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

Office of the Chancellor
Mak Hall
916-752-2065

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

College of Engineering
2132 Baton Hall
916-752-0553

College of Letters and Science
Social Sciences and Humanities Building
916-752-0392

Division of Biological Sciences
66 Briggs Hall
916-752-0410

Graduate Studies
252 Mak Hall
916-752-0650

School of Law
1011 King Hall
916-752-0243

Graduate School of Management
106 AOB 4
916-752-7362

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

School of Veterinary Medicine
1018 Haring Hall
916-752-1380

Office of Summer Sessions
44 Mak Hall
916-752-1847

University Extension
1333 Research Park Drive
916-757-8777

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

Graduate:
Graduate Studies Admissions
252 Mak Hall
916-752-0655

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

Management:
Graduate School of Management
106 AOB 4
916-752-7399

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

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

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

Financial Aid Office
North Hall
916-752-2930
(undergraduate and graduate loans, grants, employment information)

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

Fellowships and Graduate Scholarships
Graduate Studies
252 Mak Hall
916-752-7481

Teaching and Research Assistantships
Write to department or group concerned.

Housing
Community: Student Housing Office
916-752-2483
Residence Halls: Student Housing Office
916-752-2033
Student Family Housing: Orchard Park
916-752-4000

ASUCD (Associated Students UCD)
3rd floor, Memorial Union
916-752-1990

Disability Resource Center
180 South Silo
916-752-3184 (voice), 916-752-6833 (telephone device for the speech and hearing impaired)

Memorial Union Information Desk
916-752-2222

News Service
334 Mak Hall
916-752-1930

Relations with Schools/EOP Outreach Services
2828 Chiles Road
916-757-3108

Residency Matters, Legal Analyst
320 Lakeside Dr, 7th Floor
Oakland, CA 94612-3565

Student Health Service
54A Cowell Student Health Center
916-752-2900 (voice, and telephone device for the speech and hearing impaired)

Information Services Office
Buehler Alumni and Visitors Center
916-752-8111
(campus tours, maps, and information)
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Class Schedule and Room Directory available</td>
<td>May 1994</td>
<td>Oct. 31, 1994</td>
<td>February 6</td>
<td>May 22</td>
</tr>
<tr>
<td>Students pick up RSVP** registration forms</td>
<td>May 23-27</td>
<td>Oct. 31-Nov. 1</td>
<td>February 6-7</td>
<td>May 22-23</td>
</tr>
<tr>
<td>Faculty advisers available</td>
<td>May 26-27</td>
<td>November 3-4</td>
<td>February 9-10</td>
<td>May 25-26</td>
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<tr>
<td>RSVP Pass 1 (assigned appointments)</td>
<td>May 31-Sept. 4</td>
<td>November 7-18</td>
<td>February 13-26</td>
<td>May 30-Sept 3</td>
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<tr>
<td>RSVP Pass 2 (assigned appointments)</td>
<td>September 6-21</td>
<td>Nov. 28-Dec. 9</td>
<td>March 5-17</td>
<td>September 5-20</td>
</tr>
<tr>
<td>Final day to pay fees and register for classes without incurring a $50 late fee</td>
<td>September 9</td>
<td>December 9</td>
<td>March 10</td>
<td>September 8</td>
</tr>
</tbody>
</table>

**Quarter begins**
- Final day to petition for reclassification to resident status

**Instruction begins**
- Final day
  - of late fee payment
  - to drop courses via RSVP**
  - to change from part-time to full-time status or from full-time to part-time status
  - to file petitions for PELP—current quarter
  - to add courses via RSVP**
- Final day
  - to opt to take courses on a P/NP basis
  - to file to take courses on a S/A basis

**Instruction ends**
- Final examinations

**Quarter ends**
- Commencement

**Academic and Administrative Holidays**
- Academic and Administrative Holidays
  - Nov. 24-25
  - Dec. 23, 26
  - Dec. 30, Jan. 2

**Filing for Graduation**
- Filing period for those who expect to complete work for a bachelor's degree to file for candidacy with the Office of the Registrar ±
  - June 1-
  - Sept. 16
- Filing for Minor Program
  - Oct. 12
- Agricultural and Environmental Sciences
  - College of Letters and Science
  - Dec. 9

**Admission/Readmission Deadlines**
- Deadline for undergraduates to file admission applications for 1994-95
  - Nov. 30, 1993
- Deadline for filing applications with the Registrar for readmission to undergraduate status
  - Aug. 29, 1994

**Financial Aid Deadlines**
- Filing period for grants, loans, work-study, and California Student Aid awards for 1995-96
  - Jan. 1-Mar. 2

**Summer Sessions I and II, 1995**

*Dates are subject to change and should be checked with appropriate Class Schedule and Room Directory.
**RSVP (Register Students Via Phone) is the UC Davis telephone registration system. Adds or Drops after the R.S.V.P. deadlines require permission of the dean and a $3.00 fee.
† For students graduating September 1995, the filing period is May 24–July 5.
‡ For students graduating September 1995, the deadline to file a minor program with Dean's Office is July 7.
DEGREES OFFERED BY UC DAVIS

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

<table>
<thead>
<tr>
<th>Major or Discipline</th>
<th>Degree*</th>
<th>Administering School or College</th>
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<tr>
<td>Administration</td>
<td>M.B.A.</td>
<td>Graduate School of Management</td>
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<td>Aeronautical Science and Engineering</td>
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<td>College of Engineering</td>
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<td>African American and African Studies (Afro-American Studies)</td>
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<td>College of Letters &amp; Science</td>
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<td>Agricultural and Environmental Chemistry</td>
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<td>Child Development</td>
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<td>Dietetics</td>
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<td>Religious Studies</td>
<td>A.B.</td>
<td>College of Letters &amp; Science</td>
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<tr>
<td>Rhetoric and Communication</td>
<td>A.B., M.A.</td>
<td>College of Letters &amp; Science</td>
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<td>Russian</td>
<td>A.B., M.A.</td>
<td>College of Letters &amp; Science</td>
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<tr>
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<td>A.B., M.A., Ph.D.</td>
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<td>Soil Science</td>
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<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
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<td>College of Letters &amp; Science</td>
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<td>Spanish</td>
<td>A.B., M.A., Ph.D.</td>
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<tr>
<td>Statistics</td>
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<td>Textiles</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Textiles and Clothing</td>
<td>B.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Textile Arts and Costume Design</td>
<td>M.F.A.</td>
<td>School of Veterinary Medicine</td>
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<tr>
<td>Vegetable Crops</td>
<td>M.S.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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<tr>
<td>Veterinary Medicine</td>
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<tr>
<td>Wildlife and Fisheries Biology</td>
<td>B.S.</td>
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<tr>
<td>Women's Studies</td>
<td>A.B.</td>
<td>College of Agricultural &amp; Environmental Sciences</td>
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</tbody>
</table>


1Joint program between UCD and CSU, Fresno.
# MINOR PROGRAMS OFFERED BY UC DAVIS

Minor programs are offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. The College of Engineering does not offer any minors.

<table>
<thead>
<tr>
<th>Minor Program</th>
<th>Offering Department</th>
<th>Administrative College</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American and African Studies (Afro-American Studies)</td>
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<td>College of Letters &amp; Science</td>
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<tr>
<td>Aging and Adult Development</td>
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<td>Agricultural Computing and Information Systems</td>
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<td>Asian American Studies</td>
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<td>Biological Sciences</td>
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<td>Chicana/Chicano (Mexican-American) Studies</td>
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<tr>
<td>Community Development</td>
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<td>Community Nutrition</td>
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<td>Comparative Literature</td>
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<td>Computer Science</td>
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<td>Nature and Culture</td>
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<td>Nutrition Science</td>
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<td>Plant Biology (Botany)</td>
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<td>War-Peace Studies</td>
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<td>Women's Studies</td>
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With 5,200 acres, UC Davis ranks first in physical size of the nine campuses of the University of California. It’s also one of the nation’s top 20 universities in research funding and has 24 undergraduate programs rated among the country’s top 10, including the No. 1 botany department. What does this mean to you as a student? It means that the University’s reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. Creative teaching and academic innovation are encouraged by several programs, including the $25,000 Prize for Teaching and Scholarly Achievement, believed to be the largest award of its kind in the country.

The teaching faculty of 1,700 is also supported by campus resources such as the Teaching Resources Center, which helps professors and teaching assistants sharpen their teaching skills, and the Learning Skills Center, which assists faculty in preparing classroom materials. Constructive criticism is provided by the Student Viewpoint, an evaluation of classes and instructors compiled each year from course questionnaires completed by students. Additional academic resources include laboratories; natural reserves; institutes; and centers for research, teaching, or service to students, faculty, or the community.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. Undergraduate enrollment is close to 17,500 students. Graduate Studies administers graduate study and research at all schools and colleges. Professional studies are carried on at the schools of Law, Management, Medicine, and Veterinary Medicine. Nearly 5,400 students are engaged in graduate or professional study.

A Small-Town Setting
Davis is surrounded by open space—including some of the most valuable agricultural land in the state. Outdoor sports enthusiasts will find many beautiful recreational areas within a 70-mile drive from campus: Folsom Lake, Clear Lake, Lake Berryessa, the Napa and Sonoma valleys, and the historic Mother Lode country. The Sierra Nevada mountains, Lake Tahoe ski resorts, and coastal areas of Mendocino and Monterey are about 150 miles from Davis.

If you prefer city life, Sacramento, the state capital, is only 15 miles to the east, and San Francisco is just 72 miles to the southwest. Both cities offer the symphony, the ballet, sporting events, theater, shopping, and other entertainment.

For long distance travel, Davis has a Greyhound bus terminal and an Amtrak station. If you travel by plane, the Sacramento Metropolitan Airport is an easy 20-minute drive from downtown Davis. Within Davis, bicycles are a favorite mode of transportation. The terrain is flat and 50 miles of bike paths crisscross the city. With more bicycles per person than any other city in the nation, Davis has earned the title “City of Bicycles.”

Winters in Davis are generally mild. It rarely snows, but you should get good use from your rainwear. Summers are sunny, hot, and dry. On some summer days, the thermometer can exceed 100 degrees, but overnight temperatures generally drop back into the fifties. Spring and fall weather is among the most pleasant in the state.

The City of Davis
Ecologically aware and socially innovative, Davis has a small-town friendliness and spirit of volunteerism that distinguishes it from cities of similar size. Residents are active in local, national, and international political causes, in the arts, and in community organizations ranging from Little League to the Rotary Club.

Students comprise nearly half of the city’s population of 50,000, making Davis one of the state’s few remaining “college towns.” You’ll find an abundance of bookstores, coffee houses, and restaurants catering to students in the bustling downtown area adjacent to campus.

Though closely linked to the University, the city maintains a strong identity of its own. The Davis Art Center, Comic Opera Company, Musical Theatre Company, and several local galleries provide creative outlets for people in the community and supplement the cultural events presented by the University.

The city has long recognized the importance of open space in maintaining its small-town atmosphere and has created 20 city parks offering a variety of attractions: tennis courts, playgrounds, swimming pools, playing fields, and even a skateboard facility.

Campus Life
Like the city of Davis, the campus has a relaxed, country atmosphere, with plenty of open space, trees, and lawns. Even as the student population grows, the campus maintains its informal, friendly ambience.

Underlying the casual style of Davis students, however, is a fundamental seriousness and a dedication to academic excellence. Davis students do study hard. After your studying is done, however, you can relax at a movie, public lecture, dance recital, or concert. For the energetic, intercollegiate sports, club sports, and one of the largest intramural programs in the country offer athletics for fun or competition.

Davis welcomes the exchange of opinions and ideas and is committed to advancing the diversity of its students, faculty, staff, and administrators. UC Davis’s commitment to a learning environment characterized by mutual respect and understanding is reflected in the “Principles of Community” (see the opposite page).

The University Farm
Davis was founded in 1905 as the "University Farm" where students from the first UC campus in Berkeley learned the latest in agricultural methods and technology. This beginning gained Davis students their nickname, “Cal Aggies.” As the state’s population grew, so did demand for higher education, and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was awarded to students completing the Davis program. A few years later, the Davis campus had its own College of Agriculture.

In 1948 California’s only School of Veterinary Medicine was established at Davis. The College of Letters and Sci-
PRINCIPLES OF COMMUNITY

The University of California, Davis, is first and foremost an institution of learning and teaching, committed to serving the needs of society. Our campus community reflects and is a part of a society comprising all races, creeds, and social circumstances. The successful conduct of the University’s affairs requires that every member of the University community acknowledge and practice the following basic principles:

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

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

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

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

*The "Principles of Community" were prepared and adopted after extensive discussion within the campus community about the need for a statement which reflects UC Davis’ commitment to a learning environment characterized by diversity, understanding, and the acceptance of all people. This statement of common principles was published on April 20, 1990, carrying the endorsement of Chancellor Theodore L. Hullar and the leadership of the Davis Division of the Academic Senate, the Academic Staff Organization, the UCD Staff Assembly, the UC Davis Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.
ence was founded in 1951, bringing degree programs in
the humanities to add to the campus's strong scientific
foundation. By 1959, Davis had expanded enough to
be declared a general campus of the University by the
Regents, and the campus continued to grow. The Col-
lege of Engineering came into being in 1962. 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 1969. Davis's newest addition, the Graduate School of
Management, opened its doors in 1981.

From its beginning as a 778-acre teaching farm, UC
Davis has grown and diversified, establishing an inter-
national reputation for teaching and research.

THE UNIVERSITY OF CALIFORNIA

The University of California began in 1868, when Gov-
ernor Henry H. Haight signed the Organic Act, thus
providing for California's first "complete University."
Classes began the following year at the College of Cal-
ifornia in Oakland. The first buildings on the Berkeley
campus were completed in 1873, and the University
moved into its new home. The following June, the Uni-
versity of California conferred bachelor's degrees on 12
graduates.

Today the University is one of the largest and most
renowned centers of higher education in the world. Its
nine campuses span the state, from Davis in the north
to San Diego in the south. In between are the Berke-
ley, San Francisco, Santa Cruz, Santa Barbara, River-
side, Irvine, and Los Angeles campuses.

All the campuses adhere to the same admission guide-
lines and high academic standards, yet each has its
own distinct character, atmosphere, and academic
individuality. Together, the nine campuses have an
enrollment of more than 163,000 students, 90 percent
of them California residents.

Some 150 laboratories, extension centers, and re-
search and field stations strengthen teaching and
research while providing public service to California
and the nation. The collections of the more than 100 UC
campus libraries are surpassed in size in the United
States only by the Library of Congress collection.

The faculty of the University of California is interna-
tionally known for its distinguished academic achieve-
ments. On its nine campuses, the University has 18
Nobel laureates, and membership in the National
Academy of Sciences is the largest of any university in
the country. In 1993-94, 32 faculty from within the Uni-
versity were named American Fulbright Scholars.

VISITING THE CAMPUS

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

Information: Information Services Office, Buehler Alumni and Visitors
Center, 916-752-8111

UNDERGRADUATE ACADEMIC
PROGRAMS

The College of Agricultural and Environmental
Sciences offers a unique combination of diverse programs
that have grown from a shared commitment to improve
the quality of life in all of its facets. The College is com-
mittcd to creative education that emphasizes a spirit
of discovery based on the premise that tomorrow's cit-
izens will need to anticipate, understand, and solve
emerging societal problems and contribute to the dis-
covery and application of new knowledge. Hence, edu-
cation in the College aims to foster:

• critical thinking and an appreciation for diversity in
  thought and in approaches to problem solving

• an ethos of lifelong learning—of teaching oneself
  and others while confronting challenges and solving
  problems

• an ability to move beyond either/or thinking and to
  pursue innovative and integrative understandings
  of the biological, social and physical sciences

• intellectual skills that will prepare individuals to secure
  a healthful physical and cultural environment based
  on a sound, respectful management of all resources

• a commitment to serving the public with an informed
  and open-minded dedication to understanding, crit-
iqing and addressing complex societal needs and
  interests

The College is proud of its rich agricultural history and
is world-renowned today for its accomplishments. Yet
its sense of shared commitment has led it to expand
the scope of its educational offerings to encompass a
wider range of programs that highlight interconnections
among the environment, plant and animal biology, and
human health and well-being. Through a vast array of
major programs, the College prepares high potential
students for advanced studies in diverse disciplines
and leadership in such areas as public policy; re-
search and development; managerial and natural
resource economics; agricultural systems; environ-
mental protection, safety and design; human nutrition,
health and development; and the food, fiber, textile and
apparel industries.
Students are brought into early contact with faculty advisers, graduate students and post-graduate researchers. A symbiotic relationship is developed in which undergraduate students bring new perspectives and join in the excitement of discovery. This enriches and broadens the educational experience of all.

