasitology. Emphasis is placed on the recognition, life-cycle and ecology of arthropods, helminths and protozoan parasites of domestic animals. The relationships of these parasites to disease is briefly discussed.

405B. Clinical Parasitology (3) III, Baker Lecture—2 hours; laboratory—ten 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Clinical applications of pathology, pathogenesis, diagnosis, and treatment of the more important parasites of domestic animals.

406. Principles of Behavior (1.1) I, Hart Lecture—9 hours. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Normal behavioral patterns dealing with feeding, elimination, social, sexual and maternal behavior of domestic livestock and pets. Determinants of behavior including genetics, early experience, learning and hormones.

407A. Principles of Surgery (1) I, Vasseur Lecture—10 sessions total. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Principles and methods of surgical care will be developed and applied to surgery. Current principles of surgical therapy will be discussed.

407B. Principles and Techniques of Surgery (1.7) II, Lighton Lecture—8 sessions total; laboratory—nine 3-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Series of surgical procedures are done on experimental dogs to provide experience and develop skill and confidence in tissue handling, ligation of vessels, maintenance of hemostasis, obtaining adequate exposure, identification of structures and suturing techniques.

407C. Surgical Anatomy (1.2) I, Lohe Laboratory—three 3-hour sessions. Principles—second-year standing in School of Veterinary Medicine or consent of instructor. Course involves study of anatomical topics as applied in selected surgical operative procedures. Feasibility and value of approaching animals and structures will be discussed. Tissues and structures basic to surgery will be emphasized.

408. Nutrition and Nutritional Diseases in Animals (3.8) II, Morris Lecture—36 hours total: one 3-hour fieldtrip; laboratory—one 3-hour session. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Nutrition: Principles of nutrition and their application to the feeding of small and large animals. Selected clinical material will be discussed in relation to deficiency symptoms, pathology and biochemical lesions.

409A. Epidemiology (2) II, Ruppersper Lecture—20 1-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Epidemiology and its applications in veterinary medicine.

410. Veterinary Toxicology (2.8) III, Fowler Lecture—28 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Clinical diagnosis and therapeutic and preventive methods for disease of animals produced by chemical poisons, organic and inorganic. The prevalence of toxic agents in the environment and exposure of animals to the incidence, pathology, pathogenesis and treatment of diseases produced by poisons will be discussed.

411A. Laboratory Animal Medicine (2) II, Sedgwick Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnostic, therapeutic and preventive methods for diseases of rabbits, guinea pigs, hamsters and certain related laboratory rodents will be presented to serve the needs of clinical and research veterinarians. Lecture demonstrations with subject species will be provided.

412. Laboratory Animal Medicine (2) II, Sedgwick Lecture—20 sessions total. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters and laboratory species. Emphasis will be placed on animal colony health management technique, and concepts of preventive disease needed by veterinarians in charge of research facilities.

413. Medical Primatology (2) II, Henrickson Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Management of nonhuman primates. (SU grading only.)

414. Integrative Physiological Chemistry (6.6) I, Black Lecture—47 hours total: 12.6 hours laboratory; laboratory—three 3-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Physical-chemical principles underlying metabolism and its control. Course will emphasize structural-functional relationship from the molecular to the tissue level and give a background for understanding.

415. Management and Disease of Cephalopods (2) III, Fowler Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures, demonstrations, and discussions used to illustrate selected medical problems of captive wild animals.

416. Aquatic Animal Medicine (2) III, Amund Lecture—20 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, treatment and prevention of disease of fish and of some aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

417. Cage Bird Medicine (2) I, Fowler Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures on the ecology and epidemiology of disease in free-living and wild animals, including medical management of free-living populations.

419A. Behavior Therapy in Small Animal Practice (3.8) III, Hart Lecture—5 hours total: laboratory—9 hours total. Prerequisite: third-year standing in School of Veterinary Medicine. Clinical application of drug therapy and conditioning procedures to specific type of problem behavior in pet dogs.
427. Equine Internal Medicine (3) III. Carlson
Lecture—30 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Advanced medical and surgical diseases, including those in general medicine, respiratory and gastrointestinal diseases, dermatology, dentistry, ophthalmology, and radiology.

28. Food Animal Medicine (2) II. Jepson
Lecture—20 sessions 1/2 hr. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Nutritional diseases, cystic fibrosis, and other problems in food animals. Allergy, dermatology, ophthalmology, and radiology.

494. Small Animal Surgery 1 (4) II. Knapp
Lecture—1 hour, laboratory—3 hours weekly. Includes medical and surgical conditions of the dog, cat, rabbit, and ferret. Technical aspects of small animal surgery will be covered. (Defeated grading only, pending completion of two-quarter sequence.)

521. Animal Reproduction (4) II. Boulter
Lecture—24 sessions total; laboratory—36 sessions total. Prerequisite: second-year standing in School of Veterinary Medicine. sperm; morphology, physiology, genetics, and medical and surgical treatments of medical and surgical diseases will be discussed.

1. Neutering (3) II. Stevenson
Lecture—8 hours total; laboratory—12 hours total. Prerequisite: first-year standing in School of Veterinary Medicine. Sperm, spermatogenesis, and sperm function in the dog and cat. Allergic reactions, immunology, and radiology.

435. Reproduction (6) II. III. Sartwell and Sartwell
Lecture—44 hours total; laboratory—22 hours total. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The role of the endocrine system in the control of reproduction and the clinical aspects of reproduction (normal and abnormal).

456. Small Animal Gastroenterology (3) III. Feldman
Lecture—12 sessions total. Conditions affecting the reproductive system in the dog and cat, with emphasis on small animal gastroenterology. Histology and histopathology of normal and diseased tissues and glands of domestic animals will be covered.

525. Cardiopulmonary, Renal and Endocrine Systems—Normal Form and Function (8) III. Heuser
Lecture—56 hours total; laboratory—24 three-hour sessions, (discussion-laboratory sessions flexible). Prerequisite: first-year standing in School of Veterinary Medicine. Correlates presentation emphasizing anatomic, physiologic aspects of the cardiovascular, respiratory and renal systems of domestic animals: Homeostatic mechanisms governing body fluids and electrolytes will be included.

526. Cardiopulmonary, Renal, and Abnormal (8) I-II. Ling
Lecture—56 hours total; laboratory—16 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Abnormal function of the circulatory, pulmonary, and renal systems. Clinical and pathologic diseases affecting these systems in animals. The manifestations, pathology, pathophysiology, diagnosis and medical and surgical treatment of these diseases will be discussed. (Defeated grading only, pending completion of two-quarter sequence.)

2. Principles of Anesthesia (1.5) I. Steffey
Lecture—12 hours total; laboratory—3 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Course on basic principles of veterinary anesthesia and the monitoring and management of anesthesia in animals. The clinical use of analgesic drugs and anesthesia equipment.
461. Small Animal Orthopedics (1.6 II) Lecture—14 sessions total, laboratory—2 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine. Surgical approach to joints of the shoulder, hip, elbow and stifle, and fractures of the humerus, radius ulna, pelvis, femur, and tibia.

462. Radiographic Diagnosis: Small Animal (2.5) III. Gornon Lecture—25 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine. Diagnosis of radiographic findings 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.

466. Mixed Large-Animal Anesthesiology (1.5 II) Lecture—15 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Applied clinical anesthesiology for junior veterinary students. Special techniques and consideration for anesthetizing a variety of species, including horses, swine, ruminants, large non-domestic species, cats and dogs.