Available to students are several levels of academic advising designed to enhance the student’s undergraduate experience. Advisers assist students in course planning, meeting degree requirements and in taking maximum advantage of the resources available at the University. Students are encouraged to meet regularly with their assigned faculty adviser and with the Advising Associates and peer advisers housed in departmental offices. Through a shared commitment to education for service to society, College faculty, staff and students work together to improve the relationship between humanity and the natural world.

Information: College Office, 228 Mrak Hall, 916-752-0108

The College of Engineering

The College of Engineering has a tradition of excellence in instruction, in research, and in public service. To its undergraduate enrollment of approximately 2,300 and graduate enrollment of 700, the College offers both a friendly atmosphere and the varied academic programs in basic sciences and engineering that have made UCD engineering graduates highly valued in private practice and research.

The College has seven departments; each has outstanding programs of instruction. The Department of Biological and Agricultural Engineering combines study in engineering with instruction in the biological processes used to solve challenging environmental and technical problems. The Department of Applied Science instructs engineering graduate students in broad areas of scientific technology. The Department of Chemical Engineering and Materials Science offers curricula integrating an effective knowledge of chemistry, biological sciences, or materials science engineering to enable students to solve problems in both current and future manufacturing technologies or to analyze the structure, properties, and behaviors of materials. The Department of Civil and Environmental Engineering educates students to plan and design systems that have a direct impact on health and human productivity and the quality of human life. The Department of Computer Science offers programs of study that educate students in all aspects of design and use of computer hardware and software systems. The department also plays a significant service role for programs throughout the campus. The Department of Electrical and Computer Engineering offers programs in research and education crucial for the continued success of high technology industries in California and the nation, preparing students to design, analyze, and use electronic and computer systems effectively. The Department of Mechanical and Aeronautical Engineering educates students to design and manufacture complex engineering systems for transport, industry, or energy and to design, manufacture, and operate aircraft and aeronautical structures.

Every effort has been made to provide students in engineering with the maximum flexibility consistent with rigorous professional education standards. The key to flexibility is academic advising. Incoming students are assigned to a faculty adviser during their first term on campus and usually retain the same adviser throughout their college careers. Faculty advising is supplemented by a well-developed peer advising system and by staff advising in the Dean’s Office and in many departments.

Undergraduate education in engineering at Davis is intended to serve as a sound basis for beginning professional practice in engineering design and development, as a preparation for careers in corporate or governmental operations, or as a foundation for graduate study. To these ends, the College emphasizes fundamental sciences to give the student the maximum postgraduate flexibility. Technological developments in recent years have made it clear that engineering education must be based on fundamentals or rapidly become obsolete.

Engineers will continue to face new challenges as society continues its demand for improvements in the quality of life, and as our state and nation demand greater
The English Composition Requirement is designed to ensure that students are well versed in the skills of written communication.

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

The Major Requirements are designed to provide students intellectual depth and competence in a selected area of study.

The College of Letters and Science recognizes and affirms the importance of perceptive and knowledgeable academic advising. The College has a well-developed system of faculty advisers, student peer advisers and professional staff advisers who are available for individual consultations with undergraduates in a variety of settings ranging from the Dean's Office to departmental offices to campus residence halls.

Woven throughout the tapestry of diversity that is the College of Letters and Science is a fundamental and unswerving commitment to excellence. The faculty of the College are dedicated to advancing the frontiers of human knowledge through research, artistic expression and other creative endeavors, and to the effective communication and application of that knowledge through teaching and public service. Together, faculty and students in the College of Letters and Science pursue these goals and ideals with enthusiasm and excitement.

Information: Dean's Office, Social Sciences and Humanities Building, 916-752-0392

ACADEMIC RESOURCES

Central Support

The University Library

The General Library at the University of California, Davis, is composed of the Peter J. Shields Library, the Physical Sciences Library, the Loren D. Carlson Health Sciences Library, the Agricultural Economics Library, and the library at the UCD Medical Center in Sacramento. A number of specialized departmental libraries are located on the campus, and the Law Library is located at the King Hall Law School.

The libraries contain over 2.6 million volumes and receive about 50,000 periodical and journal titles annually. UCD collections are accessible via the MELVYL on-line catalog. Shields Library houses the collections in the humanities, arts, social sciences, biological sciences, agricultural sciences, and mathematics. The collections of the Physical Sciences Library support teaching and research in engineering, computer sciences, and physical sciences. The library maintains a collection of one million research reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and other governmental agencies. The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine with a collection of approximately 235,000 volumes. The Agricultural Economics Library holds more than 7,800 bound volumes and 250,000 unbound pamphlets in this field. The

participation by engineers in efforts toward competitiveness in a global market. As a unit in a land-grant institution, the UCD College of Engineering must help maintain the technological leadership long enjoyed by the United States, while advancing technology for the benefit of all.

Information: Dean's Office, 1050 Engineering II, 916-752-0553

The College of Letters and Science

The College of Letters and Science is the largest of the three undergraduate colleges at UC Davis. Through its more than 500 faculty members, the College offers over fifty major programs of study and thousands of courses per year in the fine arts, humanities, life sciences, physical sciences, social sciences, and mathematical sciences. The College confers Bachelor of Arts (A.B.), Bachelor of Science (B.S.), and Bachelor of Arts and Science (B.A.S.) degrees.

The College of Letters and Science is a community of scholars and students sharing a commitment to liberal education rather than to specialized, vocationally oriented training. The College seeks to expose students to the worlds of human experience, of ideas, of artistic accomplishments, and of man and things. Although separate and distinct to the casual observer, these realms are interconnected and may be studied in a coherent curriculum. It is within this curriculum that students are able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge, and gain the capacity for independent study and thought. By learning to think carefully and critically, students will be able to continue the ongoing process of education that begins in the classroom but continues over a lifetime. They will have learned how to learn—the ultimate objective of a liberal arts education.

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

The participation by engineers in efforts toward competitiveness in a global market. As a unit in a land-grant institution, the UCD College of Engineering must help maintain the technological leadership long enjoyed by the United States, while advancing technology for the benefit of all.
library at the UCD Medical Center provides a clinical collection of 25,000 volumes.

Information: Library Administration Office, Shields Library, 916-752-2110

**Information Technology**

Information Technology (IT) provides a range of computing, communications, and media services in support of research and instruction. A central Campus Access Point (752-2548) offers information and consulting on all aspects of information technology use at UC Davis. IT also provides academic access to microcomputing, workstation computing, and supercomputing (at various sites nationally). Students have access to media production equipment and to taped lectures and slide/tape programs at media resource centers. Microcomputer labs, both PC and Macintosh, are available for student use, and Student Easy Access (EZ) accounts allow students to use network services including electronic mail and file transfer, and to do computing on the UNIX and VMS operating systems available for academic use. EZ accounts are pre-allocated to all registered students, and can be activated by request at the Campus Access Point.

Information: 1400 Surge II, 916-752-2548; e-mail: ithelp@ucdavis.edu

**University Arboretum**

The 150-acre University Arboretum, located along Putah Creek's historic north fork, maintains a large collection of dry-land trees and shrubs for use in teaching and research. Outstanding plant collections include the Shields Oak Grove, the Mary Wattis Brown Garden of California native trees and shrubs, the Ruth Storer Garden of drought-tolerant flowering perennial, and the T. Elliot Weisner Redwood Grove. The Arboretum program of seed exchange is international in reputation, serves to distribute California native plants throughout the world, and has provided the University with numerous exotic plant specimens. Internships are available in nursery management, landscape design and maintenance, environmental education, conservation biology, Integrated Pest Management (IPM) and Geographic Information Systems (GIS).

Information: Arboretum Headquarters, 916-752-2408

**Agricultural and Environmental Sciences**

**Agricultural History Center**

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

Information: 379 Voorhies Hall, 916-752-1827

**California Agricultural Experiment Station**

The California Agricultural Experiment Station has branches in Davis, Riverside, and Berkeley. The Davis branch includes 500 faculty in over 30 departments in the College of Agricultural and Environmental Sciences and the School of Veterinary Medicine. In addition to lab facilities, it has approximately 3,000 acres devoted to agricultural research in the areas of experimental crops, orchards, and animal facilities. The Experiment Station facilitates research in agricultural production, food processing, nutrition, animal care and disease prevention, consumer sciences and community development, and environmental quality. Research emphasis is placed on resource conservation and management, water and soil pollution, and regional planning.

Information: College of Agricultural and Environmental Sciences, 916-752-1610

**Institute of Ecology**

The Institute of Ecology has a campuswide responsibility to foster ecological and environmental research, provide intellectual leadership in ecology, administer resources and facilities, provide information on extramural support of ecological research, and maintain liaisons with governmental and private organizations interested in funding ecological and environmental research, or requiring advice on these subjects. The Ecology Institute has a publication series and sponsors national and international activities, including organizing symposia and conferences.

Information: 31048 Wickers Hall, 916-752-3938

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

ITEH coordinates interdisciplinary research on biomedical and toxicological problems related to exposure to chemical, physical, and biological agents or to ionizing radiation. Studies on mutagenic, carcinogenic, and teratogenic compounds are carried out in special animal holding facilities. Central laboratories exist for analytical chemistry, radiochemistry, ionizing radiation detection and quantification, cell biology research, and inhalation toxicology. The institute houses a major Universitywide program in human epidemiology and occupational health.

Information: Institute of Toxicology and Environmental Health, 916-752-1340

**J.M. Tucker Herbarium**

The J. M. Tucker Herbarium is used for research in plant systematics and ecology, and for handling public service requests. The herbarium contains more than 115,000 vascular plant specimens. It also houses 30,000 specimens of the Beecher Crampton Herbarium Collection of grasses and other range plants. Smaller teaching herbaria are located in various plant science departments on campus.

Information: Section of Plant Biology, 916-752-1091/0617

**Mann Laboratory**

Plant scientists in the Mann Laboratory study the physiology, biochemistry and molecular biology of harvested horticultural crops. They train students and disseminate information about postharvest biology and technology to growers, shippers, marketers, and consumers. The facility is a part of the Department of Vegetable Crops, houses six faculty, and is equipped with 16 controlled-temperature rooms, 14 research laboratories, a teaching laboratory, and a conference room.

Information: 104 Mann Laboratory, 916-752-1410; FAX: 916-752-4554
Natural Reserve System
The Davis campus administers seven natural reserves located within the state that are available for teaching and research.

- Bodega Marine Reserve, located at Bodega Bay, 100 miles west of campus, consists of coastal dune vegetation and bay and coastal tidal areas with facilities for overnight and longer stays (See Bodega Marine Laboratory below).
- Eagle Lake Field Station on the shore of Eagle Lake in northeastern California has boats, a small laboratory, and facilities for overnight and longer stays.
- Jepson Prairie Reserve, located in Solano County fifteen miles south of the campus, consists of native California bunchgrass grasslands and vernal pools.
- Donald and Sylvia McLaughlin Reserve, located near Clear Lake about 70 miles northwest of campus, consists of intercoastal range habitat and serpentine soil habitat.
- Putah Creek Campus Reserve is a 150-acre corridor along the north bank of Putah Creek with a remnant of the riparian ecosystem.
- Quail Ridge Ecological Reserve consists of intercoastal range habitat located about 25 miles west of campus on a peninsula jutting into Lake Berryessa. The reserve has a small facility plus camping for overnight stays.
- Stebbins Cold Canyon Reserve, located about 24 miles west of campus, consists of several different plant communities found in California's inner and outer coast ranges.

The University maintains over 30 reserves throughout the state, many of which are available for teaching and research.

Information: Office of Research, 410 Mrak Hall, 916-752-6949/7073

Sustainable Agriculture Program: Student Experimental Farm
The Student Experimental Farm is an innovative teaching and research facility located on 25 acres of University land, and is the main focus of the Sustainable Agriculture Program. Since its inception, the Student Experimental Farm has provided students with unique opportunities to explore alternative agricultural technologies and philosophies through classes, special projects, internships, work study jobs, and original research. Because the farm includes several acres of land that have been managed organically for over a decade, it provides researchers with a facility for conducting field research into sustainable agriculture.

Information: Student Experimental Farm, 916-752-7645

UC Agricultural Issues Center
The UC Agricultural Issues Center, headquartered at Davis, is a Universitywide research and outreach unit that draws on expertise from many disciplines. The center is particularly interested in issues such as the impacts of demographic change on agriculture, natural resources, and rural life in California: the social, economic, and environmental effects of agricultural technologies; food consumption and international trade; and local and national policies that affect Western agriculture or its workers.

Information: 110 University House, 916-752-2320

Water Resources Center
The center supports aquatic-related research in such areas as agricultural and biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences, and political science. Research interests include drought responses, aquatic ecosystem structure and function, water resource systems engineering, economic evaluation of water development and conservation, political strategy in water resources development, environmental and energy relationships in water resources management, watershed hydrology, ground water use, soil and land use management in relation to water resources use, and maintenance and improvement of water quality.

Information: 1323 Academic Surge, 916-752-6070

Wildland Resources Center
The center coordinates activities among the University's research and extension programs and stimulates research into conservation, management, and utilization of wildland resources with a view toward the optimum present and future uses of wildlands. Projects focus on such topics as habitat conservation, assessment and management of timber resources and old-growth forests, and development of a system for evaluating California's environmental resources. The center's goal is to increase awareness of and advance the University's research and extension programs related to wildlands. The center serves as liaison between the University and state and federal agencies and other organizations concerned with wildland resources and problems.

Information: 1323 Academic Surge, 916-752-6070

Biological and Life Sciences

Adult Fitness Program
The Adult Fitness Program serves as an educational laboratory for undergraduate and graduate students engaged in advanced study of the role of exercise and nutrition in the management of optimal physiological function. Basic and clinical research studies are conducted in the areas of cardiovascular, respiratory, and metabolic functions. The program emphasizes risk reduction for cardiovascular disease and development of cardio-respiratory endurance. Studies stress fitness, relaxation, and weight reduction and control through appropriate diet and exercise programs which are individually prescribed after extensive medical and physiological testing.

Information: Department of Physical Education, 916-752-2540

Bodega Marine Laboratory and Reserve
The Bodega Marine Laboratory is an organized research unit dedicated to research and teaching in marine biology and related fields. Research areas include population biology/ecology, cell and developmental biology, and aquaculture and fisheries. Well-equipped facilities contain running seawater to two classrooms and most laboratories, a marine science
library, greenhouses, aviary, experimental freshwater system for anadromous fish studies, and a dive locker and air station. A number of undergraduate courses are taught during the academic year and summer session. The laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis.

The Bodega Marine Reserve, part of the UC Natural Reserve System, is 362 acres of remarkably diverse habitats, including an excellent rocky intertidal zone, sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh, coastal prairie, and dunes. Adjacent subtidal sand and rock habitats in a Marine Life Refuge are administered as part of the reserve. Current areas of research include population biology of shorebirds, marine invertebrates, fishes, and coastal plants; plant-insect interactions; subtidal biomechanics; and other topics.

Information: Bodega Marine Laboratory, P.O. Box 247, Bodega Bay, CA 94923, 707-875-2211; FAX: 707-875-2089; Internet: UCDIML@UCDAVIS.EDU

**California Regional Primate Research Center (CRPRC)**

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

Information: Primate Center, 916-752-0447

**Food Intake Laboratory**

The Food Intake Laboratory supports predoctoral and postdoctoral research in nutrition and behavior. Studies on the control of food intake and the nature of the factors that govern feeding choices are emphasized. The laboratory promotes collaborative research involving the roles of metabolic, psychological, neurochemical, hormonal, gender, genetic, and sensory inputs in the feeding behavior of experimental animals.

Information: TB 33, 916-752-7516

**Health Sciences Research Labs**

The Health Sciences Research Laboratories are composed of several high technology biological science facilities with research staff and assistance for faculty, staff, and students. These include:

- **Animal Surgery Laboratory**—provides facilities in compliance with NIH/AAALAC standards for researchers who perform both survival and non-surgical animal surgeries.

  Information: Buildings H and J—ARS, 916-752-7756

- **Biochemistry and Special Instrumentation Laboratory**—a central facility providing investigators access to certain common but expensive laboratory equipment. Equipment includes ultracentrifuges and high speed centrifuges with rotors, scintillation and gamma counters, UV/VIS spectrophotometers, densitometers, Betaplate and Elisa readers.

  Information: TB 161, 916-752-3166

- **Protein Structure Laboratory**—provides instrumentation for protein sequencing and for amino acid, protein and DNA synthesis. Also available are a microbore HPLC for high sensitivity peptide mapping and a preparative HPLC for large scale purification.

  Information: 1145 Surge 1, 916-752-6228

**Human Performance Laboratory**

The Human Performance Laboratory houses equipment for the study of blood and muscle chemistry and enzymology, metabolism and energetics, muscle mechanics and electromyography, movement kinetics and kinematics, body composition and anthropometry, cardiorespiratory function during exercise in a controlled environment, control and acquisition of motor skills, and the psychosocial aspects of human performance. Apple Macintosh and IBM microcomputers are located within the laboratory and can be used for data
collection, reduction, graphing, and statistical analysis as well as for biomechanical, physiological systems, and human performance modeling.

Information: 164 Hickey Gym, 916-752-0965

**Veterinary Genetics Laboratory**

The laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities include gene mapping and discovery and screening of DNA markers and biochemical polymorphisms. Knowledge acquired will be applied to detecting parentage and solving questionable parentage cases arising from the breeding of horses, cattle, sheep, goats, llamas, alpacas, and dogs. Relationships between blood and DNA markers and livestock diseases are being investigated. We continue to explore red cell, serum and karyotyping for diagnosis of clinical diseases.

Information: Horse Bloodtyping Laboratory, Armstrong Tract, 916-752-2211; Cattle Bloodtyping Laboratory, Armstrong Tract, 916-752-7383

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

VMTRC is a clinical teaching and research center within the UCD School of Veterinary Medicine. The center offers a forum for teaching, research, and service programs for D.V.M. students, M.P.V.M. students, graduate students, food animal residents, university faculty and visiting researchers interested in food animal medicine. VMTRC programs emphasize herd health medicine, epidemiology and preventive medicine, production management, agricultural economics, food safety and animal welfare.

Information: UCD VMTRC, 18830 Road 112, Tulare, California 93274, 209-688-1731

**Engineering and Physical Sciences**

**Center for Geotechnical Modeling**

At the Center for Geotechnical Modeling, research in physical and numerical modeling is conducted by students from several departments and other universities. The center operates two centrifuges, including the 9-m radius, 4,500-kg payload National Geotechnical Centrifuge. These centrifuges are used for research on geotechnical problems such as the effect of earthquakes on earth structures, toxic waste transport in groundwater, and deformations of foundations of bridges and large buildings.

Information: 119 Everson Hall, 916-752-6986

**Crocker Nuclear Laboratory**

This facility is 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, material damage studies, the effect of background radiation on computers, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications, including pioneering work in brain imaging.

Information: Crocker Nuclear Laboratory, 916-752-1460

**Facility for Advanced Instrumentation**

The Facility for Advanced Instrumentation is a training and research center where students, faculty, and staff have access to major scientific instruments. An electron microscope laboratory houses scanning and transmission electron microscopes adjacent to a specimen preparation laboratory. Morphometric analysis is supported by a computerized digitizing tablet and digitizing video image analysis computer. A mass spectrometer laboratory consists of a research-grade GC/MS, a high resolution instrument; and a newly acquired HPLC/MS equipped with electrospray ionization for analysis of proteins and peptides. The facility also coordinates access to additional instruments located in other departments around the campus.

Information: 9 Hutchison Hall, 916-752-0264

**Institute of Theoretical Dynamics**

The institute is an organized research unit promoting research and graduate education in the mathematical sciences. The institute provides a focus for extramural and intramural research pursuits; the two most impor-
tant research themes are dynamics and stochastic processes. Approximately 30 faculty from all of the colleges participate in the activities of the institute, which include conferences, workshops, seminars and summer schools. The institute provides networking of computer workstations, a gateway to supercomputers, research offices, and facilities for interaction with students, faculty, and visitors. Three core research areas are currently supported: mathematical biology, mathematical physics, and applied mathematical analysis, especially fluid dynamics. The institute houses the NSF Computer Graphics Facility for computational biology, which is open to faculty, graduate students and postdoctoral researchers for graphic visualization in biology.

Information: 2201 Academic Surge Building, 916-752-0938

**Inter campus Institute for Research at Particle Accelerators**

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

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

**Nuclear Magnetic Resonance Facility**

The Nuclear Magnetic Resonance Facility provides qualified researchers in the biological, medical and physical sciences access to state-of-the art NMR instrumentation for spectroscopy and imaging. At present, the facility operates five spectrometers of varying purposes and capabilities. Two horizontal magnet bore spectrometers are used for in vivo spectroscopy and imaging of small animals and materials, and in vitro spectroscopy of perfused organs. Two vertical bore spectrometers are used primarily for solution studies of biomolecules, with an additional vertical bore instrument for in vitro studies. All of the spectrometers are multinuclear, and a large variety of high resolution, surface, and imaging coils are available for use. The facility also has SUN and Silicon Graphics workstations for off-line data processing and molecular modeling.

Information: Med Sci 101, 916-752-7677

**X-Ray Crystallographic Facility**

The X-Ray Crystallographic Facility is located in the Department of Chemistry. There are three automated four-circle diffractometers. One of these has a Siemens area detector and is used with an 18 kW rotating anode X-ray source, making it suitable for biocrystallography. There are also traditional Weissenberg and precession cameras. All diffraction equipment is fitted with low-temperature (liq. N$_2$) attachments. In addition, the facility contains two VAX-station 3000 series computers, microcomputers, graphics terminals and multi-pen plotters. The laboratory is known for pioneering work in low-temperature crystallography, for the development of rapid structure determination methods, and techniques for handling reactive materials.

Information: Dr. Marilyn Olmstead, Department of Chemistry, 916-752-6965

**Humanities and Social Sciences**

**Early Childhood Laboratory**

The Early Childhood Laboratory is a teaching and research facility of the Division of Human Development and Family Studies. The laboratory provides a facility where students enrolled in human development courses develop observational techniques and participate with peers, children, parents, and professionals in a fully integrated early childhood program. Students study theories of development in a naturalistic setting. Students link theory to principles of interaction and develop a recognition and respect for individual differences. Selected undergraduate students participate in the research that is conducted at the laboratory by faculty and graduate students.

Information: West House of Early Childhood Laboratory, 916-752-2886

**Humanities Institute**

The Davis Humanities Institute organizes interdisciplinary research seminars open to graduates and faculty, and seeks to promote creative exchanges between the humanities, social sciences, and environmental sciences. Its fellowship program enables campus fellows, visiting fellows, and distinguished visitors to spend time in residence at the institute, and to participate in year-long or quarter-long seminars on designated themes. The seminar theme in 1994-95 will be Reading the Cultural Text. The institute also co-sponsors lectures with other departments; organizes a Friday noon series of talks and films entitled "Problems and Paradigms;" produces a calendar of events; and publishes a quarterly newsletter, Humanities at Davis.

Information: 707 Spiral Hall, 916-752-2229; FAX: 916-752-4283

**Institute of Governmental Affairs**

The Institute of Governmental Affairs (IGA) serves as a center for advanced social science research. IGA offers research opportunities for faculty, undergraduate, and graduate students, as well as for visiting scholars from throughout the United States and around the world. The institute houses the Center for State and Local Taxation. In addition, IGA sponsors five research programs: Program on Workable Energy Regulation; Pacific Rim Business and Development; Program on Leadership and Democracy; Program on Telecommunications Policy; and Program on Immigration, Population, and the Economy. The institute also supports a wide range of public affairs programs, seminars, and conferences designed to foster debate on political, economic, and social issues. IGA provides specialized library services and oversees the Social Science Data Service.

Information: Shields Library, 916-752-2042

**Social Science Data Service**

The Social Science Data Service provides assistance to students and faculty interested in quantitative research involving the use of the computer. The facility offers consultation on statistical packages, database management, survey and database development, and data archives.

Information: 161 AOB 4, 916-752-6063
works in their entirety, not just textbooks and anthologies, and should encompass a wide variety of forms and topics.

Writing: Effective critical thinking and proficiency with the written language are closely related, and both are skills that every University student must master. By University standards, a student who is proficient in English composition is able to: a) understand the assigned topic; b) select and develop a theme by analysis and argument; c) choose words which aptly and precisely convey the intended meaning; d) construct effective sentences, i.e., sentences that economically and successfully convey the writer's ideas and display a variety of structures; and e) demonstrate an awareness of the conventions of standard written English.

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

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

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

Algebra is necessary for success in University mathematics courses. Students who do not take a mathematics course during their last year in high school must take a preparatory course at the University in order to renew their algebra skills. The need to take such a course at the University could delay your undergraduate studies for which mathematics is a prerequisite.

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

ADMISSION AS A FRESHMAN

The University of California defines a freshman applicant as a student who has graduated from high school but has not enrolled since then in a regular session in any college-level institution. Summer session immediately following high school graduation is excluded in this determination.
Admission requirements vary for California residents and nonresidents. Nonresidents must meet higher scholarship requirements.

The following describes the minimum requirements to establish eligibility at the University of California. At UC Davis, students generally must perform well above these minimums in order to gain admission.

Requirements for California Residents

To be eligible for admission to the University of California as a freshman, you must meet the subject requirements, scholarship requirement, and examination requirements that are described on this and the following pages.

Subject Requirements: A to F

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

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

A. History/Social Science—2 years

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

B. English—4 years

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

C. Mathematics—3 years

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

D. Laboratory Science—2 years

Two years of laboratory science providing fundamental knowledge in at least two of these three areas: biology, chemistry, and physics. Not more than one year of ninth grade laboratory science can be used to meet this requirement.

E. Language other than English—2 years

Two years of the same language other than English. Courses should emphasize speaking and understanding, and include instruction in grammar, vocabulary, reading, and composition. (Courses taken in grades seven and eight may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

F. College Preparatory Electives—2 years

Two years in addition to those required in "A" through "E" above.

- History and English: courses that fit the general description for elective courses above.
- Advanced Mathematics: trigonometry, linear algebra, precalculus (mathematical analysis), calculus, statistics, computer science, and similar courses. (Courses containing significant amounts of material for arithmetic or from shop, consumer, or business mathematics are not acceptable.)
- Laboratory science: courses in the biological and physical sciences. A general science course taken in grade nine as preparation for a laboratory science may be used.
- Language other than English: courses may be in either the same language used to satisfy the "E" requirement or a second foreign language. If a second language is chosen, however, at least two years of work in that language must be completed.
- Social science: courses that fit the general description for elective courses above, and that serve as preparation for lower division work in social science at the University. (Courses of an applied, service, or vocational nature are not acceptable.)
- Visual and Performing Arts: courses should enable students to understand and appreciate artistic expression, and to talk and write with discrimination about artistic materials studied. Courses that develop creative artistic ability or artistic performance may be used. (Courses that are recreational or are offered under physical education are not acceptable.)

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

English Proficiency

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

- SAT II Subject Test in Writing (a score of 600 or above); or
- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, or 3).

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

Scholarship Requirement

An applicant must have earned a grade of C or better in all high school courses to satisfy the "A" through "E" requirements above. The grades earned in these courses that are taken in grades ten through twelve
will be used to evaluate the grade point average for minimum eligibility.

If you attain a grade point average of 3.30 [where the letter grade A=4, B=3, and C=2, and in University-approved honors or advanced placement courses taken during the tenth, eleventh and twelfth grades (limit of four year-long courses with not more than two coming from the tenth grade) where the letter grade A=5, B=4, and C=3] in the required "A to F" subjects taken after the ninth grade, you will meet the minimum requirements to be eligible to enter the University, regardless of your scores on standardized tests. If your grade point average falls between 3.29 and 2.82, you will meet the minimum requirements for the University if you achieve the specified scores on the standardized tests (see the Eligibility Index opposite).

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

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

**Examination Requirement**

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

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

  or

- American College Test

**AND**

- Three Scholastic Assessment Tests-II (SAT-II—College Board), which must include (a) writing test, (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 3.30 or higher, the tests are required but your scores will not be used to determine your minimum eligibility for admission. (Reminder: At UC Davis, students generally must perform well above the minimums in order to gain admission.)

If your grade point average in the "A to F" requirement is less than 3.30, refer to the table below to see the examination scores you must earn to be eligible for University admission.

**Eligibility Index**

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<tr>
<td>Requirement</td>
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<tr>
<td>3.29</td>
<td>490</td>
<td>12</td>
</tr>
</tbody>
</table>

<sup>†</sup>The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.

<sup>‡</sup>The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600.
Make arrangements to take the required SAT-I and SAT-II by writing to College Board SAT, Princeton, NJ 08541. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not the University.) UC Davis's College Board code is 4834 and the ACT code is 0454.

Requirements for Residents of Other States
If you are a freshman applicant who does not claim California residency, you must meet the following requirements for admission to the University of California:

- Graduate from a regionally accredited or state-accredited high school
- Satisfactorily complete the subject requirements listed under Requirements for California Residents
- Earn a grade point average of at least 3.4 (B+) in the courses used to meet the subject requirements
- Complete the examination requirements listed for California residents

Minimum Eligibility by Examination Alone
If you do not meet the minimum scholarship and subject requirements for admission, you can meet minimum requirements for admission as a freshman by examination alone. (If you have completed transferable college courses, College Board tests cannot be taken in academic subjects covered in those courses.) You must take the same College Board tests discussed above and receive a total score of at least 1300 on the SAT-I, or a score of 31 on the American College Test. Your total score on the SAT-II must be 1650 or higher with no score less than 500 on an individual test. If you are a nonresident applicant, your score on the SAT-II must be 1730 or higher.

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).

Transfer Credit
Transfer credit may be granted to a freshman applicant for an acceptable college course taken while still in high school if an official transcript is received from the college that conducted the course. Transfer credit is also granted for each College Board Advanced Placement Examination completed with a score of 3, 4, or 5. International Baccalaureate Higher Level Examinations with scores of 5, 6, or 7 will receive transfer credit.

ADVANCED PLACEMENT EXAMINATIONS
If you take one or more of the College Board Advanced Placement (AP) Examinations and score 3, 4, or 5, you will be awarded college credit. The credit will become part of the minimum 180 quarter units you need in order to receive a bachelor's degree. The credit from the AP Examinations may also be used to satisfy specific degree requirements. Consult the chart on the facing page to learn how many units you will receive for an AP Examination (see the column headed: 'Credit Toward Degree'), and how those units will be applied toward specific degree requirements (see the column headed: 'Credit Allowed Toward Specific Degree Requirements'). Please note that the courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UCD General Education Requirement. Rather, AP credits are counted as transfer credits and may reduce the number of General Education (GE) courses you have to complete. (See the GE section in Bachelor's Degree Requirements chapter.)