467. Small Animal Anesthesiology (1.5 II) Lecture—15 hours total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Presentation of material which is basic to safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, and methods of use of common anesthetic drugs and techniques will be discussed.

468. Equine Lameness and Radiology (4) III. Meagher, O’Hagan, Pool, Lohse Lecture—4 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiological diagnosis of causes of lameness in the horse will be emphasized. Methods used in large-animal radiography will be illustrated and latest techniques for treating lameness will be discussed. Anatomy and pathology of some of the musculoskeletal system will also be presented.

468L. Equine Lameness and Radiology (1) III. Meagher, O’Hagan, Pool, Lohse Laboratory—3 hours. Prerequisite: course 468 (concurrent). Priority enrollment for students in equine track; others will be enrolled as space permits.

469. Equine Surgery (2) III. Wheat Lecture—20 sessions total. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Designed to allow veterinary students additional training and experience with surgical procedures in the horse.

469L. Equine Surgery Laboratory (1) III. Wheat Laboratory—3 hours. Prerequisite: course 469 (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 Horse and Foal Diseases (2-2-2) I-III. The Staff (Director VMTH in charge) Lecture—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 Clinic (2.5-15) I-III; Summer Sessions I-III and I. 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 small and large animal species. May be repeated for credit. Students in combined DVM/PVM program enroll for the summer in a fall sequence. (SU grading only, pending completion of three-quarter term.)

472. Urban Practice Clinic (2.5-15) I-III. Hiperpe 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 relating to large animal veterinary practice. May be repeated for credit. Students in combined DVM/PVM program enroll for the Summer Sessions I and II sequence. (SU grading only, pending completion of three-quarter sequence.)

474. Equine Practice Clinic (2.5-15) I-III. Hiperpe Veterinary clinical practices—40 hours, plus animal patient care and emergency/night rotation (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 relating to equine veterinary practice. May be repeated for credit. Students in combined DVM/PVM program enroll for the Summer Sessions I and II sequence. (SU grading only, pending completion of three-quarter sequence.)

475. Food Animal Practice Clinic (2.5-15) I-III. Hiperpe 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 relating to equine veterinary practice. May be repeated for credit. Students in combined DVM/PVM program enroll for the Summer Sessions I and II sequence. (SU grading only, pending completion of three-quarter sequence.)

476. Zoological Practice Clinic (2.5-15) I-III. Hiperpe 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 relating to zoological veterinary practice. May be repeated for credit. Students in combined DVM/PVM program enroll for the Summer Sessions I and II sequence. (SU grading only, pending completion of three-quarter sequence.)

480A-480B-480C First-year Clinic Rounds (1.2) I-III. The Staff (Director VMTH in charge) Discussion—twelve 1¾ hour sessions total. Prerequisite: first-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (SU grading only, pending completion of three-quarter sequence.)

481A-481B-481C Second-year Clinic Rounds (1.2) I-III. The Staff (Director VMTH in charge) Discussion—twelve 1½ hour sessions total. Prerequisite: second-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (SU grading only, pending completion of three-quarter sequence.)

Courses in Veterinary Microbiology

Upper Division Courses

126. Fundamentals of Immunology (3) I. Buchanan, Hirsh Lecture—8 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or equivalent. Immunoreponse and defenses of host against infectious agents. Antibodies, antigen-antibody 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) II. Gershwin Laboratory—6 hours. Prerequisite: course 126. Laboratory procedures in immunology. The immune response to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

127. Medical Bacteria and Fungi (5) III. Babinstein in charge Lecture—5 hours, laboratory—5 hours. Prerequisite: general microbiology; basic immunology. An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Limited enrollment.


132. Introduction to Parasitology (5) III. Wang Lecture—3 hours; laboratory—4 hours. Prerequisite: Zoology 2-2L. The nomenclature and repair and parasites. Their general morphology, life cycles, epidemology, diagnostic techniques, and post-parallel relationships. Individual laboratory studies supplemented with demonstrations.

196. Directed Group Study (1-5) I, II, III. The Staff (Baker in charge) Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Baker in charge) (P/NP grading only.)

Graduate Courses

270. Advanced Immunology (6) III. Osebold, Gershwin Lecture—3 hours; laboratory—4 hours. Prerequisite: course 126 and Immunology 450 or consent of instructor. Immuneologibin structure and function. Antigenic determinants. Complement. Biology of lymphocytes; cell immunity; immunogens; antigensensitivity. Pathogenic mechanisms in immunological diseases. The immune system—responsiveness, unresponsiveness, immunologic dynamics of infection and resistance. Methods in immunology and immunobiology. Offered in odd-numbered years.


292. Seminar in Animal Virology (1) I, II, III. Zee Seminar—1 hour. A discussion of the current topics in animal virology. (Same course as Bacteriology 296.)

293. Seminar in Infectious Diseases (1) I, II, III. Babinstein, Hirsh Seminar—2 hours (alternate weeks). A discussion of the current topics in infectious diseases in man and animals. (SU grading only.)


296. Microbiological Diagnosis (2-5) I, II, III. Babinstein, Hirsh Laboratory—6-15 hours. Prerequisite: consent of instructor; concurrent enrollement with course 295. Identification of microbial pathogens in clinical and pathological specimens. Casework in Veterinary Medical Teaching Hospital diagnostic laboratory.

299. Group Study (1-5) I, II, III. The Staff (Baker in charge)

Research (1-12) I, II, III. The Staff (SU grading only.)
Viticulture and Enology
(College of Agricultural and Environmental Sciences)
Cornelius S. Ough, D.Sc., Chairperson of the Department
Department Office, 1023 Wickersom Hall (752-0300)

Faculty
Maynard A. Amerine, Ph.D., Professor Emeritus
Harold W. Berg, M.S., Professor Emeritus
Roger B. Boulton, Ph.D., Associate Professor
James A. Cook, Ph.D., Professor
Richard E. Kepner, Ph.D., Professor (Chemistry)
W. Mark Kliewer, Ph.D., Professor
Ralph E. Kunkee, Ph.D., Professor
Lloyd A. Lider, Ph.D., 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
Dewey D. Rys, Ph.D., Professor (Chemical Engineering)
Vernon L. Singleton, Ph.D., Professor
Robert J. Weaver, Ph.D., Professor
A. Dinamoore, Ph.D., Professor Emeritus
Lynn A. Williams, Ph.D., Assistant Professor
Albert J. Winkler, Ph.D., L.L.D., Professor Emeritus

Related Major Programs: See majors in Fermentation Science (page 218) and Plant Science (page 288).

Related Courses: See courses in Food Science and Technology, Plant Science 112, 112L.

Courses in Viticulture and Enology

Lower Division Courses
3. Introduction to Wine Making (3) I, II, Ill. Kunkee, Singleton
Lecture—1 hour; laboratory—1 hour. An introduction to wine technology. Including effects of alcohol, control 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) (PNN grading only.)

Upper Division Courses
110. Grape Growing (3) I. Weaver
Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2, Botany 2, or consent of instructor. Grape growing including vineyard and morphological orientation, distribution, and cultivation, propagation, varieties and uses, climatic requirements, rootstock varieties, and diseases and insect pests. Vineyard grape industry.

105. Systematic Viticulture Including Fruit Maturation and Handling (3) I. Lider, Meredith
Lecture—1 hour; laboratory—6 hours. Prerequisite: Plant Science 2, and consent of instructor. Principles underlying grape varieties, rootstocks, and varieties of species; genetic factors affecting composition of the fruit during growth and maturation; fruit handling practices for wine, raisin, and table grape production.