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

ADMISSION AS A TRANSFER STUDENT
The University of California defines a transfer applicant as a student who has been a registered student in a college or university or in college-level extension classes since last attendance at high school. Summer session attended immediately following high school graduation is excluded in this determination. If you are a transfer applicant, you may not disregard your college record and apply for admission as a freshman.

California residents must meet the requirements that follow. If you are not a California resident, see Requirements for Residents of Other States below. At UC Davis, students generally must perform well above the minimums in order to gain admission.

Minimum Requirements for California Residents
Transfer applicants must meet one of the following conditions:

- If you were eligible for admission to the University when you graduated from high school—meaning you satisfied the subject, scholarship, and examination requirements—you are minimally eligible for admission if you have a C (2.0) average in your transferable college coursework.

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. All transfer students, regardless of the date of high school graduation, must meet the high school requirements stated earlier in this catalog, or establish eligibility as junior-level transfers.

- If you have graduated from high school and meet the needed scholarship and examination requirements but you have not completed one or more of the "A to F" subjects while in high school, you will be minimally eligible to be considered for admission after you have:
<table>
<thead>
<tr>
<th>EXAMINATION</th>
<th>UCD COURSE</th>
<th>CREDIT TOWARD</th>
<th>CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGLISH</td>
<td></td>
<td>DEGREE</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>5, 4</td>
<td>8 units</td>
<td>English/Humanities Credit: Satisfies Subject A requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>College of Agricultural and Environmental Sciences: 4 units satisfies first part of English composition requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>College of Engineering: 8 units satisfies English 1, 4 units toward Humanities/Social Sciences electives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>College of Letters and Science: Satisfies first course toward English Composition requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Satisfies Subject A requirement.</td>
</tr>
<tr>
<td>FOREIGN LANGUAGES</td>
<td></td>
<td>8 units</td>
<td>Humanities Credit/Unrestricted Electives: 4 units for each foreign language examination passed.</td>
</tr>
<tr>
<td>French</td>
<td>5</td>
<td></td>
<td>In the College of Agricultural and Environmental Sciences, satisfies credit toward breadth/Unrestricted electives.</td>
</tr>
<tr>
<td>French</td>
<td>4</td>
<td></td>
<td>In the College of Letters and Science, examinations (except for Latin) satisfy the Foreign Language requirement.</td>
</tr>
<tr>
<td>French</td>
<td>3</td>
<td></td>
<td>In the College of Engineering, 4 units toward Humanities/Social Science electives.</td>
</tr>
<tr>
<td>German</td>
<td>5, 4</td>
<td>8 units</td>
<td>German 101, upper division literature courses</td>
</tr>
<tr>
<td>German</td>
<td>3</td>
<td>4 units</td>
<td>German 4</td>
</tr>
<tr>
<td>Latvian (Vergili)</td>
<td>5, 4, 3</td>
<td>4 units</td>
<td>Determined by consultation with Classics advisor.</td>
</tr>
<tr>
<td>Spanish</td>
<td>5, 4</td>
<td>8 units</td>
<td>Spanish 22, 23 or 24, or more advanced course in consultation with adviser.</td>
</tr>
<tr>
<td>Spanish</td>
<td>3</td>
<td>8 units</td>
<td>Spanish 21 or 8</td>
</tr>
<tr>
<td>HUMANITIES</td>
<td></td>
<td></td>
<td>Humanities Credit/Unrestricted Electives: 8 units in the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
</tr>
<tr>
<td>Art Studio</td>
<td>5</td>
<td>8 units</td>
<td>In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
</tr>
<tr>
<td>Art Studio</td>
<td>4</td>
<td>6 units</td>
<td>In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
</tr>
<tr>
<td>Art History</td>
<td>3</td>
<td>8 units</td>
<td>In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
</tr>
<tr>
<td>American History</td>
<td>5, 4, 3</td>
<td>8 units</td>
<td>History 17A, 17B</td>
</tr>
<tr>
<td>European History</td>
<td>5, 4, 3</td>
<td>8 units</td>
<td>History 4A and 4B may be taken for full credit.</td>
</tr>
<tr>
<td>Music</td>
<td>5, 4, 3</td>
<td>8 units</td>
<td>In the College of Letters and Science, partially satisfies Area (breadth) requirements for A.B. degree.</td>
</tr>
<tr>
<td>NATURAL SCIENCES</td>
<td></td>
<td>8 units</td>
<td>Natural Sciences Credit/Preparatory Courses for Science Majors: 4 units Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences.</td>
</tr>
<tr>
<td>Biology</td>
<td>5, 4, 3</td>
<td>8 units</td>
<td>Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 21A, 21B, 21C sequence.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>8 units</td>
<td>Credit for Computer Science Engineering 30 may serve as prerequisite for Computer Science Engineering 40 with consent of instructor.</td>
</tr>
<tr>
<td>Computer Science</td>
<td>4, 4</td>
<td>8 units</td>
<td>In the College of Engineering, examination awards units towards the unrestricted electives requirement.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>5, 4, 3</td>
<td>2 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3</td>
<td>4 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>5</td>
<td>8 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>4, 3</td>
<td>8 units</td>
<td>Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.</td>
</tr>
<tr>
<td>Physics</td>
<td>5</td>
<td>8 units</td>
<td>No credit for laboratory parts of Physics 5 or 9.</td>
</tr>
<tr>
<td>Physics</td>
<td>4, 3</td>
<td>4 units</td>
<td>Course equivalents may be used as prerequisite for succeeding courses of same series with consent of instructor.</td>
</tr>
<tr>
<td>Physics</td>
<td>5</td>
<td>4 units</td>
<td>In the College of Engineering, only a score of 5 on Physics (Cl) Examinations applies toward Physics requirement.</td>
</tr>
<tr>
<td>SOCIAL SCIENCE</td>
<td></td>
<td>4 units</td>
<td>Social Science Credit/Unrestricted Electives: 4 units Political Science 1 satisfies American History and Institutions requirement.</td>
</tr>
<tr>
<td>American Govern-</td>
<td>5, 4, 3</td>
<td>4 units</td>
<td>In College of Agricultural and Environmental Sciences, satisfies credit toward breadth requirement or Unrestricted electives.</td>
</tr>
<tr>
<td>ment and Politics</td>
<td></td>
<td>4 units</td>
<td>In College of Engineering, awards credit toward Humanities-Social Sciences electives requirement.</td>
</tr>
<tr>
<td>Comparative</td>
<td>5, 4, 3</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Government and</td>
<td></td>
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<tr>
<td>Politics</td>
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<td></td>
</tr>
<tr>
<td>Economics (Micro)</td>
<td>5, 4, 3</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Economics (Macro)</td>
<td>5, 4, 3</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>5</td>
<td>4 units</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>4, 3</td>
<td>4 units</td>
<td></td>
</tr>
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</table>
1. established an overall grade point average of 2.00 or better in another college or university;
2. completed with a grade of C or better appropriate college courses in the high school subjects that you lack; and
3. completed 12 or more transferable quarter (or semester) units, or have met the freshman examination requirement.

- If you did not meet the needed scholarship requirement or did not meet the scholarship requirement and lack the required subjects, you will be minimally eligible to be considered for admission after you have:

1. completed 84 transferable quarter (56 semester) units of credit in college courses (Note: Although the minimum requirement is 84 quarter/56 semester units, to be competitive for admission to UC Davis, students should complete at least 90 quarter/60 semester transferable units); and
2. established an overall grade point average of 2.40 or better in another college or university; and
3. completed one of the following:
   a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit=one year-long course) of credit may be waived except in English and mathematics;
   or
   b. a college course, or courses, in mathematics; one transferable course in English; and one transferable course in either U.S. history, a laboratory science, or a language other than English, all with grades of C or better. The mathematics component may be satisfied in one of the following ways: a) take courses in algebra, geometry, and advanced algebra; b) take a course that employs the topics of advanced algebra—for example, college algebra, pre-calculus, calculus, linear algebra; c) take a transferable statistics course that has advanced algebra as a prerequisite.

Minimum Requirements for Residents of Other States

If you meet the requirements for admission as a nonresident freshman, you must have a grade point average of 2.8 or better in college courses that are accepted for transfer credit by the University of California.

If you don’t meet the minimum requirements for admission as a nonresident freshman, you must have completed at least 84 quarter units (56 semester units) of transferable work with a grade point average of 2.8 or better and have completed the subject requirements for California residents.

Transferring to the College of Engineering

If you are admitted with fewer than 84 quarter units of college work (56 semester units), you are classified in lower division standing, and must complete one of the four Lower Division Programs listed under Engineering in the Programs and Courses section of this catalog. You are advanced to upper division standing after completing 84 units.

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

Unit Credit for Courses Taken Elsewhere

The University gives unit credit to transfer students for courses they have completed at other accredited colleges and universities. To be accepted for credit, your courses must be comparable to those offered at the University, as determined by the Undergraduate Admissions Office.

A total of 105 quarter units (70 semester units) toward a university degree may be earned at a community (two-year) college. Only subject credit will be granted for courses taken in excess of these amounts.

UC Intercampus Transfer

If you are an undergraduate student currently or previously registered at another campus of the University of California and have not since been registered in another institution, you may apply for transfer to the Davis campus. Filing dates and application fees are the same as those listed for new applicants.

ADMISSION AS AN INTERNATIONAL STUDENT

International students attend the University of California, Davis from many countries in the world. An international application may be obtained by writing the Undergraduate Admissions Office, University of California, Davis, California, 95616. It is very important that the application be filed during the appropriate filing period.

To be eligible for admission to the University, international students need to meet specific academic and financial qualifications. International students are responsible for providing the University with all secondary school and college transcripts. The Test of English as a Foreign Language (TOEFL) is a requirement of admission for applicants from abroad or for those with little schooling in the United States when English is not the applicant's native language. A minimum score of 500 is required.

The Scholastic Assessment Tests (SAT-I and SAT-II) are required for international freshman applicants who are graduates of U.S. high schools or American-type schools abroad. These tests are also required for applicants who come from countries that do not have national, external examinations at the end of secondary school. Because many preliminary admission decisions are made on the basis of test scores and marks, all international freshman applicants are strongly encouraged to take these tests and to have the official scores reported to UC Davis as early as possible.

For transfer students, coursework is considered transferable if the applicant completed the course at an institution that is recognized by the University of California and is comparable to coursework offered at the University of California.
Most international students are required to complete a "Certification of Finances" form that attests to the student's ability to pay for non-resident tuition and fees and living expenses.

All international students who have not satisfied the Subject A requirement through domestic coursework or testing, or whose native language is not English, must take the Examination in English for Non-Native Speakers upon entrance to UC Davis. Depending on the results of the exam, students may be required to enroll in appropriate classes until they have achieved the necessary language skills.

UC Davis welcomes competent, qualified applicants from around the world.

**CAMPUS SELECTION CRITERIA**

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

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

The selection criteria described below will be used for applicants for the fall 1995 term. The criteria may differ for the winter and spring terms because enrollment targets and applicant qualifications change. Applicants for winter or spring should contact the Undergraduate Admissions Office for more information.

**Selection Guidelines**

Each campus, in consultation with the Office of the President, develops enrollment targets that specify the number of new freshman and advanced standing students expected to enroll. Campuses that receive more applications than the number required to meet their enrollment target admit students using the criteria described below.

**Freshman Applicants**

**Academic Criteria** (used to select 60% of admits): Davis selects freshman applicants who have made the greatest effort to fully prepare academically as measured by the following criteria:

1. Calculated GPA on all academic courses completed in the "A to F" subject areas, with additional points given for honors courses. Maximum value is 4.00.
2. College entrance test scores—SAT-I or ACT and SAT-II test scores.
3. The number and content of college preparatory courses taken in academic subjects beyond UC minimums.
4. The number of University-approved honors or advanced placement courses completed or in progress.
Supplemental Criteria (used to select 40% of admits): Applicants are evaluated using the selection criteria described above in conjunction with the following supplemental criteria:

1. Personal accomplishments, talents, experiences, or interests that will contribute to the educational environment of the campus.

2. Special circumstances which may have affected the applicant’s life, including personal hardship, disabilities, economic disadvantage, and membership in groups historically underrepresented at the University.

Transfer Applicants

Academic Criteria: Top priority for admission consideration is given to UC-eligible California community college junior level transfer applicants. Other UC-eligible transfer applicants will be admitted if space is available. When applications far exceed the number of spaces available—for majors such as engineering, biological sciences, computer science, environmental policy analysis and planning, international relations, and psychology, for example—the completion of specific lower division preparatory courses for the major is required. Contact Undergraduate Admissions for information on which majors are so impacted.

Supplemental Criteria: The same supplemental criteria described above for freshmen are used.

Notification and Acceptance of Admission

Upon completion of a review of your academic records, you will be notified of your admission status by letter. The length of time before admission notification varies, depending upon the completeness of your application. For example, most applicants for fall quarter will be notified of their admission status between March 1 and mid-March for freshmen, and March 1 and May 1 for transfer applicants. When you receive your notification of admission you will also receive an important form called the "Statement of Intent to Register" (SIR). Complete the form and return it to the Admissions office, along with the required nonrefundable $100 deposit, in order to complete the admissions process. This advance deposit is applied to your University Registration Fee as long as you register in the quarter to which you are admitted. Intercampus transfer, EOP, and readmission applicants are not required to submit the $100 advance deposit; however, they will pay full registration fees at the time of registration.

The Statement of Intent to Register (SIR) should be returned by May 1 (as a freshman) or June 1 (as a transfer) to notify the campus that you wish to attend. Students admitted to winter or spring quarter must return the SIR by the date specified in the notification of admission. Students not selected for admission consideration at the UC campuses to which they have applied may have their application considered at another UC campus where space is still available.

READEMISSION

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

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

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Deadline Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 1994</td>
<td>August 24, 1994</td>
</tr>
<tr>
<td>Winter 1995</td>
<td>November 8, 1994</td>
</tr>
<tr>
<td>Spring 1996</td>
<td>February 2, 1995</td>
</tr>
<tr>
<td>Fall 1995</td>
<td>July 31, 1995</td>
</tr>
</tbody>
</table>

SPECIAL PROGRAMS

Concurrent Enrollment

Concurrent courses are regular University courses open to the community on a space-available basis through UC Extension. This program allows an individual to pursue academic interests and to test academic abilities at the University.

For information, write the University Extension Office, Research Park, University of California, Davis, CA 95616, 916-757-8777.

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

The Educational Opportunity Program/Student Affirmative Action assists students from ethnic groups that are underrepresented in the UC eligibility pool (African American, American Indian, Chicano, and Latino). Also, the program assists students with disabilities and students from economically and/or educationally disadvantaged backgrounds. EOP/SAA can help you with the admission application process and offers academic, social, and cultural support. (See also under the Academic Advising and Student Resources chapter.) An admissions application fee waiver and financial aid are available to those individuals with demonstrated financial need. You can contact the Undergraduate Admissions Office for information on obtaining the fee waiver.

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

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

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. Fees and filing dates are the same as those for new applicants. 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 must also submit transcripts from all schools attended. 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 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 and the College of Letters and Science.

Second Baccalaureate

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. A Duplicate Degree Fee of $6,000 annually is assessed for students with a bachelor's or higher degree who attend the University of California to obtain instruction at the baccalaureate level. Students are exempt from paying the Duplicate Degree Fee if they are enrolled in joint degree and double major programs; are seeking post-baccalaureate degrees, including education credentials or certificates; are nonresident students paying nonresident tuition; or qualify for certain categories of low-income student status, as defined in state law.

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

Enrollment pressures have necessitated closing this category of admission for the College of Letters and Science. The College of Engineering will accept applicants if their first degree is not in engineering and if they complete the lower division engineering program at a California community college.

Special Status

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

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

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

ADMISSION CHECKLIST

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

☐ 2. Complete the application including the essay and list the college and major you prefer. Attach a check or money order to cover the application fee with your application materials, and return them in the preaddressed envelope during the priority filing period for the quarter in which you are interested.

☐ 3. Keep a copy of your application and essay.

☐ 4. Retain for your records the notices received from both the Undergraduate Application Processing Service and the Undergraduate Admissions Offices which acknowledge receipt of your application.

☐ 5. If you are applying from high school, do not send a preliminary transcript unless requested to do so by Undergraduate Admissions. If you are applying as an advanced standing student, arrange to have all official transcripts sent. If test scores are required, please arrange to have these forwarded by the testing agency.

☐ 6. High school applicants to the fall quarter should take the SAT-I or ACT and SAT-II tests no later than December. We strongly encourage you to complete these tests by the November test date.

☐ 7. The Undergraduate Admissions Office may request additional information, such as transcripts, test scores, or confirmation of work in progress. Send this information right away so your application can be processed without delay. Note: Your eligibility for admission cannot be evaluated until all your application materials are received, i.e., application form, filing fee, essay, official transcript (if required), work in progress, and test scores (if required).

☐ 8. If you are admitted, keep your admission letter for your records.

☐ 9. Return your “Statement of Intent to Register” (SIR), “Statement of Legal Residence,” and Student Address form along with the nonrefundable advance deposit of $100 (if required) as soon as possible and no later than the date stated on the SIR so your registration materials can be ordered before you register.

☐ 10. After your SIR is received, you will be sent information from the Cowell Student Health Center. Return your completed Medical History and Immunization forms to the Cowell Student Health Center as soon as possible.
FEES AND EXPENSES

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

These are the proposed fees for the 1994-95 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.

At the time of registration each quarter, every student must pay the following fees. (A Registration Fee Deferred Payment Plan, which allows students to pay their quarterly fees in three monthly installments, is available.)

**Undergraduate Student Fees**
- University Registration Fee* $239.00
- Memorial Union Fee 28.50
- Associated Students Fee 23.50
- Student Services Maintenance Fee 34.00
- Educational Fee** 1121.00
- **Total for California residents** $1,446.00
- Tuition for nonresidents 2,566.00
- **Total for nonresidents** $4,012.00
- Optional Undergraduate Health Insurance Fee (132.00)

**Graduate Student Fees**
- University Registration Fee* $239.00
- Memorial Union Fee 28.50
- Graduate Student Association Fee 6.50
- Health Insurance Fee 142.50
- Educational Fee** 1121.00
- **Total for California residents** $1,537.50
- Tuition for nonresidents 2,566.00
- **Total for nonresidents** $4,103.50

* University Registration Fee = $237.00 in winter and spring quarters.
** Educational Fee = $1120.00 in winter and spring quarters.

The Student Services Maintenance Fee is effective for a period of three years beginning fall quarter 1993. In May 1993, UC Davis undergraduates voted on and passed a referendum to establish the Student Services Maintenance Fee; the Fee was approved by the Regents. The Fee is assessed on undergraduates only, and helps fund selected student service programs.

The Undergraduate Health Insurance plan is a voluntary plan available to all undergraduates except for foreign undergraduate students, who must participate in the Graduate Student Health Insurance Plan and pay the Graduate Student Health Insurance Plan Fee. Graduate students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another insurance plan.

The Graduate Student Association Fee is optional for students in the Schools of Law, Medicine, and Veterinary Medicine. Law students are required to pay a Law Student Association Fee of $8.00 per semester.

**Parking Permit and Bicycle Licensing Fees**

**Parking** (per year: $60 to $276 for cars, depending on the type of permit; $108 for motorcycles; $108 for nighttime only permit, i.e., $20 to $74 per quarter)

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

For details concerning fees and deposits, consult the publication 1994-95 Student Fees and Deposits, available from the Office of the Registrar. Current fees are also published in the Class Schedule and Room Directory.

**Additional Fees for Professional Schools and Second Degrees**

Effective fall 1994, students entering the Graduate School of Management, or Schools of Law, Medicine, or Veterinary Medicine will pay an additional professional school fee. Fees for the professional schools are listed in the relevant chapters in this catalog.

Students who have earned a baccalaureate or higher degree and who attend the University of California to obtain instruction at the baccalaureate level must pay a **Duplicate Degree Fee** of $6,000 annually. Students are exempt from paying the Duplicate Degree Fee if they are enrolled in joint degree and double major programs; are seeking post-baccalaureate degrees, including education credentials or certificates; are non-resident students paying nonresident tuition; or qualify for certain categories of low-income student status, as defined in state law.

**Costs for a Year at UC Davis**

The costs listed in the chart below 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.

<table>
<thead>
<tr>
<th>Average Student Costs Annually</th>
<th>Undergraduate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$4,332</td>
</tr>
<tr>
<td>Books and Supplies</td>
<td>$841</td>
</tr>
<tr>
<td>Housing</td>
<td>$3,846</td>
</tr>
<tr>
<td>Food</td>
<td>$1,919</td>
</tr>
<tr>
<td>Personal Expenses</td>
<td>$1,413</td>
</tr>
<tr>
<td>Transportation</td>
<td>$756</td>
</tr>
<tr>
<td><strong>Total (off-campus residence)</strong></td>
<td>$13,107</td>
</tr>
<tr>
<td><strong>Less for living on campus</strong></td>
<td>$275</td>
</tr>
<tr>
<td><strong>Total (on-campus residence)</strong></td>
<td>$12,832</td>
</tr>
</tbody>
</table>

**Graduate (Single, living off campus)**

| General                       | $14,269       |
| School of Law                 | $14,369 to 16,544 |
| (depending upon the year in school) |
| Graduate School of Management | $16,249       |
| School of Medicine            | $18,249 to 19,309 |
| (depending upon the year in school) |
| School of Veterinary Medicine | $16,753 to 16,811 |
| (depending upon the year in school) |

**Employee-Student Fees**

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admi-
sion to the University. Once admitted, the employee-student must file a petition for the reduction in fees before each quarter of enrollment. Employee students pay one-third of the full-time Registration Fee, one-third of the full-time Education Fee, and the Memorial Union Fee. Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Section 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff program) available in department offices, at the Library Reference Center, or the Staff Development and Professional Services Office. Petitions can be obtained through the employee's unit.

**Part-Time Students**

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

**International Student Expenses**

International students are responsible for all of their expenses while studying at UC Davis. The expenses include non-resident tuition, educational fees, room and board and a modest amount for personal expenses. For the 1994-95 academic year, we estimate the cost will be $23,500. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, $23,500 is only a preliminary figure. This minimum allowance may be increased without advance notice.

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

All students need to be aware that there are numerous initial expenses during the first few months, including tuition and fees, an initial down payment for housing, food and personal expenses. We suggest that you bring a minimum of $4,000 for immediate expenses. Careful budgeting is essential for international students.

**Cancellation, Withdrawal, and Fee Refunds**

If you registered for courses and wish to cancel your registration or withdraw from the University, you must complete a Notice of Cancellation/Withdrawal form. This form is available from the Office of the Registrar. Failure to do so may make you liable for fees according to the University refund policy (below). All of your courses will be dropped automatically when this form is processed.

**New Undergraduate Students:**

*Prior to Day 1, Registration fees paid are refunded in full except for the $100 acceptance of admission fee.*

*Day 1 and after, the $100 acceptance of admission fee is withheld from the registration fee and the Schedule of Refunds is applied to the balance of fees assessed.*

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

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

**Schedule of Refunds**

The Schedule of Refunds below applies to all continuing and readmitted students and new students who do not receive federal financial aid.

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>60%</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>

* For new students who receive federal financial aid and withdraw during their first academic term, fees may be refunded according to a Modified Fee Refund Schedule, which is available at the Office of the Registrar.

**Refund Schedule subject to change.**

**Refund of Health Insurance Fee**

If you paid the health insurance fee and you are cancelling your registration before the first day of instruction, you are entitled to a 100 percent refund of this fee. Undergraduates must contact the Health Insurance Office at (916) 752-2612 to receive the refund. Graduates will get an automatic refund from the Accounting Office.

After the first day of instruction, no refund of the health insurance fee will be issued. Any questions regarding the refund of health fees for withdrawals should be directed to the Student Health Center.

**FINANCIAL AID**

**Financial Aid Office**

113 North Hall
916-752-2390 (TDD 752-3244)

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

**Financial Aid Deadlines**

| Priority filing period for grants, loans, work-study, and California Student Aid Commission applications for 1995-96 | Jan. 1-Mar. 2 |
| Deadline to file for fellowships and graduate scholarships for 1995-96 with Graduate Studies | Jan. 15 |
Students who miss the March 2 deadline should still apply for financial aid. Even though Cal Grant, scholarship, and work-study funds may be depleted, eligible applicants can receive Pell Grants and Federal Stafford Loans to help meet their need. The Free Application for Federal Student Aid (FAFSA) is available at local high schools, community colleges, and the Financial Aid Office. Continuing UC Davis students and prospective graduate students should obtain the FAFSA from the Financial Aid Office in December.

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

Graduate students are eligible for most of the same types of financial aid as undergraduates. In addition, graduate scholarships, fellowships, and teaching and research assistantships are administered through Graduate Studies. State graduate fellowships are awarded to students who are pursuing an advanced or professional degree and demonstrate financial need and academic eligibility. The awards pay part of the cost of tuition and are based on undergraduate grades, test scores, parents’ educational level, and consideration of disadvantaged background.

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

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

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

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

TYPES OF FINANCIAL AID

Grants

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

Federal Pell Grants. All undergraduate financial aid applicants are required to apply for a Federal Pell Grant each year by following the instructions in the financial aid application packet. Recipients must be enrolled at least half time and must maintain good academic standing and make satisfactory academic progress. Eligibility is determined by the federal government according to a formula developed by the Department of Education and approved annually by Congress. All applicants are notified via a “Student Aid Report” (SAR). Submit all parts of the SAR to the UC Davis Financial Aid Office. The amount you receive depends on your 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. Follow the instructions in the financial aid application packet.

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

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

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

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

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

Bureau of Indian Affairs (BIA) Grants are awarded to students who are at least one-fourth American Indian, Eskimo, or Aleut as recognized by a tribal group served by the Bureau of Indian Affairs and who show financial need. Applicants must submit a Free Application for Federal Student Aid (FAFSA) and provide supporting documents. Write to the agency that administers your tribal affairs and request a BIA Higher Education Assistance application. The BIA Financial Aid counselor on campus can help you complete the application.

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

Loans
A Financial Aid Offer almost always includes a long-term, low-interest loan. Repayment of these loans (with the exception of the PLUS/SLS program) begins after you graduate or withdraw from school.

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

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

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

- $3,000 undergraduate annual loan limit
- $15,000 undergraduate maximum loan limit
- $30,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)

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

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

The 1992 reauthorization of financial aid programs changed the eligibility requirement for HPSL for medical students. Beginning with the 1993-94 academic year, new HPSL borrowers must commit themselves to complete a primary care residency program, and practice in a primary care field until their HPSLs are repaid.

Federal Subsidized and Unsubsidized Stafford Student Loans (SSL) are available through banks and other lending institutions. Subsidized loans are based on financial need and interest accrued while the student is in school is paid by the federal government. Unsubsidized SSLs are available to students regardless of income and assets, and there is no interest subsidy. Students are advised to speak with a Financial Aid counselor before borrowing an unsubsidized loan.

- Undergraduate students may borrow up to annual maximums of $2,625 for freshmen, $3,500 for sophomores, and $5,500 for juniors and seniors, up to a maximum aggregate indebtedness of $23,000.
- Graduate and professional students may borrow up to $8,500 per year, not to exceed a maximum aggregate of $65,500 for combined undergraduate and graduate borrowing.
- Variable interest rate is adjusted annually, capped at 9 percent (new borrowers), 7-10 percent interest (previous borrowers).
- Repayment begins six months after graduation or withdrawal.

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

- Parents may borrow PLUS up to the cost of education minus other financial aid received during the years the dependent students is an undergraduate.
- There is no interest subsidy for this loan.
- Repayment begins within 60 days after loan disbursement.

Short-Term Loans meet temporary or emergency financial needs of registered students. Loan funds are provided by UC Davis alumni, ASUCD, the Cal Aggie Foundation, the Regents of the University of California, and private donors.

- Emergency Loans: $200 maximum; the maximum repayment period is 30 days.
- Short-Term Loans: $300 maximum. The maximum repayment period is five months or the end of the academic year.
- Assistant Loans: graduate students who are in the teaching assistant, research assistant, associate-instructor, or postgraduate researcher classifications can apply for a maximum of one month’s salary. The maximum repayment period is six months or the end of the academic year.
For information about how to apply, pick up an application in the lobby of North Hall. Application procedures vary slightly during the registration cycle of each quarter. Check the Short-term Loan bulletin board in the lobby of North Hall for instructions.

**Work-Study**

College work-study programs enable students to earn part of their financial aid through part-time employment. To participate, you must first receive work-study as a part of your financial aid package. Your work-study award offers you both money for your education and work experience. The Student Employment Center coordinates all college work-study programs.

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

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

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

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

## UNDERGRADUATE SCHOLARSHIPS AND AWARDS

**Information:**
Scholarship Office
207 North Hall
916-752-2393

UC Davis recognizes exceptional students with scholarships awarded on the basis of academic excellence and exceptional promise. The Scholarship Office administers approximately 150 different undergraduate scholarships. Many more scholarships are handled through outside agencies.

Scholarship recipients are chosen by committees made up of both students and faculty. In addition to academic records (a minimum grade point average of 3.25 is required), selection may be based on letters of recommendation, test scores, and a personal essay in which your University goals and objectives are stated. Some awards are limited to students in specific majors or colleges, residents of certain geographical areas, students of a particular class standing, or students with demonstrated financial need. Most scholarships are not renewable and you must re-apply each year for scholarship aid.

Students applying to the University for the fall quarter are considered for scholarships using the same forms completed for admission purposes. Continuing students should obtain scholarship applications from the Scholarship Office in October. These applications are due in early December. Announcement of winners is usually made beginning in April.

Graduate students are also eligible for various scholarships and fellowships. (See the Graduate Studies chapter.)

**Regents Scholarships,** among the highest honors that undergraduates at the University can receive, are granted to exceptionally promising freshmen or juniors enrolling in the fall quarter. Awards may be honorary (a $500 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs. These scholarships are renewable as long as you maintain a 3.25 grade point average.

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

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

- $1,000 maximum
- New undergraduates only
- Selection by local Alumni Association chapters

**Military Scholarships** are awarded to outstanding high school seniors without regard to financial need, as well as to UC Davis students who have demonstrated exceptional leadership and scholastic achievement during their freshman and/or sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UCD scholarship students participate in the Military Science (ROTC) Program. Information and applications are available from the Department of Military Science, 125 Hickey Gymnasium, 916-752-0543.

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

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

- Generally $100 to $3,200

**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
LIVING AT DAVIS

Residence Halls

Information:
Student Housing Office
916-752-2033

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 3,500 undergraduates and 178 graduate students do just that. Students and professional staff in each of the residence hall complexes help create and maintain an environment conducive to personal growth and educational achievement. About 90 percent of the freshmen students live in residence halls. Twenty-five percent of the transfer students elect to live in a residence hall environment. All new undergraduates whose Statements of Intent to Register (SIR) are received before July 1, 1994 are guaranteed residence hall housing as long as they complete all of the instructions that accompany their contracts. All graduate students whose applications are received on or before May 1, 1994, will participate in a lottery for the 178 spaces available in Lysle Leach Hall.