116A. General Viticulture (3) III. Cook
Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 and consent of instructor. Principles underlying pruning, training, grafting, and propagation of vines; environmental and economical factors affecting choice of vineyard type and location; establishment of vineyards.

116B. General Viticulture (3) III. Lider
Lecture—2 hours; eight 3-hour laboratory sessions; one Saturday field trip. Prerequisite: course 116A. Economics and scientific principles of recommended vineyard management practices including irrigation, mineral and carbohydrate nutrition, root development and fruit set, virus and fungal diseases, and insect control.

123. Analysis of Musts and Wines (3) I. Ough
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Chemistry 5, Food Science and Technology 103 recommended. The principles and practices of wine analysis.

124. Wine Production (3) I. Ough
Lecture—2 hours, laboratory—3 hours. Prerequisites: Botany 2, Chemistry 5, recommended. Courses 3, 123, 124, 125, 126. (May be taken concurrently.) The principles and practices of making the various types of wines with extensive practical experience with the students working at the winery.

125. Wine Types and Sensory Evaluation (3) III. Noble
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Chemistry 5, recommended. Courses 3, 123, 124, 125, 126. Major types of wines and the factors influencing their quality; principles of sensory evaluation.

126. Wine Processing (3) I. Boulton
Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2, Chemistry 5, recommended. Courses 3, 123, 124, 125, 126. (May be taken concurrently.) The principles and practices of processing the varieties of wines with special reference to the grape varieties used and the methods of vinification required for each.

135. Wine Processing Equipment (3) II. Boulton
Lecture—1 hour, field trip. Prerequisite: courses 124, 126. Food Science and Technology 110A, 110B recommended. A course for undergraduates which provides a systematic description of unit operations and processing equipment used in modern commercial winery operation. 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 (4) II. Williams
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5, Food Science and Technology 110A, 110B. The conversion of alcoholic beverages to other distilled beverages; characteristics of raw materials, fermentation, distillation, aging, and sensory evaluation.

192. Internship (1-12) I, II, III. Summer. The Staff (Ough in charge) (PNN grading only.)

194. Directed Group Study (1-9) I, II, III. The Staff (Ough in charge) (PNN grading only.)

189. Special Study for Advanced Undergraduates (0-6) I, II, III. The Staff (Ough in charge) (PNN grading only.)

Graduate Courses
217. Microbiology of Wine Production (3) III. Kunkee
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 123, 124, 125, 126. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines.

218. Plant Pathology (3) III. Singleton
Lecture—3 hours. Prerequisite: Biochemistry 101 or the equivalent and consent of instructor. The effect of certain natural and chemical factors on the development and control of plant diseases and pests. Plant disease vectors, and interactions of plant and insects on the disease process.

235. Winery Design and Economics (2) II. Boulton
Lecture—2 hours, 4 design classes; field trip. Prerequisite: course 135, 110A, 110B, and Economics 110. A graduate course which specializes in the design and economic evaluation of modern commercial wineries. Emphasis is given to the design of new wineries and the interaction of size, equipment, and bottle prices on the economic feasibility of the venture. Offered in odd-numbered years.

280. Seminar (1) I, III. Meredith
Seminar—1 hour. Prerequisite: consent of instructor. (SU grading only.)

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, page 309.

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 97.


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 (752-1689).

Lower Division Courses
10. Water and Man (3) III. Hagan
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 uses in developing and developed nations. A cultural and technical course providing an introduction to water science and engineering.

41. Ecology of Polluted Waters (3) II. Knight
Lecture—3 hours. Prerequisite: Biological Sciences 1 or the equivalent. Causes and nature of various types of pollution and their effects upon aquatic life. Particular emphasis on biological effects of toxic compounds, inorganics, and organic compounds, suspended matter, organic matter, salts and heated water on aquatic life.

92. Water Science Internship (1-12) I, III. The Staff (Chairperson in charge)
Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-experience experience in the field of water science. Internship supervised by a member of the faculty. (PNN grading only.)
Water Science; Wildlife and Fisheries Biology

Upper Division Courses

106. Principles of Water Science (4) I. Lecture—4 hours; laboratory—3 hours. Prerequisites: Chemistry 1A, Physics 2A, and Botany or 2 Plant Science 2; Chemistry 1B and Physics 2B recommended. Introduction to the basic principles of the distribution of water and water problems. Topics include hydrology (surface and ground water), soil chemistry, flow through porous media, water in soil-plant-air relationships, water supply, and water pollution through pipes and channels, and regulatory water-resource problems.

103. Water Quality, Salt Control and Reclamation (4) I. Biggar Lecture—4 hours; laboratory—3 hours. Prerequisites: course in soil or water chemistry or consent of instructor. Water quality parameters, water analysis and water pollution control; evaluation of salt factors; reclamation of soil and disposal of waste water and their effects on receiving waters; localized and regional river basin problems in relation to salinity control and water quality.

104. Plant-Water-Soil Relationships (4) III. Hisao Lecture—3 hours; discussion—1 hour; two mid-quarter examinations to be arranged. Prerequisites: course 100 or the equivalent preparation in elements of water in soil and plants, Soil Science 100 and one additional course in soils or plant physiology; or consent of instructor. Principles of plant-water-salt relationships 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.

110A. Irrigation Principles and Practices (3) III. II. Henderson Lecture—3 hours. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and water management; examination of irrigation methods; plant responses to irrigation regimes; water use by crops; procedures for determining frequency and depth of irrigation; distribution systems; water measurement; farm water supply including wells and pumping plants; water application methods; land drainage systems.

110B. Irrigation Principles and Practices (3) I. Lecture—3 hours. Prerequisite: Physics 2B. General course for agricultural and engineering students dealing with engineering aspects of irrigation and water management; examination of irrigation methods; plant responses to irrigation regimes; water use by crops; procedures for determining frequency and depth of irrigation; distribution systems; water measurement; farm water supply including wells and pumping plants; water application methods; land drainage systems.

122. Biology of Running Waters (3) I. Knight Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in biology and junior standing. The study of aquatic animals and plants in their environment; various factors affecting the distribution of fresh-water plants and animals is emphasized in a manner particularly suitable for students of freshwater ecology, soil and water science, and related natural resources.

123L. Biology of Running Waters Laboratory (2) I. Knight Lecture—2 hours (including 2 or 3 weekend field trips). Prerequisite: introductory course in biology or consent of instructor and a course in plant soil; course 123 (concurrent). Course allows interested students to obtain experience in sampling, processing, and synthesizing data field trips. Field trip material provides an understanding of the structure and function of stream ecosystems.

140. Seepage and Drainage (3) III. Nielsen Lecture—3 hours. Prerequisite: Engineering 103A or Water Science 142. Flow through porous media; measurement of hydraulic conductivity; seepage through hydraulic structures; anisotropy flow nets, drainage design for water table and salt control. (Same course as Engineering; Agricultural 140.)

141. Hydrology (3) II. Bugy Lecture—3 hours. Prerequisite: consent of instructor. Principles of hydrologic analysis including consideration of precipitation, stream flow, and ground water phenomena.

142. Hydrobracta (3) III. Scott, Bugy Lecture—2 hours; laboratory-discussion—3 hours. Prerequisite: Physics 2A; course 100 recommended. An introductory course for soil water management and hydrology. Physical properties of soil; fluid statics; principles and equations of flow, continuity, and conservation; flow in pipes and open channels, flow measurements; and stream flow performance and selection.