The total room-and-board rate for 1994-95 is $4,980-5,640 for a double-occupancy room and $5,510-6,170 for a single room (of which there are very few available to new residents). Cost depends on which of the six meal plans you choose. Rooms are furnished with a bed, desk and chair, bookcase, chest of drawers, study lamp, and bulletin board for each resident.

If the Davis campus is your choice when filling out your University Admissions Application, the Student Housing Office mails necessary housing information with your admissions letter. If you have a physical disability which requires special housing accommodation, please send a detailed letter of explanation to the Contracts and Accounts Office, Room 160, Student Housing Office, at the time you return your Statement of Intent to Register. Your housing contract will be mailed to you between April and July. At that time you will be able to choose your meal and payment plan.

Student Family Housing:
Orchard Park/Solano Park

Information:
916-752-4000

There are 476 University-operated, furnished and unfurnished on-campus apartments for UC Davis student families. The monthly rates for the academic year 1993-94 were as follows:

- Orchard Park, two-bedroom unfurnished apartment, $465.
- Orchard Park, two-bedroom furnished apartment, $495.
- Solano Park, one-bedroom unfurnished apartment, $366.
- Solano Park, two-bedroom unfurnished apartment, $415.

Vacancies in Orchard Park/Solano Park are filled from a chronological list based on the date of application. For a fall assignment, you should expect a wait of two to three months after you apply. For an assignment during the remainder of the year, the waiting period is usually shorter. An application may be submitted before you are admitted to the University and before you are married, but you must show documentation of your student and marital or parental status before occupancy can be granted. If a member of your family has a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

Russell Park

Information:
916-753-7322

Privately owned and managed on-campus living accommodations are available for student families. Russell Park features one-, two-, and three-bedroom unfurnished units. Monthly rents for academic year 1994-95 range from $470 for a one-bedroom unit to $756 for a three-bedroom unit.

Other Graduate Student Housing

Information:
The Atriums
916-753-9669

The Atriums offers on-campus living accommodations for single graduate students. The privately owned and managed apartments feature studio and two-bedroom unfurnished units. For the academic year 1994-95, monthly rent for a studio is $450 and $628 for a twobedroom unit.

STUDENT SERVICES

Student Health

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

Your health is important to you and to the University. Consequently, new students are asked to submit a medical history form, and evidence of rubeola and rubella immunity to the Health Center.

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. Students with contagious diseases will be excluded from the classroom.

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

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

The Health Center currently does not provide services for dental problems or routine eye care.
Health Center services are available to students' dependents on a fee-for-service basis. Also, you may purchase a Health Insurance Plan at the Health Center for your spouse and children.

**Health Insurance.** Graduate, professional, and international students must purchase a mandatory insurance plan as part of registration. Undergraduate students have an opportunity to purchase a voluntary plan during registration. For more information, you may call 916-752-2612 or visit the Insurance Office at Cowell Student Health Center, 8:00 a.m. to noon and 1:00 to 5:00 p.m., Monday, Tuesday, Thursday, and Friday, and 9:00 a.m. to noon and 1:00 to 5:00 p.m. on Wednesday.

**Child Care Programs**

Need help with child care? The following programs are available on campus and in the community to help you with child care arrangements and expenses.

- The Student Housing Office distributes child care publications, coordinates an information and referral network among campus units, and serves as the University's liaison with LaRue Park Children's House, Russell Park Child Development Center, and City of Davis Parks and Community Services/Child Care. For further information, contact 260 Student Housing Office, or telephone 916-752-5415.

- City of Davis Parks and Community Services/Child Care provides free resource and referral information and administers a variety of child care subsidies. The program is funded jointly by the University of California, Davis; the City of Davis; and the State Department of Education. The program maintains information on licensed family day care homes, day care centers, nursery schools, co-ops, playgroups, and other family-related services. Additional services include parenting workshops and handouts; a bimonthly newsletter; a parenting resource library; and a book, video, and toy lending library. It is located at 23 Russell Boulevard, 916-757-5626.

- The UC Davis Registration Fee Child Care Subsidy Program provides partial child care subsidies to full-time students. Spouses must also be attending school and/or employed full time. Special needs situations will be considered on a case-by-case basis. Eligibility is based on family income, with awards determined through a lottery. Parents may choose from licensed family day care homes and child care centers. For additional information, call City of Davis Parks and Community Services/Child Care at 916-757-5626, or drop by 23 Russell Boulevard.

- The Child Care Grant Program, funded through the State Department of Education and administered by City of Davis Parks and Community Services/Child Care, can help income-eligible families pay for child care costs through a variety of different subsidies. Eligibility requirements for the programs vary, but all parents need to be employed, in school, or seeking employment full or part time. All care is provided in Davis from a child care provider of the parents' choice. Parents may be required to pay a fee based on a sliding scale, and in some instances, an additional co-payment may be required. Admittance is based on income and priority guidelines set by the state and federal government. A waiting list is maintained for all programs, and applications are accepted year round. For information call 916-757-5626, or drop by 23 Russell Boulevard.

- The Financial Aid Office can assist students who are parents and who qualify for financial aid with allowances for direct child care costs (in-home provider or child care center charges). This office is in 113 North Hall, 916-752-2390.

- The Student Employment Center posts job listings of parents wishing to hire child care providers. This office is in 114 South Hall, 916-752-0520.
- LaRue Park Children's House and Russell Park Child Development Center are privately owned and operated child care centers on the UC Davis campus. Residents of Russell Park, Orchard Park, and Solano Park student family housing pay reduced rates. Information about LaRue Park Children's House, which serves infants through preschool-age children, can be obtained at 916-753-8716. Information about Russell Park Child Development Center, serving infants through school-age children, is available by calling 916-753-2487.

- The Early Childhood Laboratory is a teaching and research facility for the Human Development Program and Family Studies Unit. Four different programs accommodate children from the ages of six months to six years for three hours a day, following the UC Davis academic calendar. Student families pay tuition less than the UC Davis staff, faculty, and community-affiliated families. Children are selected from a waiting list according to criteria designed to meet academic goals. The laboratory is located on campus, and the office is in TB 117, 916-752-2888.

- The Perfect Tender Infant Care Cooperative serves infants under twelve months of age whose parent(s) attend the School of Law. Contact 916-752-0243 for additional information.

- The Women's Resources and Research Center sponsors the Child Emergency Notification Service, intended to provide schools and child care providers with the means of contacting student parents in the event of a health-related emergency involving the child. Interested students must sign up for this service in person; this includes providing information that will assist a staff member in notifying the parent if she or he is in class at the time of the emergency. This service, available to single parents and others with special circumstances, is intended as a back-up if the child care provider cannot reach the primary emergency contact. The center is located in 10 Lower Freeborn, 916-752-3372.

**Student Employment**

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

The Student Employment Center helps students who are enrolled in a full-time or part-time degree program, students on PELP, students' spouses, and students with a letter of acceptance for the following quarter who have not yet registered.

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

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

The center is open from 9:00 to 11:45 a.m. and from 1:00 to 4:00 p.m.

**Transportation and Parking**

**Parking.** If you park a vehicle (including a motorcycle or moped) on the Davis campus you must have a valid parking permit or pay at a meter Monday through Friday between the hours of 7:00 a.m. and 10:00 p.m. Parking lots on campus are financed solely by fees collected from parking permits and meters. Daily permits are currently $2.00 and may be obtained from permit dispensers located in lots 1, 2, 5, 25, 47, 47A, 49, 50, 54, and 81; daily permits for lots 2B and 30 are $1.00. Long-term permits are required for all other parking lots, and may be purchased at the Transportation and Parking Services Office, located on Extension Center Drive directly south of lot 30 and the Rec Pool. For visitor parking information, please consult the South Gate Kiosk on Old Davis Road, or call Transportation and Parking Services at 916-752-8277.

**Shuttles.** The UCD/UCMC Shuttle provides hourly service to the Medical Center in Sacramento. The shuttle operates Monday through Friday and is available to all members of the UC community. The Intracampus Bus provides transportation between the Davis campus and the Berkeley campus for University employees, registered students, and other University affiliates. Call Fleet Services at 752-8287 for schedule information.

**Buses.** Unitrans, 13 bus lines operated by the Associated Students, serves the campus and city year round. Undergraduate students ride by showing a valid registration card. Others ride by paying a cash fare or purchasing tickets or passes at the Campus Box Office. Full service is provided each UCD school day (Monday through Friday) and Monday through Thursday night during the regular school year—fall, winter, and spring quarters. Reduced schedule bus service operates during the summer, finals week, and all academic break periods. Schedules are available at the MU Information desk, bus terminals, City Hall, and at the Unitrans office.

**Ridesharing.** UC Davis encourages ridesharing. For information on transportation alternatives to the Davis campus, call 916-752-MILE or visit the Transportation and Parking Services Office located on Extension Center Drive. Alternatives include carpooling and vanpooling (registered pools receive reduced parking rates as well as preferential parking), public transit, commuter match assistance, and shuttle systems.

**RECREATION AND THE ARTS**

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

Facilities and programs such as the Equestrian Center, Craft Center, Outdoor Adventures, Recreation Hall, Intramural Sports, MU Art Gallery, Recreation Swimming Pool, or the MU Games Area will help you balance the academic demands at UC with your leisure interests. A catalog of recreational activities is published quarterly, mailed to all residences in Davis, and distributed throughout campus. You may call 752-1770 to request a catalog.
Memorial Union and Campus Recreation

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

The Memorial Union (MU) complex, directly north of the Quad, serves as the community center for the campus. Bring yourself up to date on local events by stopping at the MU Campus Information Center on the first floor. The Information Center takes reservations for the use of tables and display boards in and around the MU. The center maintains an up-to-date database of 1,200 organizations and is able to refer you to people, places, programs and services both on and off campus. The goal is to save you the “run-around” so you can get the information you need quickly and conveniently. A valuable resource for current students as well as new students and visitors, the center can also be reached by telephone, 916-752-2222. Other first-level facilities include the UCD Bookstore, Corral gift shop, and Coffee House.

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

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

The Games Area, located below the UCD Bookstore, is a recreational facility consisting of a bowling center, billiards room, video arcade, lounge, and storage lockers. The Games Area conducts bowling leagues, classes, clinics, and tournaments for all ages from beginning through advanced skill levels. The facility is fully accessible to those with disabilities. Call 916-752-2580/1730 for details.

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

Outdoor Adventures, located in the Barn on the corner of California and Hutchison, will help you develop your outdoor skills and plan your outdoor excursions. You can rent equipment of professional quality for your adventure. An up-to-date library contains topographic maps, trail guides, and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, white-water rafting, kayaking, sea kayaking, mountaineering, cross-country skiing, and other sports are offered throughout the year. Group rates and custom-designed trips can be arranged. Many special activities such as wilderness emergency-care clinics, white-water river guide training, slide presentations, and programs conducted by outdoor experts are also held. Stop in and share your own outdoor experiences! For more information call 916-752-1995/1730.

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

The Recreation Swimming Pool, at the corner of La Rue Road and Hutchison Drive, is a large free-form pool with a separate wading pool, a bathhouse, shuffleboard courts, and an extensive grass area for sunbathing. The staff offers lessons to all age groups and arranges for special events such as “family nights.” The pool opens for the season in April and closes in October. More information regarding the Rec Pool can be obtained by calling 916-752-2695 or 916-752-1995/1730.

The Silo Union, recently renovated to serve a variety of campus needs, offers food services, meeting/confer-
ence facilities, lounges, and the campus pub. If you would like to reserve space in the Silo for a meeting, social event or conference, contact Campus Events and Information at 916-752-2613.

The Craft Center in the South Silo is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or purchase a pass for more frequent use of the equipment and work space. Workshops and classes are offered each quarter in such varied crafts as woodworking, weaving, jewelry-making, art and graphics, ceramics, photography, silk-screen printing, welding, leatherworking, and stained glass. Call for more information: 916-752-1475/1730.

The South Silo also houses the ASUCD Experimental College (916-752-2568), Student Special Services (916-752-2007), Graduate Student Association (916-752-6108), and a small branch of the Bookstore serving the School of Law (916-752-2961).

Recreation Hall
Information:
Entrance 1B
916-752-6073

Recreation Hall is a multi-use arena available for intramural and informal recreation play, intercollegiate athletic basketball and women's gymnastics, physical education classes, and sports clubs. Numerous special events sponsored each year by the campus and community are held in the 8,400-seat Recreation Hall. The tri-level facility has locker rooms; a flat running track; an equipment room; racquetball, wallyball, and squash courts; a weight room with free weights, universal, hydraulic machines, stair machines, rowing machines and bicycles; court areas for basketball, volleyball, and badminton; and areas for martial arts, table tennis, gymnastics, aerobics, and dance. The upper level north area has a state-of-the-art artificial rock climbing wall for climbers of all skill levels. The Special Events Room can be reserved for meetings by calling the Campus Events and Information Office.

Undergraduate students can use Rec Hall facilities by showing their current, valid photo ID card. Graduate students must pay a $5.00 per quarter activity fee. Students may also purchase a $6.00 guest pass valid for three people. Non-students may purchase a privilege card at Rec Hall to use lockers, equipment, and facilities. Patrons may also purchase a daily pass at the B entrance. Rec Hall is open Monday through Thursday, from 6:30 a.m. to midnight, Fridays 6:30 a.m. to 10:00 p.m., Saturdays 9:00 a.m. to 6:00 p.m., and Sundays noon to 10:00 p.m., throughout the year. Rec Hall hours are shortened during quarter breaks and summer.

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

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

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

Although intercollegiate athletics at Davis is intended to benefit the campus by providing esprit de corps, its prime role is to provide personal development opportunities for as many non-scholarship student-athlete participants as facilities and resources permit. Currently, the program consists of varsity teams in eleven men's sports and nine women's sports. Membership affiliation is with the Northern California Athletic Conference and Division II of the National Collegiate Athletic Association. Approximately 1,000 students compete on varsity or junior varsity teams each year.

The club sports program includes both recreational and competitive offerings involving 37 sports with 1,400 participants per year, while the intramurals program provides competition in 36 sports and serves approximately 18,000 participants.

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

UC Davis Presents (916-757-3199), located at 200 B Street, Suite A, brings a wide variety of touring performing artists to UC Davis to serve both the campus and surrounding communities. During the academic year, UC Davis Presents offers concerts and recitals by classical, jazz, and folk music artists; drama; classical, modern, and ethnic dance; and lectures by eminent public figures. Various departments such as English, the foreign languages, and history sponsor lectures,
poetry readings, and exhibits open to the University community. Bulletin boards, kiosks, the student radio station KDVS, and the California Aggie inform audiences about upcoming events.

You'll find annual and quarterly brochures and promotional materials on all events sponsored by UC Davis Presents at the Campus Box Office and at the UC Davis Presents office. Tickets for UC Davis Presents events may be purchased at the Campus Box Office in Freeborn Hall, or any BASS/TM outlet.

Music

The Department of Music (916-752-5537) sponsors the UCD Symphony Orchestra, Chorus, Chamber Singers, Early Music Ensemble, Concert Band, and small ensemble groups. Music majors and other interested students can receive credit for participation in these groups, which perform at concerts and recitals open to the University community. The department sponsors the annual Theatre of Voices Festival and also an artist-in-residence for one quarter each year who gives concerts, recitals, and lectures. Free noon concerts featuring individual performers and ensembles—both professional musicians and music students—are a favorite weekly event during the school year. The UC Davis Contemporary Music Players and the UCD Faculty Woodwind Quintet are in residence on campus. The Department of Music sponsors nearly one hundred public concerts each year.

Drama

The Department of Dramatic Art has one of the best theater facilities in California. The excellent faculty and the Granada Artists-in-Residence program (which brings a major British director to the department each quarter); graduate students working on Master of Fine Arts (M.F.A.) degrees in acting; and an unusually good stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year's drama schedule includes University Theatre Season (five major productions of established plays); Second Season (five smaller productions of established plays written by students); 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.

Art Galleries

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

The Design Gallery (916-752-4139) on the first floor of Walker Hall is known for its exciting exhibitions of design-related material. Changing presentations and installations of architecture, interiors, graphics, costumes, textiles, folk art and the annual Student Show and Picnic Day Exhibition reflect the interests of the design program. The Design Gallery is an innovative space where the installations are as interesting as the material presented. Hours during exhibition periods are noon to 5:00 p.m. Monday through Friday, 2:00 to 5:00 p.m. Sundays, and closed on holidays.

The Richard L. Nelson Gallery (916-752-8500), named in honor of the first chairperson of the Department of Art, was dedicated in 1976. Located on the first floor of the Art Building, the Gallery organizes regularly changing exhibitions of historical and contemporary works of art. The Gallery's program 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. Hours during exhibition periods are noon to 5:00 p.m., Monday-Friday, and 2:00 to 5:00 p.m. Sunday. The Fine Arts Collection (916-752-8500) is located adjacent to the Nelson Gallery. Representing various historical periods and cultures, it is the Davis campus's major collection of art. Selected works are available for viewing weekday afternoons. The Basement Gallery is a student-directed gallery that exhibits artwork of advanced UCD art majors. The gallery is located in the Art Building. The exhibitions change bimonthly throughout the academic year. Hours are 9:00 a.m. to 4:00 p.m. Monday through Friday. Gallery openings are Thursday evenings between 5:00 and 7:00 p.m.

The C. H. Gorman Museum (916-752-6567, Native American Studies), is located on the first floor in Hart Hall. The museum was established in 1973 in honor of Carl N. Gorman, artist, advocate, and former faculty member of Native American Studies. The museum features changing exhibitions of works by Native American and diverse artists. Selections from the permanent collection of art are also exhibited on a rotating basis throughout the year. Hours are noon to 5:00 p.m., Tuesday through Friday, and by appointment.

ASSOCIATED STUDENTS (ASUCD)

Information:
Executive Council Office
370 Memorial Union
916-752-3632
ASUCD Main Office
364 Memorial Union
916-752-1990

The Associated Students of the University of California, Davis (or ASUCD), authorized by the Regents and the Chancellor, represents all undergraduate students. Law and graduate students also currently have access to all ASUCD commercial activities. Funds allocated to ASUCD provide activities and services that will make life as a student a little easier, less expensive, or just more fun.

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

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

- **External Affairs** deals with off-campus concerns (the Regents, UC Office of the President, etc.).
- **Internal Affairs** recommends policies to improve the quality of nonacademic student life on campus.
- **Academic Affairs** acts as an advocate to student rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure, and teacher evaluations.
- **Business and Finance** makes recommendations to the Executive Council on all financial matters.
- **Ethnic and Cultural Affairs** makes recommendations on policies and programs concerning UCD's ethnic community, for establishing liaison and achieving rapport with on-campus and off-campus bodies affecting ethnic students and their quality of life while at the University.

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

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

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

Some of the services operated by the ASUCD for University students include the Unitrans bus system, California Aggie newspaper, the Bike Barn repair services, travel service, free legal advice for undergraduate students, convenience store, U.S. Post Office, and the Coffee House in the Memorial Union. The ASUCD-sponsored Experimental College offers a variety of non-traditional classes each quarter for students interested in diversifying their educational experience. Other ASUCD activities include Radio KDV9 stereo 90.3 FM, Classical Notes and Campus Copies, Housing Viewpoint, Homecoming, Student Forums, Entertainment Council, Whole Earth Festival, and Picnic Day.

**UC Davis Administrative Advisory Committees**

Students may become involved in issues affecting the campus community by applying for membership on an Administrative Advisory Committee. Each committee advises on policies affecting campus life in a specific area, such as athletics, child care, disability issues, information technology, and registration fees.

The committees respond to requests for advice, identify needs or concerns within the charge of the committee, and recommend action to the administration. As members of an Administrative Advisory Committee, students can make sure that student perspectives are well represented in the Committee's recommendations, and, in turn, learn more about faculty, Academic Federation, and staff views of campus issues. Applications are accepted each winter for service on committees the following academic year.

**GRADUATE STUDENT ASSOCIATION (GSA)**

*Information: Room 253, South Silo 916-752-6108; FAX: 916-752-5158; e-mail: gsa@ucdavis.edu*

The Graduate Student Association (GSA) is the officially recognized student government for UC Davis graduate students. GSA is a representative assembly that provides a forum for addressing the concerns of graduate students and promotes communication with campus administrators. GSA also serves as an advocate at all levels of the university on behalf of graduate students. Funded by graduate student fees, GSA provides services to all academic graduate students and to professional students in the Graduate School of Management. Services include: new student orientation, community housing listing service, legal service, fax service, travel awards, newsletters, and assorted social events. Other professional students are eligible to join the GSA by paying a fee.

GSA is run by graduate and professional students who devote time and expertise to the General Assembly, the Executive Council, and committees. GSA's General Assembly representatives are designated by other students in their department or graduate group. General Assembly meetings are held once a month and are open to all graduate and professional students. Each year the General Assembly elects the members of the Executive Council, who serve in a variety of positions to carry out the policies and functions of the organization. To find out what GSA can do for you, please call or visit the GSA office.

**STUDENT LEADERSHIP CENTER**

*Information: Student Leadership Center 4th Floor, Memorial Union 752-2027*

There are over 300 registered student organizations at UCD, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall, and service groups. The Student Leadership Center registers these diverse groups and provides advising on activities, resources, and campus policies. In addition to the subunits described below, the Student Leadership Center administers a number of campus programs: Danzantes del Alma folklore dance troupe, Club Finance Council, activities fair, leadership training programs, College Bowl, and liaison to fraternities and sororities. Student Leadership Center staff assist individual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the office to review the resources available to them.

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

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

JUDICIAL AFFAIRS

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

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

Student Conduct and Discipline

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

A summary of student conduct expectations is published each quarter in the Class Schedule and Room Directory. Misconduct for which students are subject to discipline includes, but is not limited to, plagiarism; cheating; knowingly furnishing false information to the University; sexual or other physical assault; threats of violence; possession of weapons; harassment, including "fighting words"; forgery; theft; vandalism; illegal possession, use, or sale of drugs or alcohol; hazing; obstruction or disruption of University activities or functions; and alteration or misuse of University documents, records, keys, or identification. Disciplinary sanctions which may be imposed range from a warning to dismissal, and may include restitution and/or assigned community service.

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

Student Responsibilities

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

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

ALUMNI ASSOCIATION

Information:
Cal Aggie Alumni Association
Walter A. Buehler Alumni and Visitors Center
UC Davis
Davis, CA 95616-6517
916-752-2828
Toll free in California 1-800-242-GRAD

After graduation, you can maintain your ties with UC Davis and your fellow alumni by joining and participating in the Cal Aggie Alumni Association.

This worthwhile and vibrant organization sponsors a wide variety of activities and programs that support UC Davis and keep alumni in touch with the campus. Members are also entitled to special privileges. As a new graduate, your first year of membership is only $20, a $15 savings off the regular annual membership fee. For more information, call the alumni association or drop by the Alumni Center before you graduate.
ACADEMIC ADVISING

UC Davis offers many different types of academic advising to help you get the most from your education. College advisers can assist you in meeting degree requirements and taking maximum advantage of the resources available in the University. A conference at least once a quarter is especially desirable for students during their first year and for seniors during the final quarters preceding graduation.

College of Agricultural and Environmental Sciences

Office of the Dean
228 Mrak Hall
916-752-0108

The Dean's Office provides you with

- Staff advisers who can advise on University and College rules, regulations, and policies and procedures that affect students.
- Academic advising: in-depth advice regarding probation/dischristment status, admission to the College, readmission, and second bachelor's, limited, and regular status.
- Advice and action on petitions.
- Additional services include study plan clearance, College English requirement check, release of holds on registration packets, and final evaluation for graduation.

Academic Advising Center

Advising Center. Coordination of the College’s Advising Center and the Summer Advising Program is available at the College’s Academic Advising Center, 228 Mrak Hall.

Primarily, the Academic Advising Center advises students in the Exploratory Program. Advising for Individual Majors, as well as for other College majors and programs, is also available at the center.

Faculty Advisers/Staff Advisers. You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The Master Advisers coordinate advising within a major. Staff advisers located in the department can advise you on courses, specific requirements of majors, and career opportunities. You are strongly urged to consult with your faculty adviser or staff adviser each quarter before selecting your courses.

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

College of Agricultural and Environmental Sciences Undergraduate Programs

Major programs in the College of Agricultural and Environmental Science highlight the multiple connections among the environment, plant and animal systems, and human health and development, all within the larger context of the quality of life in the global economy. The following areas of study include majors with specific focuses:

Environmental and Resource Sciences and Policy majors focus on the broad facets of the human and natural environments and their interactions. These majors draw on the social, physical and biological sciences as needed to prepare students for leadership and advanced studies in the areas of natural resource management, environmental quality and stewardship, community planning and design, and public policy decision making.

- Applied Behavioral Sciences
- Atmospheric Science
- Environmental and Resource Sciences
- Environmental Policy Analysis and Planning
- Environmental Biology and Management
- Landscape Architecture
- Soil and Water Science
- Wildlife and Fisheries Biology (see Animal Biology area)

Plant Science majors provide students with a strong background in plant biology in the context of environmental systems and societal needs. The Agricultural Systems and Environment major couples a strong background in plant biology with an ecological understanding of food and fiber production systems. A wide range of options within the major allows students to focus on such areas as agricultural communications and education and sustainable agriculture. The plant biology major provides a basic background in all areas of plant biology, including plant development and protection, biotechnology, and post harvest physiology.

Agricultural Systems and Environment
- Plant Biology (with the Division of Biological Sciences)

Animal Biology major programs prepare students in animal biology and the management of environmental resources as needed to develop sustainable animal production technologies. Also considered is the impact of production and management processes on animal health and welfare, human diet and health, and the natural environment.

- Animal Science
- Animal Science and Management
- Avian Sciences
- Entomology
- Wildlife and Fisheries Biology (see Environmental and Resource Sciences and Policy area)

Human Health and Development programs offer a wide assortment of curricula focusing on basic human needs (i.e., food, diet, clothing, and shelter) and human development. Together, these programs link the processing of food and fiber with consumer health and well-being. Emphasis is on the continuum between food/fiber production and consumer use—a continuum that includes a strong attention to product quality as well as to human needs and preferences. These majors also address the physiological, psychological, social and aesthetic dimensions of human health, comfort, safety, and the quality of life.

- Agricultural and Managerial Economics
- Community Nutrition
- Design
- Dietetics
- Environmental Toxicology
- Fermentation Science
- Fiber and Polymer Science
You are encouraged to meet individually with your faculty adviser at least once each quarter. Freshmen are strongly urged to do so each quarter of the first year of enrollment, and new advanced-standing transfers should meet with a faculty adviser for the first quarter.

To facilitate dialogue with your adviser on your program of study, use the Advising Worksheets. Copies are available in the Undergraduate Office. You should complete your Lower Division Worksheet early in your freshman year, have your adviser sign it, and then review it regularly with your adviser. Similarly, you should complete your Upper Division Worksheet early in your junior year, have it signed by your adviser, and then review it regularly with your adviser.

Departmental Staff Advisers. Faculty advising is supplemented in some departments by a system of staff advising especially designed for students in that department. Consult your departmental office for more information.

Peer Advisers. A well-developed peer advising system complements faculty and staff advising. Student advisers are available at Bainer Hall, Engineering II, and at other locations described in the Other Academic Advising section of this chapter.

College of Letters and Science

Office of the Dean/Letters and Science Advising Office
Social Sciences and Humanities Building
916-752-0392

The associate deans and staff in the Letters and Science Advising Office can assist you with a wide variety of issues relating to your academic goals and experiences. You can consult the Advising Office on matters such as program planning, selection of a major, exceptions to regulations, and academic enrichment opportunities. The office also provides a number of additional services:

- Determines how your transfer credits from other institutions apply towards completion of breadth and unit requirements for the bachelor's degree (applicability of transfer credit to the major is determined by your major faculty adviser)
- Provides degree checks to identify remaining College requirements
- Acts on petitions requiring the dean's approval
- Reviews the records of students who are subject to disqualification and determines whether such students may continue at UCD

Advising

Faculty Advisers. New students are assigned to a faculty adviser when the University receives their Statement of Intent to Register. If you indicated an interest in a particular program on your application, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

New students are encouraged to see their faculty adviser at least once every quarter during their first year on campus to discuss their educational goals, course program, and progress.
Continuing students who have completed three quarters in residence in the College should consult with an adviser at certain important checkpoint stages in their academic careers (below). They are urged, however, to maintain regular contact with an adviser in their major to avoid program errors that may delay graduation. Seniors should maintain close contact with their adviser in order to ensure that they are meeting the major requirements.

**Academic Options Program.** If you did not indicate an initial commitment to a particular major program on your application, you will participate in the Academic Options Program which provides academic advising to lower division students. You will be assisted by an advising team available in the Letters and Science Outreach Advising Offices located in each of the university residence hall complexes. Students living off campus are asked to contact the Letters and Science Advising Office early in the quarter to receive their adviser assignments.

**Advising Checkpoints.** You should consult with your faculty adviser at two, possibly three, critical stages in your academic career:

- Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and graduation requirements. You must also have declared a major by this time. Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.

- When you complete 135 units of degree credit, including transfer work, you should obtain Degree Check materials from the Letters and Science Advising Office and consult your adviser concerning course selection and satisfaction of requirements in the major.

- Before you complete 195 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser a firm study plan, in the form of a quarter-by-quarter program that will satisfy all remaining degree requirements as expeditiously as possible. This plan will be filed with your adviser. If the plan indicates that you will have to register beyond the 225-unit limit in order to meet degree requirements, you must contact the Letters and Science Advising Office immediately. Exceptions to the 225-unit limit are granted by the dean only rarely. Typically, approval is granted only to allow completion of minimum degree requirements.

If you have not met with your faculty adviser before these established checkpoints, a hold may be placed on your registration materials as a reminder.

**Peer Advisers.** Student-to-student advising is an important part of the University advising services. The College of Letters and Science student assistants to the dean are available during regular office hours in 150 Mrak Hall to talk with students about their academic concerns.

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**Division of Biological Sciences**

The Division of Biological Sciences Office

96 Briggs Hall
916-752-0410

The associate dean and staff in the Division of Biological Sciences Office can assist you with a variety of issues including PELP, withdrawal, part-time status, change of major, and some financial aid forms.

This office is also responsible for the academic progress of all students majoring in the division. If you have any problems (personal, medical, financial) that are affecting your academic performance, or if you are on academic probation, make an appointment to see one of the advisors in the division office.

**Sections and Advising Centers**

Students entering or intending to declare sectional majors in biochemistry, plant biology (botany), genetics, microbiology, physiology, or zoology should contact the specific section office for academic advising services. Students selecting the biological sciences major should contact the Division of Biological Sciences Office for academic advising services.

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**OTHER ACADEMIC ADVISING**

**Academic Peer Advising**

Academic Peer Advising (APA) places peer advisers in over 45 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 107 South Hall, 916-752-3000.

**The First Resort**

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

**Orientation and Summer Advising Office**

The Orientation and Summer Advising Office coordinates the Summer Advising and Registration Program, Fall Quarter Orientation activities, and many other student assistance and orientation programs for new stu-
Advising Services

The Pre-Graduate School Information and Referral Service is a program available through Advising Services to assist students interested in M.A., M.B.A., Ph.D., or teaching credential programs. Specific services include help in locating graduate school programs in specific fields, completing application forms and statements of purpose, and planning financial options. This unit also coordinates the Undergraduate Research Conference, an annual event open to all undergraduate UC Davis researchers. Advisers are available through the main Advising Services office, 107 South Hall, 916-752-3000.