149. Groundwater Hydrology (3) I. Manfo Lecture—3 hours. Prerequisite: Mathematics 16A-16B and course 100; course 142 or Engineering 103A recommended. Occurrence, distribution, and movement of groundwater; transient groundwater-flow systems. Aquifer tests. Well construction, operation, and maintenance. Groundwater exploration, quality, and contamination. Offered every other year.


154. Water and Related Resource Allocation from Economic Principles (3) I. Lecture—2 hours. Prerequisites: Mathematics 16A or consent of instructor. An examination of information needed for analysis and planning, capital production, and capital consumption in water-resource systems (with emphasis on farm irrigation methods) and appurtenant structures. Preparation for land for irrigation. Problem solving and field and laboratory exercises.

160. Water Application Systems (4) I. Pruitt Lecture—3 hours; laboratory—3 hours. Prerequisite: senior standing in Soil and Water Science or Civil Engineering, or consent of instructor. Indroduction to the planning, development, and application of water systems (with emphasis on farm irrigation methods) and appurtenant structures. Preparation for land for irrigation. Problem solving and field and laboratory exercises.

170. Field Studies in Irrigation and Drainage Management (1) Extra-session summer. Robinson in charge Discussions and field observations—7 days. Prerequisite: junior standing in Soil and Water Science or Civil Engineering, or consent of instructor. Field observations and discussions on irrigation and drainage systems in the San Joaquin Valley.

172. Farm Irrigation Management (3) III. Hendersen Lecture—3 hours; one field trip. Prerequisite: course 104 or 110A, or consent of instructor. The water budget is used as a means of optimizing crop yield, soil, climate, and water system operations, and operational factors to develop a rationale for farm irrigation practices. Plant and soil factors are emphasized.

186. Chemistry of the Water Cycle (4) III. Tanji Lecture—4 hours; laboratory—3 hours. An introductory course in geochemistry, soils, hydrology, and thermodynamics. 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, stream and rivers, lakes, ground waters, estuaries, and oceans.

192. Water Science Internship (1-12) I, II, III, The Staff (Chairperson in charge) Lecture—0 hours; laboratory—0 hours. Prerequisite: completion of 84 units and consent of instructor. Work-experience off and on campus in water science. Internship supervised by a member of the faculty. (P/N grading only.)

196. Directed Group Study (1-3) I, II, III, The Staff (Chairperson in charge) (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge) (P/N grading only.)

Graduate Courses

210. Water-Soil-Plant Relationships in Irrigation Programming (3) III. Hendersen 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 developing and developed nations.

211. Advanced Plant-Water Relations (3) I. Hisao Lecture—3 hours; discussion sessions. Prerequisite: course 104 or Plant Science 101 or Botany 11A; elementary knowledge of metabolism and rudiments of thermodynamics or concurrent enrollment in unit of course 256 with instructor's consent. Crop and component potentials of water; quantitative aspects of water transport to, within, and from plants; transpiration, regulation, and environmental factors affecting plant water status; metabolic and other physiological processes associated with efficient water use, and with xerophytes; responses to water deficiency and salinity. Offered every fourth quarter (fall 1986).

212. Evapotranspiration (2) II. Pruitt Lecture—2 hours. Prerequisites: Atmospheric Science 20, 20L, or 106, or consent of instructor. Radiation and energy balances of water, soil and vegetative surfaces and the effects of wind, temperature, humidity, and other factors; transpiration; prediction of evapotranspiration; soil water, energy balance, and empirical approaches.

215. Water-Resource Systems Analysis: Deterministic Models (3) I. Manfo Lecture and/or laboratory. 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. Allocation of aqueduct and reservoir capacities, conjunctive surface and groundwater systems. Sequencing of water supply projects.

217. Hydrochemical Models (3) III. Tanji Lecture—2 hours; laboratory—3 hours. Prerequisite: physical chemistry, calculus and computer programming or consent of instructor. Mathematical and computer modeling of chemical state variables and terrestrial and aquatic systems. Equilibrium and rate models; transport models; systems assessment and simulations.

222. The Biology of Streams (5) III. Knight Lecture—5 hours. Prerequisites: consent of instructor; course in physical chemistry, ecology and soil chemistry or consent of instructor. Advanced course in water chemistry emphasizing principles governing interactions of inorganic constituents in water with sediment and soils. Topics include electro-kinetic properties of clay, membrane phenomena, rate processes and thermodynamic applications to the water soil system. Offered in odd-numbered years.

226. Hydrochemical Models (3) III. Tanji Lecture—2 hours; laboratory—3 hours. Prerequisite: physical chemistry, calculus and computer programming or consent of instructor. Mathematical and computer modeling of chemical state variables and terrestrial and aquatic systems. Equilibrium and rate models; transport models; systems assessment and simulations.

250. Physics of Soil Water Movement (3) III. Nielsen Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor; course in physics of soil or water systems recommended. The physics of fluid flow through porous media; miscible and immiscible displacement theories; theory of capillary pressure and pore size distribution with emphasis on unsaturated flow problems; physical aspects of permeability, porosity, specific surface and pore structure. Offered in odd-numbered years.

260. Seminar (1) II. Knight Seminar—1 hour. Prerequisite: graduate standing. Critical review of relevant water quality problems and recent water quality research and literature.

269. Seminar in Water-Soil-Plant Relations and Irrigation (1) I, II, III. Henderson, S. Hisao Seminar—1 hour. Prerequisite: graduate standing and background in water-soil relations. Current methods and techniques of applied soil research. Internal presention on current developments in water-soil-plant relations, plant water use, and irrigation management. Associated discussion analyzes recent approaches and techniques and data interpretations. (S/U grading only.)

280. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Wetland and Fisheries Biology

(College of Agricultural and Environmental Sciences)

Peter B. Moyle, Ph.D., Chairperson of the Division
Division Office, 66 Briggs Hall (752-6566)
The Major Program

The Wildlife and Fisheries Biology major deals with the interface between the needs of man and wildlife which must be maintained for the sake of future generations for ecological stability, recreation, and food supply. 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. Emphasis is placed on biological and physical sciences, with specialization in wildlife or fisheries. This program provides training in biology appropriate to careers as wildlife or fisheries biologists, animal control specialists, game or fish technicians, or, following additional academic preparation, for careers in teaching, research, and administration in those areas.

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.)

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<td><strong>Preparatory Subject Matter</strong></td>
<td></td>
</tr>
<tr>
<td>Biology (Biological Sciences 1)</td>
<td>54</td>
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<tr>
<td>Botany (Botany 2)</td>
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<tr>
<td>Chemistry (Chemistry 1A, 1B, 4A, 4B)</td>
<td>16</td>
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<tr>
<td>Computer science (Engineering 5 or Mathematics 19)</td>
<td>3</td>
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<tr>
<td>Math (Mathematics 15A, 16A, 16B)</td>
<td>9</td>
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<tr>
<td>Physics 2A, 2B, 2C</td>
<td>6</td>
</tr>
<tr>
<td>Statistics (Statistics 13, 105, or Agricultural Science and Management 150)</td>
<td>12</td>
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<tr>
<td>Zoology (Zoology 2-2)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Depth Subject Matter</strong></td>
<td></td>
</tr>
<tr>
<td>Chemistry (Biochemistry 101A-101B or Physiological Sciences 101A-101B)</td>
<td>6-7</td>
</tr>
<tr>
<td>Ecology (Environmental Studies 110, Entomology 104, or Zoology 125)</td>
<td>6-7</td>
</tr>
<tr>
<td>Genetics (Genetics 120 or 100A-100B)</td>
<td>4-5</td>
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<tr>
<td>Physiology (Physiology 110)</td>
<td>4-6</td>
</tr>
<tr>
<td>Vertebrate anatomy (Zoology 105 or 106-106A)</td>
<td>6-7</td>
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<tr>
<td>Evolution (Zoology 148, 149, Genetics 103)</td>
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<tr>
<td><strong>Breadth Subject Matter</strong></td>
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<tr>
<td>English and Rhetoric 1 or the equivalent</td>
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<tr>
<td>Social sciences and humanities</td>
<td>12</td>
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<tr>
<td><strong>Courses in the Major</strong></td>
<td>13</td>
</tr>
<tr>
<td>Wildlife and Fisheries Biology 106, 130, 140</td>
<td>13</td>
</tr>
<tr>
<td>Additional Courses (select Plan I or Plan II)</td>
<td></td>
</tr>
<tr>
<td><strong>Plan I: Wildlife Biology specialization</strong></td>
<td>25-28</td>
</tr>
<tr>
<td>Botany (Botany 125 or 108)</td>
<td>9</td>
</tr>
<tr>
<td>Statistics, one upper division course</td>
<td>3-4</td>
</tr>
<tr>
<td>Wildlife biology (Wildlife and Fisheries Biology 100, 110, 111, 111L)</td>
<td>13</td>
</tr>
</tbody>
</table>

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Plan II: Fisheries Biology specialization

26-32

Aquaticultural ecotonomy (Entomology 116 or Zoology 112A with advisor's approval) | 3-5
Fisheries biology (Wildlife and Fisheries Biology 102, 100, 21) | 14
Limnology/opharmacology (Environmental Studies 116, 111L) | 3-4
Statistics, upper division courses | 6-9

Unrestricted Electives | (variable)

Total Units for the Major (minimum) | 180

Major Adviser: J.J. Gehl.
Graduate Study: See page 97.

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

10. Wildlife Biology (4). 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.

92. Internship (1-6). I, II. The Staff (Department Chairperson in charge) Laboratory—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work-learning experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Field Methods in Wildlife Biology (3). The Staff Lecture—10 hours total; laboratory—40 hours total (5 days). Prerequisite: course 110 or 111-111L. Zoology 125 or the equivalent; consent of instructor. Intensive course on methods of studying and reporting data obtained from free-ranging wildlife, from winter and spring snow fowlers conducted in central course for preenrollment. Limited enrollment. (P/NP grading only)

102. Field Studies in Fisheries Biology (3). Extra session—summer. The Staff Lecture—1 hour; laboratory—40-48 hours; field study—4 weeks, and data analysis and presentation—2 weeks. Prerequisite: upper division course each in ecology and fish biology, consent of instructor. Intensive field study of the biology and management of fishes, followed by sample processing, data analysis and presentation. Emphasis is on individual projects and data knowledge gained from other courses on fish and fisheries.

101. Mammalian Biology and Ecology (3). Schwab Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1 and 21; Zoology 2-2 or equivalent; course in ecology recommended. Integrated introduction to the biology and ecology of nonrodent mammals. Emphasis on natural history, taxonomy, behavioral adaptations of mammals in their environment, and research and management methodologies.

111. Biological and Management of Wild Birds (3). Anderson, Raveling Lecture—3 hours. Prerequisite: upper division course in ecology or consent of instructor. Physiology, distribution, migration, reproduction, population dynamics, behavior, and physiological ecology of wild birds. Emphasis on adaptations to environments, seasonal recoveries, and management considerations. Students who have had Zoology 137 may not receive credit for this course.

111L. Laboratory in Biology and Management of Wild Birds (2). Anderson, Laboratory—6 hours. Prerequisite: course 111 may be taken concurrently. Consent of instructor. Laboratory exercise in bird species identification, anatomy, morphology, and sex, specialized adaptations, behavior, and research and management techniques.

120. Biology of Fish (4). J. Moy Per lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 2-2L, or consent of instructor. Ecology, morphology, evolution, and taxonomic relations of freshwater and marine fishes. Laboratory emphasizes morphology, identification, ecology, and relation of fish to fish management.

121. Physiology of Fishes (4). J. Cech Lecture—4 hours; laboratory—3 hours. Prerequisite: upper division courses in nutrition and physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes.

122. Population Dynamics and Estimation (4). J. Betsford Lecture—3 hours; discussion—1 hour. Prerequisite: Mammalogy 16A-16B; or the equivalent. An upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling, philosophy, techniques for estimation and manipulation (live-trap, mark-recapture, change-in-ratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment); case histories.

130. Physiological Ecology of Wildlife (5). J. Jacobsen Lecture—4 hours; discussion—1 hour. Prerequisite: course 110 or 111 or 120; Physiology 110 and Zoology 125 or the equivalent. A study of animal physiology, nutrition, and ecological energetics of wildlife. Nutrition metabolism, thermoregulation, and productivity are enmeshed as a part of understanding the distribution and abundance of wildlife in time and space.

138. Ecology of Waterfowl and Game Birds (3). P. Raveling Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: course 110 or 111, or equivalent. Examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered fall/summer.

140. Ecology and Evolution of Vertebrate Social Organization (4). J. Lott Lecture—4 hours. Prerequisite: Zoology 2 and upper division course in social organization (Zoology 125 or the equivalent). Social organization, cooperation, competition, and social units of vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal consideration is given to man and the other primates.

51. Wildlife Ecology (3). J. Howard Lecture—3 hours. Consideration of the ecology of wildlife species in man-dominated environments, including ecological aspects of wild vertebrates in relationship to reforestation, range management, and pollution; the relationship of wildlife to natural and man-made resources; and wildlife conservation in the human ecosystem.

151. Principles of Vertebrate Control (3). J. Howard Lecture—4 hours. Prerequisite: course 151 recommended. The physiological, historical, ecological, behavioral, and economic basis for regulating population levels of species of terrestrial vertebrates found throughout the world.

153. Wildlife in Polluted Environments (3). Anderson Lecture—3 hours. Prerequisite: introductory courses in organic chemistry, inorganic chemistry, or equivalent. Physiological, or consent of instructor. Environmental pollution in relation to vertebrate ecology, studies of the effects and mechanisms of various forms of pollution, review of instances of pollution-wildlife interaction, the ecological consequences, effects on individuals, philosophical considerations. Offered even-numbered years.

190. Present in Wildlife and Fisheries Biology (1) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: senior standing in Wildlife and Fisheries Biology or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. (P/NP grading only)

195. Research Internship Conference (I) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fisheries biology. May be repeated for credit. (P/NP grading only)

191. Museum Science (2) I. Cole Lecture—1 hour; laboratory—2 hours. Prerequisites: upper division standing and consent of instructor. Provides the student with biological sciences with methods used to preserve and prepare biological specimens for research and teaching purposes and their philosophy. (P/NP grading only)

192. Internship (1-12) I, II, III. Summer. The Staff (Chairperson in charge) Lecture—33 hours. Prerequisite: completion of 84 units and consent of the student. Work-learning experience off and on campus in all subject areas offered in the department. Supervised by a member of the faculty. (P/NP grading only)

197. Tutoring in Wildlife and Fisheries (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: major in Wildlife and Fisheries Biology and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only)

860. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)
Women’s Studies Program

Graduate Courses

201. Field Research in Wildlife Biology (6) Extra-semester summer. The staff 
Lecture—1 hour; laboratory—40 hours; individual research projects and oral and written reports. Prerequisite: courses 140, 110 or 111-111L, Zoology 125, Statistics 102, or the equivalent; consent of instructor. Field research in wildlife biology: formulation of testable hypotheses, experimental design, execution of the study, data reduction, and preparation of suitable written and oral reports. Limited enrollment. (SU grading only.) 

202. Physiology of Fishes Seminar (1) I, II. The Staff (Chairperson in charge) 
Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology; consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. (SU grading only.) 

203. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) 
Lectures and/or discussions—1-5 hours. 

209. Research (1-12) I, II, III. The Staff (Chairperson in charge) 
(SU 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 kinds of issues 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 woman, and about the relations between the sexes. Aristotle misguidedly 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 problem 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 interdepartmental major in Women’s Studies explores the ways in which, especially for women, but also for men, gender has affected cultural achievements, historical events and socioeconomic structures. Students majoring in this field may take courses in Afro-American studies, American studies, anthropology, comparative literature, English, history, linguistics, Mexican-American (Chicana) studies, political science, psychology, Russian and Soviet, sociology, Asian American studies, human development, Native American studies, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an adviser.

Career Alternatives. Preprofessional students who major in Women’s Studies will discover that it offers useful undergraduate training for schools of medicine and law, particularly in medicine, for specializations 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, anthropology, psychology, economics or political science will benefit from a strong undergraduate background in women’s studies. Increasingly, too, such fields are being used as consultants in industry, higher education, insurance companies and personnel firms. Lately, moreover, state and federal government agencies require people who have special training in understanding the problems that women face in society. Finally, educational institutions need specialists to develop and administer women’s studies programs, women’s centers, and other institutional structures designed specifically to study and assist women.

Women’s Studies

A.B. Major Requirements:

Preparatory Subject Matter

History 129A 4 
Women’s Studies 50 4 

All the preparatory requirements listed for a discipline in an area of student’s interest (i.e., American studies, anthropology, economics, English, history, philosophy, political science, psychology, etc.) must be chosen in consultation with an adviser. 

Depth Subject Matter

Two-quarter senior seminar 8 

At least 36 upper division units to be chosen with consent of adviser including at least 8 units from Area A, and 12 units from Area B. 

Area A: Women and the Humanities 8 

Area B: Gender and Society 12 

Special topic courses 16 
(List of acceptable courses offered throughout the University, will be available from major advisers.)

Total units for the major 64-77

Recommended

The following courses are recommended: American Studies 1F, Biological Sciences 10, Economics 151B, Genetics 10, History 729, Physiology 10.

Minor Program Requirements:

Women’s Studies 24 
Women’s Studies 50 4 

Upper division units in women’s studies area with courses to be chosen in consultation with adviser. 

At least 4 units must be from Area A (above) and 8 units from Area B (above). Remaining courses may be elected from Area A and/or B, and/or from relevant special topic courses in the field (current list is available from Women’s Studies advisers). 

Courses in Women’s Studies

Lower Division Course

50. Introduction to Women’s Studies (4) I, II, III. The Staff 
Lecture—3 hours; term paper. An interdisciplinary introduction which will survey and integrate literary, anthropological, psychological, historical, sociological and biological perspectives on the study of sex roles.
## Work-Learn Program

Onville E. Thompson, Ph.D., Director
Work-Learn and Career Planning and Placement 2nd Floor, South Hall (752-2855)

### Program Areas
- Agricultural and Environmental Sciences
- Education and Graduate Placement
- Engineering and Physical Sciences
- Health and Biological Sciences
- Liberal Arts
- Linda Hughes, Program Coordinator
- Donald J. Hagerty, 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, are 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 and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have acquired 64 units of credit. All internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the director of the sponsoring faculty member and facilitated by Work-Learn staff.

### The Major Programs
The Zoology major presents animal biology from the subcellular and molecular to the community and ecosystem levels. As a basic life science major, it is suitable for students who plan to pursue a professional career in Zoology, to do graduate work in Zoology or another life science, or who intend to apply to professional schools in the health sciences. The major is structured to insure breadth of preparation while still allowing individualization of each student's program in accordance with his or her interests.

### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Chemistry 1A, 1B, 8A, 8B</td>
<td>16</td>
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<tr>
<td>Biological Sciences 1</td>
<td>5</td>
</tr>
<tr>
<td>Zoology 2-25</td>
<td></td>
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<tr>
<td>Mathematics 16A-16B or Statistics 102</td>
<td>4-6</td>
</tr>
<tr>
<td>Physics 1A-1B or 2A-2B</td>
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</tbody>
</table>

NOTE: For key to footnote symbols, see page 12a.

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## Zoology

### Department Office, 2320 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 (Zoology, Physiology)
- David W. Deamer, Ph.D., Professor
- Carol A. Erickson, Ph.D., Assistant Professor
- Robert D. Gray, Ph.D., Professor
- Richard K. Gribben, B.A., Acting Assistant Professor
- Milton Hildebrand, Ph.D., Professor
- Everett W. Jameson, Jr., Ph.D., Professor
- Millor A. Miller, Ph.D., Professor Emeritus
- Brien Mulloney, Ph.D., Professor
- Richard L. Nuccitelli, Ph.D., Assistant Professor
- James F. Quin, Ph.D., Assistant Professor
- William R. Rice, Ph.D., Visiting Assistant Professor
- Laurens E. Rosenberg, Ph.D., Professor Emeritus
- Robert L. Rudd, Ph.D., Professor
- George W. Salt, Ph.D., Professor
- Thomas W. Schoener, Ph.D., Professor
- Arthur M. Shapiro, Ph.D., Professor
- Herman T. Spith, Ph.D., Professor Emeritus
- Judy Stamps, Ph.D., Associate Professor
- Catherine A. Toft, Ph.D., Assistant Professor
- Charles van Riper III, Ph.D., Adjunct Assistant Professor
- Kenneth E. F. Watt, Ph.D., LL.D., Professor
- Martin C. L. Wilson, Ph.D., Assistant Professor
- Stephen L. Wolfe, Ph.D., Senior Lecturer

### Degree Requirements:

- Chem. 1A, 1B, or 8A, 8B
- Biology 101
- Zoology 2-25
- Mathematics 16A-16B or Statistics 102
- Physics 1A-1B or 2A-2B

### Areas of Study
1. Ecology and Behavior: Zoology 125, 147, 149, 165
3. Cell biology: Zoology 121A, 121B, 121L, 166, Botany 130A, 130B
4. Developmental biology: Zoology 100, 100L, 101
5. Physiology: Zoology 142L, 143, 144, 166, Physiology 110G

Note: A maximum of 5 units of variable-unit courses (numbered 192, 196, and 199) may be applied to upper division elective unit requirements. Zoology 197 is not a variable-unit course. Zoology majors may not substitute course 192 for the Zoology 101 laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.
Courses in Zoology

Lower Division Courses

2. General Zoology (4) I, II, III. Lecture—3 hours; discussion—1 hour. Prerequisite: biological sciences 1 or equivalent. Introduction to the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

2L. Laboratory in General Zoology (2). I, II, III. Lecture—6 hours; laboratory—6 hours. Prerequisites: course 2 (I, II, III). Laboratory on the diversity of animal life and the basic principles of organ development. (P/N grade only.)

92. Internship (11-12). I, II, III. The Staff (Chairperson in charge). Lecture—36 hours. Prerequisite: lower division standing and consent of instructor. Work—learn experience off campus in a variety of settings. Internships supervised by a member of the faculty. (P/N grade only.)

99. Special Study for Lower Division Students (1-5). I, II, III. The Staff (Chairperson in charge). Directed study of a specific topic selected by the student and the instructor. (P/N grade only.)

Upper Division Courses

100. Embryology (4) I, II. Armstrong, II. Grey III, Erickson. Lecture—4 hours. Prerequisites: biological sciences 1 and courses 2L. Concurrent enrollment in course 100. Studentsically recommended. Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

100L. Laboratory in Vertebrate Embryology (2) I, II. Armstrong, II. Grey III, Erickson. Lecture—6 hours. Prerequisite: course 100 (concurrent). Comparative anatomy of the embryonic development of vertebrates. Limited enrollment. (P/N grade only.)

101. Experimental Analysis of Animal Development (3) II. Armstrong. Discussion—1 hour; laboratory—6 hours. Prerequisites: courses 100, 100L, biological sciences 101A, 101B, and consent of instructor. Techniques and relatively recent findings related to DNA, RNA, protein synthesis and molecular biology.

111. Cell Biology Laboratory (3) I, II. Baskin, Deamer. Lecture—4 hours; laboratory—4 hours. Prerequisites: course 121A; working knowledge of elementary physiology is essential. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes.

122. Histology Laboratory (3) I, II. Baskin—Laboratory—4 hours. Prerequisite: course 122 (may be taken concurrently). Laboratory practice in histology techniques; use of such techniques in research. Design and execution of a research project is required.


133A. Parasitology (3) I, II. Jameson. Lecture—3 hours. Prerequisites: course 121A; working knowledge of elementary physiology is essential. Introduction to phylogeny, distribution, skin and color, senses and communication and breathing in vertebrates.

133B. Patterns in Vertebrate Biology (3) I, II. Jameson—3 hours. Prerequisites: course 121A. Vertebrate biology with respect to thermo-regulation and water balance, seasonal dormancy, migration, food, reproduction and population dynamics.

133L. Systematics and Field Studies In Cold-Blooded Vertebrates (3) I, II. Jameson—Laboratory—4 hours. Field trips. Prerequisites: course 133 and consent of instructor. Systematics, life history, reproduction, distribution of cold-blooded vertebrates.

136. Mammalogy (2) I, II. Rudd. Lecture—2 hours. Prerequisites: course 125 or equivalent general course in ecology. Systematics, life history, reproduction, distribution and habits of wild mammals.

136L. Mammalogy Laboratory (3) I, II. Rudd. Laboratory—4 hours. Extensive field trips. Prerequisites: course 125, or 136 and consent of instructor. Systematics of California. Field study in professional mammalogy. May be taken concurrently with course 136.

137. Ornithology (2) I, II. Rudd. Lecture—2 hours. Prerequisite: course 125 or equivalent general course in ecology. Systematics, distribution, physiology, and population dynamics of birds. Students who have had Wildlife and Fisheries Biology 111 may not receive credit for this course.

137L. Ornithology Laboratory (3) I, II. Rudd. Laboratory—6 hours. Prerequisite: course 125 or 137 (may be taken concurrently) and consent of instructor. Individual study and field trips strongly emphasized. Systematics, behavior, population dynamics and reproduction of California birds.

138. Ecology of Tropical Latitudes (3) I, II. Rudd. Lecture—3 hours; laboratory—2L or the equivalent. Prerequisites: courses 2L or the equivalent; general course in introductory ecology recommended. Physical and biological aspects of tropical zones. Distribution, numbers (biological competition and survival of species, reproductive diapause, growth and sexual maturity; development of virility and other topics. Offered in even-numbered years.

139. Patterns of Vertebrate Reproduction (3) I, II. Jameson. Lecture—2 hours; term paper. Prerequisite: any upper division course in vertebrate biology. Reproductive adaptations and evolutionary and ecological relationships of tropical animals.
141. Principles of Systematic Zoology (3) III. Shapiro Lecture—2 hours; prerequisites: course 214, 215, 216; biotechnology 101; or equivalent. An introduction to research methods in biology. Presentation and discussion of research by faculty, graduate and undergraduate students. May be repeated for credit up to a total of 3 units. (P/NP grading only.)

192. Internships (1-12) I, II, III. The Staff (Chairperson in charge) Laboratory—0-36 hours. Prerequisite: completion of 84 units and consent of instructor. Field work experience in various professional areas and on campus in all subject areas offered in the Department of Zoology. Internships supervised by a member of the faculty or resident scientist. (P/NP grading only.)

197. Senior Colloquium in Zoology (2) III. Shapiro Lecture—discussion—2 hours. Prerequisite: senior standing. The consideration of innovation and synthesis in broad areas of zoology. (P/NP grading only.)

197. Tufting in Zoology (1-5) I, II, III. The Staff (Chairperson in charge)

197. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

197. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Graduate Courses

201A-201B. Advanced Biological Ecology (4-4) I-II. Pearcy, Salt, Schoener, Toft (in charge). Lecture—4 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: course 225 or equivalent. Ecological and evolutionary theory and techniques of data analysis, using the latest computer-based programs. (Same course as Biology 201A-201B and Ecology 201A-201B.)

202. Biometrics (3) III. Watt Lecture—4 hours; laboratory—4 hours. Prerequisite: course 225 or equivalent. Analysis of variance, hypothesis testing, regression, correlation, and analysis of biological data. Offered in odd-numbered years.

203. Global and Regional Modelling (3) II. Watt Lecture—1 hour; discussion—1 hour; seminar—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B, Statistics 100A or 131A-131B-131C; FORTRAN Use of statistical analysis of data, mathematical modeling, and computer simulation of the world or regions to provide basis for policy recommendations and new legislation. Offered in even-numbered years.

204. Cell Basis of Morphogenesis (3) III. Armstrong Lecture—3 hours; term paper. Prerequisite: course 100 or equivalent. Development of form and pattern, movement, mechanisms of cellular motility, cell adhesion, intercellular interaction, invasion of cells and tissues in development.

205. Development of Cell Polarity and Pattern (4) II. Nicoll Lecture—3 hours; term paper. Prerequisite: course 120A or equivalent, and consent of instructor. Morphology and mechanism of formation beginning with cell migration. Emphasis will be on essential stages in cell polarity. Offered in even-numbered years.

206. Mechanisms of Organogenesis (3) IV. Erickson Lecture—3 hours; term paper. Prerequisite: course 100. Course will deal with the development of a variety of organs. Prerequisite: completion of 84 units and consent of instructor. Offered in odd-numbered years.

207. Topics in Advanced Ornithology (4) III. van Riper Lecture—2 hours; laboratory—6 hours. Prerequisite: undergraduate standing in ornithology 217 or equivalent. Advanced training in field of ornithology. Specific ecological and morphological principles of avian studies. Laboratory oriented toward the breeding biology of birds in the Central Valley of California, but will also deal with species of avian anatomy.

222. Topics in Advanced Ecology (2) I, II. Schuster Lecture—1 hour; seminar—1 hour. Prerequisite: course 201A-201B or the equivalent. Each year, some topic of current research presented. Possible topics include feedback strategies, island ecology, competition. Time will be divided between lecture and student presentations. May be repeated for credit when a different topic is studied. (SU grading only.)

224. Developmental Biology (5) III. Erickson Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: course 100 and consent of instructor. Biochemical 101 recommended. An introduction to research in developmental biology. Developmental and evolutionary aspects of vertebrate and invertebrate development. Offered in odd-numbered years.

225. Biology of Fertilization (3) III. Grey Lecture—2 hours; term paper. Prerequisite: course 121A or the equivalent and consent of instructor. Structure, function, physiology and biochemistry of gametes and the mechanisms and consequences of their union. Offered in odd-numbered years.

232. Cellular Biology of the Malignant Transformation (1) I, Armstrong Lecture—1 hour. Prerequisite: course 100, course 121A or 121B, and consent of instructor. Course will include studies of the mechanism causing the malignant transformation of cells, control of growth of tissue cells (and loss of control in transformed cells), mechanisms of cellular intercellular, normal and malignant, mechanisms for transformed cells. Emphasis is on the cellular and molecular levels.

238. Experimental Animal Ecology (3) III. Salt Lecture—2 hours; 2 weeks, lectures, 2 weeks lab, 2 weeks critiques. Prerequisite: course in animal ecology. Discussion of means of gathering ecological hypotheses and means of testing those hypotheses. Topics will include field and laboratory, statistical analysis of field observation, experimental design in both field and laboratory, and interpretation of results. Limited enrollment.

238. Muscle Physiology (4) III. Baxin Lecture—2 hours; discussion—2 hours; term paper. Prerequisite: Biochemistry 101A-101B and Mathematics 168 or 218; or consent of instructor. The physical and chemical aspects of muscle function.

240. Topics in Cell Biology (3) I, Decker Lecture—3 hours; discussion—3 hours. 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) I, Decker Lecture—3 hours. Prerequisite: courses 121A-121B or Biochemistry 101A-101B recommended, or consent of instructor. Emphasis on biophysical aspects of membranes—structure and function. The general approach will be to discuss cell biology from the viewpoint of membrane composition and function of cells. Offered in even-numbered years.

243. Topics in Cellular and Behavioral Neurobiology (3) III, Ulmeyen 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.)

246. Seminar in Cell Biology (2) I, Wolfe Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the chemical and physical aspects of organization and function of living systems. Topics of current interest in ultrastucture and function of cells. Organizational and functional properties on the molecular and cellular levels of biological systems.

249. Research Conference in Developmental Biology (1) I, II, III. Erickson, Erwin, Goldmacher Seminar—1 hour. Prerequisite: consent of instructor. Seminar presentation and discussion of current developments in invertebrate and vertebrate animal behavior.

249. Current Topics in Zoology (1) I, II, III. The Staff (Chairperson in charge)

275. Seminar in Animal Behavior (2) II. Stamps Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion of current research on the behavior of vertebrate and invertebrate animals.

276. Seminar in Advanced Cell Biology (2) III. Baxin Seminar—2 hours. Prerequisite: consent of instructor. Seminar presentation and discussion of current research in cell biology.

290. Current Topics in Zoology (1) I, II, III. The Staff (Chairperson in charge)

290. Current Topics in Developmental Biology (1) III. Nicoll Seminar—2 hours (alternate weeks). Seminar on current topics in developmental biology will be presented and discussed. Speakers will be drawn from University and outside sources. Time and outside the time when feasible. (SU grading only.)
292. Seminar in Development (2) II. Armstrong, Erickson, Greve.
Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussions on topics in morphology, morphogenesis, and developmental mechanisms.

293. Seminar in Invertebrate Zoology (2) III. Crowe.
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.

Seminar—3 hours. Prerequisite: course 125 and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals.

295. Seminar in Marine Invertebrate Ecology (2) I. Quinn.
Seminar—2 hours. Prerequisite: course 112A or 112B, consent of instructor. Reports and discussions on current topics in marine invertebrate ecology. Open to qualified undergraduates.

296. Seminar in Geographical Ecology (3) I. Shapiro.
Seminar—2 hours. Prerequisite: course 125 or 148 or Genetics 103 or consent of instructor. Recent developments in theoretical and experimental biogeography, the biology of colonizing species, and related topics.

297. Seminar in Systematic Zoology and Evolution (2) III. Rugh.
Seminar—2 hours. Prerequisite: consent of instructor. Principles of animal classification, speciation and the evolution of higher categories: emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge).
(SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge).
(SU grading only.)

300. Methods of Teaching Zoology (2) I, II, III. The Staff (Chairperson in charge).
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and procedures of teaching zoology and related biological sciences. Includes analysis of texts and supporting materials; discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (SU grading only.)
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 37).

The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter.

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 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 duration 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; obtaining a professional license 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. 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 must establish that they are financially independent of their parents. This factor is in addition to the other requirements necessary for a resident classification.

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 prior to the late 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.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note 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.
Inquiries and Appeals

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Residence Deputy in 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. 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 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;
- 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 for 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 wish to have 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.
### Retention Data AND Graduation Rates at UCD

#### Freshmen

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled in 4th Quarter</th>
<th>*Percent Graduating in 4 Years</th>
<th>*Percent Graduating in 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

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled in 4th Quarter</th>
<th>*Percent Graduating in 2 years</th>
<th>*Percent Graduating in 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>Bachelor's</th>
<th>Average Monthly Salary</th>
<th>Master's</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Sciences</td>
<td>$1,210</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>1,368</td>
<td>1,805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>1,298</td>
<td>1,776</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>1,574</td>
<td>1,997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td>1,624</td>
<td>2,035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1,857</td>
<td>2,574</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Professions</td>
<td>1,304</td>
<td>1,786</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities</td>
<td>1,048</td>
<td>1,419</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics/Statistics</td>
<td>1,494</td>
<td>2,425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical and Earth Sciences</td>
<td>1,720</td>
<td>2,051</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Sciences</td>
<td>1,047</td>
<td>1,373</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Source: A 1981 national survey of a representative group of colleges and universities conducted by the College Placement Council. 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.

### 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.

#### Field of Study

<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 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.

2 Source: A 1980 survey of 1979 and 1973 UCD graduates conducted by Student Affairs Research and Information, University of California, Davis.
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 description 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.)

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 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 Unix courses, including times and locations.
University Extension, 4445 Chemistry Addition. (No charge.)

City of Davis Information
Chamber of Commerce, 620 4th Street, Davis, CA 95616.
GLOSSARY

Academic Senate The faculty governing body of the University. Consists primarily of the regular faculty and certain administrative officers. Determines conditions for the admission of students and for granting certificates and degrees; develops educational policy; and authorizes and supervises all courses in the University.

Academic year Starts at the beginning of the Fall Quarter, ends at the close of the Spring Quarter; does not include Summer Sessions.

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 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, a '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 96, 99, 196, 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 64 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. PNP grades are not included in a student’s grade-point average, but the units are counted toward the 180-unit graduation requirement.

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 19-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.

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 pre-fabricated building not intended as a permanent facility.

TBA Stands for “to be announced.” In the Class Schedule and Room Directory course listings, TBA may refer to class meeting time, instructor’s name, or room number for class meeting.

Tenure Denotes security of employment until retirement; may be granted to a faculty member after a specified number of years at the University.

Term A regular quarter (Fall, Winter, or Spring).

Transcript An official copy of your academic record (grades) at an educational institution such as the University of California.

Undergraduate A college student who is pursuing a bachelor’s degree.

Unit Courses are assigned a unit value based on one unit of credit for every three hours of work (in-class and preparation time) per week by the student. A student’s progress in the University and class level are determined in part by the number of units completed.

Upper Division Junior and senior standing at UCD, based upon completion of at least 84 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.
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