The Pre-Law Advising Office is where students interested in the legal profession 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. Students can get more information on preparation for law school and a legal career through the many seminars and workshops held each year. You may contact one of the pre-law advisers in 107 South Hall, 916-752-3009.

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

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

Information:
313 North Hall
916-752-3472

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

EOP/SAA Information Office services are also accessible at various outreach locations throughout the campus such as the Colleges of Agricultural and Environmental Sciences, Letters and Science, and Engineering; Learning Skills Center; The Hous; and all ethnic studies departments. All students are invited to telephone or stop by the EOP/SAA Information Office on the third floor of North Hall or any one of the outreach locations to find out more about the peer counseling services.

ACADEMIC HELP

Learning Skills Center (LSC)

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

At the Learning Skills Center you can receive assistance in a wide variety of areas, including:
- General study skills
- Math/science study skills
- Writing essays and term papers
- Reading efficiency
- English as a second language
- Time-management skills
- Test-taking skills
- Test anxiety reduction and more

The center also provides individual tutoring sessions for students on academic probation or subject to dismissal. Group and drop-in tutoring are available to all students.

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

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

EOP/SAA Tutoring

Information:
Learning Skills Center
The Basement, South Hall
916-752-2013

EOP/SAA tutoring is a free service for EGP and affirmative action students. If you are having difficulty with your coursework, the Learning Skills Center offers tutoring in most course areas. Tutoring is provided in groups and on a drop-in basis. For students in academic difficulty, pre-arranged one-to-one tutoring is also available. Although primary emphasis is on the assignments in your classes, tutorial services may also be used to improve study habits and learning skills.

The tutoring program is staffed by students carefully selected for their knowledge of course content and their sensitivity to the needs of students being tutored.

Special Transitional Enrichment Program (STEP)

Information:
Learning Skills Center
The Basement, South Hall
916-752-2013

New EOP/SAA students (freshmen) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected reg-
Learning Resource Centers

Learning Resource Centers are located in the Segundo, Tercero, and Cuarto residence hall areas. They offer the following services to all residence hall students: PC computer terminals (IBM clones and Macintosh) and assistance, a reference library, language tapes, study skills sheets, an exam file, and a quiet place to study.

RESOLVING ACADEMIC PROBLEMS

The Grievance Process

Discrimination/Harassment. If you believe that you have been discriminated against or harassed, you may contact the office of Student Judicial Affairs (see below) or the ASUCD Grievance Center (see below) for information and assistance. Advice is also available from the campus’s Sexual Harassment Information Line (916-752-2255). Graduate students may contact Graduate Studies (752-0650) and/or the Graduate Student Association (752-6108).

Grade Changes. If you believe you received an incorrect grade due to a clerical error, ask your instructor to file a grade change form with the Registrar’s Office. If you believe you received an incorrect grade due to any type of discrimination, consult the office of Student Judicial Affairs (see below).

Other Grievances. If you need a requirement waiver or any other type of variance, contact your faculty adviser or the appropriate dean’s office for information on your college’s procedures. If you cannot get satisfaction through normal channels, contact the ASUCD Grievance Center or the Committee on Student-Faculty Relationships (see below).

ASUCD Grievance Center

The ASUCD Grievance Center advocates students’ academic concerns to the faculty and administration. Grievance counselors deal with students one-on-one, directing them to appropriate channels through which to state their grievances (i.e., student-faculty relations, sexual harassment, grade change problems, prejudicial treatment in the classroom, and problems with academic procedure and policy). Students can get counseling, referrals, and support to aid in the resolution of these matters.

Committee on Student–Faculty Relationships

If students with a grievance feel they cannot get satisfaction through normal procedures, they may contact the Committee on Student–Faculty Relationships for assistance. The committee is advisory and can make recommendations to the office having authority to resolve the problem. It may also meet informally with the students involved with the grievance.

Student Judicial Affairs

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

STUDENT SERVICES

Counseling Center

The Counseling Center offers confidential psychological, psychiatric and peer counseling services to students having problems that affect their academic progress and sense of well-being. The center’s staff offer assistance for personal and interpersonal issues such as relationships, family, stress, cultural differences, assertiveness, self-esteem and intimacy. Additionally, staff provide assistance for educational vocational concerns such as coping with university life, academic performance, test anxiety, reentry adjustment and determining life goals. Services for relationship issues are also offered to students and their parents.

Walk-in services are available daily for students needing immediate assistance. Short-term individual counseling, group counseling, and assistance with off-campus referrals are provided. Career interest testing, personality testing, and information about graduate school admissions tests and the Planned Educational Leave Program are available.

Services are free to all registered students. Confidentiality is strictly maintained in accordance with state laws and ethical standards. Students, faculty or staff who are concerned about a student or desire consultation or assistance in making a referral are encouraged to call the center. To make an appointment, telephone or come to the Counseling Center.
Located in a green, two-story house next to the Housing Office, The House is a professionally managed peer counseling program of the Counseling Center. Students receive confidential support, information, and referrals regarding personal or social problems. Well-trained student volunteers assist students through individual peer counseling and a wide variety of workshops and support groups held in an informal setting. No appointment is necessary and services are offered on a drop-in or telephone basis. The House is open seven days a week and is wheelchair accessible. Volunteers for peer counselor positions at the House are accepted each quarter. Students are trained in basic counseling skills and can receive units for training. Transcript notation is also available for quarters working as a peer counselor volunteer.

Health Education

Information:
Cowell Student Health Center
316-752-9652

Health education programs listed below are administered by Cowell Student Health Center.

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

BikeRight—Bicycle Safety and Injury Prevention Program (916-752-8812)—Information on topics such as bicycle safety, equipment, laws, injury prevention and discount coupons for bicycle helmets.

Campus Alcohol and Drug Abuse Prevention Program (CADAPP) (916-752-6334)—Individual assessments, six-week small group education courses, and workshops on alcohol/other drug-related problems as well as issues of dysfunctional families and addiction. CADAPP includes two components: Peer Counselors in Athletics, an athlete-to-athlete substance abuse prevention and health education program, and SESAP (Student Educators in Substance Abuse Prevention).

Student Educators in Substance Abuse Prevention (916-752-DRUG or 752-3784)—Information, peer counseling, and resource referrals for students dealing with substance abuse issues of their own, or of their friends or family members. Programs and materials on responsible hospitality and non-alcohol party planning options.

Health Advocates (916-752-9651)—Information on personal nutrition, exercise, stress management, wellness issues, and many other topics is available. Students may also receive free individual computerized dietary analysis and peer nutrition counseling.

Peer Counselors in Sexuality (916-752-1151)—Information and peer counseling (in person or by phone) on birth control, pregnancy, sexually transmitted diseases (including HIV/AIDS), safer sex, healthy relationships, sex roles and other issues related to sexuality.

International Student Services (S.I.S.S.)

Information:
Services for International Students and Scholars
300 South Hall
916-752-0694

The S.I.S.S. Office assists international students throughout their programs of study at UCD, providing orientation and personal and cultural advising. S.I.S.S. also provides information and assistance regarding immigration regulations and helps students maintain their legal status while at UCD.

All new and transfer international students are required to attend a special orientation program that is held just before fall quarter registration. The orientation will help new students with registration, class enrollment, making housing arrangements, immigration regulations, and finding campus services and community resources.

Students must report to Services for International Students and Scholars as soon after their arrival as possible. S.I.S.S. can help new international students with their immediate needs, and familiarize them with the Davis campus and community. S.I.S.S. will introduce students to the Davis international community, and help them locate other individuals from their home countries.

Lesbian, Gay, and Bisexual Resource Center

Information:
Temporary Building 206, Room 126
916-752-2452

The Lesbian, Gay, and Bisexual (LGB) Resource Center offers a safe, supportive environment for people to learn more about lesbian, gay, and bisexual concerns and to meet other members of the Davis community. The center has a wealth of information and resources about lesbian, gay, and bisexual issues. Students who are studying or researching lesbian, gay, or bisexual issues are encouraged to use the center's resources. The center can also serve as a meeting place for local organizations or support groups. Call the center to reserve this space. The center's resources include:

- A library of books and literature on topics ranging from domestic partnership issues to lesbian humor. Many of these books are available for personal use. Local and national newspapers and magazines are available, including The Advocate, Mom Guess What, and The Latest Issue.
- A resource database and files on all of the local resources, including health professionals, legal services, clubs, organizations and community contacts.
- A bulletin board exchange, where community members may advertise special events, services, etc.

The LGB Resource Center is staffed by volunteers and serves all members of the Davis community. Open hours are Monday–Friday, 2:00 to 6:00 p.m.

Rape Prevention Education Program

Information:
Fire and Police Building, Kleiber Hall Drive
916-752-3399

The goal of the Rape Prevention Education Program (RPEP) is to explore myths and expose the realities of sexual assault. Focusing on prevention through educa-
tion, the program reaches out to the UCD community in a variety of ways. Services include the following:

- Free discussions and workshops for student groups and classes on topics such as rape prevention and safety awareness, sexual harassment, acquaintance rape, men and rape prevention, media images of women, pornography, and dating violence
- Seven-week self-defense classes for women, offered quarterly
- Tear gas certification classes
- Short-term counseling, referrals, and support groups for victims of rape or sexual assault, and for incest survivors
- Training for peer counselors and professionals
- A circulating library of books, videos, and articles on sexual assault and related issues
- Quarterly newsletter, *Freeing Our Lives*
- Call RPEP for drop-in hours or to make an appointment

RPEP has student work-study positions, and a volunteer staff. Contact RPEP if you have questions.

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

Information:
10 Lower Freeborn
916-752-3323

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

The center encourages you to drop by and talk with our friendly, knowledgeable professionals and student interns. Student internships are available in legislative work, graphics, library, editing and program planning.

**Student Special Services**

Information:
160 South Silo
916-752-2907

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

**Disability Resource Center**

Information:
Disability Resource Center (DRC)
160 South Silo
916-752-3184 (voice) or 752-6700 (Telephone Device for the Deaf)

The Disability Resource Center (DRC) serves students who find their disability is a barrier to achieving academic or personal goals. Most often this occurs as individuals begin UCD, get established in the community, set up class support, seek personal/social outlets or plan career/personal changes. DRC provides information concerning campus as well as community resources, and provides specialized support not available elsewhere.

DRC was founded with a strong commitment to improving individual choices, personal control of essential resources, and integrated participation in campus life. All University students are assumed to have similar needs, but the consequences of a disability may include some specialized requirements. Therefore, we work closely with each student in identifying his or her particular needs.

Academic and mobility resources for registered students with verified permanent or temporary disability-based needs include the following:

- Alternative educational materials, including large-print and taped textbooks
- Disability management counseling
- Emergency wheelchair repair
- Facilitation of access to all campus programs
- Registration assistance and priority registration
- Maintenance of a list of personal care attendants
- Peer support groups
- Reader and notetaker services
- Referral for special parking
- Referral for tutoring
- Referral to on-campus and off-campus resources, services and agencies
- Shuttle service (on-campus)
- Sign language, oral interpreting, and transliterating services
- Special adaptive equipment and computers

The campus is flat, with a good network of bicycle paths, curbs cuts and pedestrian walkways. Almost all instructional, recreational and student facilities are wheelchair accessible. Accessible on-campus housing is available and an accessible bus system links the campus and the community of Davis.

Preadmission counseling is available for persons with disabilities. You are encouraged to contact DRC if your disability has affected your ability to meet academic requirements for admission.

**Reentry Student Services**

Information:
Reentry Student Services
160 South Silo
916-752-2005

The Reentry Student Services Office assists students who have reentered the university after several years of life and work experience. The office provides admissions assistance, information, orientation, and peer support. It also provides referral assistance through the Reentry Resource Network composed of representatives from existing student services units, colleges, and divisions (e.g., from the Women's Resources and Research Center, Financial Aid, Student Housing, the Dean's Offices, etc.). In addition, the office sponsors special programs for new reentry students and assists members of Advocates For Reentry Students.

**Transfer Student Services**

Information:
Transfer Student Services
160 South Silo
916-752-2200

The Transfer Student Services Office assists students who have transferred from other institutions of higher education. The office coordinates transfer student matters among existing student services units to ensure students an easy and smooth transfer to the Univer-
sity. It also sponsors special receptions and workshops for new transfers and publishes an annual Transfer Guide of available campus services.

Veterans Affairs
Information:
Veterans Affairs Office
180 South Silva
916-752-2020

The Veterans Affairs Office assists veterans, dependents of deceased or disabled veterans, and reservists through a variety of federal, state and campus programs. The office certifies course attendance to the Veterans Administration, coordinates a tutorial assistance program, provides advice and support, and helps with employment, work study and financial aid concerns.

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

INTERNSHIPS AND CAREER SERVICES

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

You can take advantage of one of the hundreds of organized internships through the Internship and Career Center or initiate your own.

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

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

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

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

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

Education and Graduate Placement Services
Information:
The Internship and Career Center
2nd floor, South Hall
916-752-0724

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

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

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

Human Corps Program
Information:
The Internship and Career Center
227 South Hall
916-752-3813

Human Corps is the student community services program at UC Davis. Public service work can be a rewarding and satisfying experience that may also improve a student's qualifications for the job market. Community service may or may not be compensated through wages, academic credit or transcript notation, and can take many forms, from a one-day activity to a long-term commitment.

The goal of Human Corps is to facilitate student involvement in community service by serving as a referral center for students wishing to perform community service and as a resource for agencies and campus units with service opportunities.

The Human Corps office contains a database and numerous service directories with information about non-profit agencies in California, community service opportunities throughout the world, and finding employment in the non-profit or public sectors after graduation. Students will also find the Human Corps community service database at the MU Campus Information Center.
REGISTRATION

Information:
Office of the Registrar
124 Mak Hall
(916) 752-2973

Registration is the means by which you become a student at the University. The registration process includes registering for classes via RSVP, the telephone registration system (752-7767); paying fees and other financial obligations; and completing and filing informational forms. Every UCD student must register each quarter.

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

- Have a photo ID picture taken.
- Submit a Statement of Legal Residence (see Appendix).
- Return the completed Medical History form, evidence of rubella immunity, results of a tuberculin skin test, and the Insurance Information Request form. These forms are mailed to each new student from the Student Health Center.

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

Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of $50 to defray the extra clerical costs of late registration. Permission to register after the deadline will be allowed only under conditions where action or inaction on the part of the University delays registration. A recommendation from an appropriate administrative unit will be required, and the registration fee must be paid with cash, cashier's check, credit union check, University check, or fee credit.

Change of Name. Petitions to change your name on official University records may be obtained from the Office of the Registrar. (Students planning to graduate should file this petition no later than the fifth week of the quarter in which they intend to graduate.)

Change of Address. Be sure to inform the Office of the Registrar of any change of address. Important registration materials, information, and announcements are mailed to students throughout the year, so keep your campus/local mailing address, your billing address, and your permanent address up to date. Change of Address forms are available at the Office of the Registrar.

REGISTRATION FOR COURSES

The Class Schedule and Room Directory, available several weeks before the beginning of each quarter, gives class meeting times and room numbers, changes to the General Catalog, and the most up-to-date information on registration procedures, including RSVP (telephone registration).

Class Level

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

<table>
<thead>
<tr>
<th>Class</th>
<th>Unit Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0.0 — 44.9</td>
</tr>
<tr>
<td>Sophomore</td>
<td>45.0 — 89.9</td>
</tr>
<tr>
<td>Junior</td>
<td>90.0 — 134.9</td>
</tr>
<tr>
<td>Senior</td>
<td>135.0 —</td>
</tr>
</tbody>
</table>

Undergraduate Courses

Lower Division Courses

These courses, numbered 1-99, are open to all students for lower division credit, but are designed primarily for freshmen and sophomores.

Upper Division Courses

These courses, numbered 100-199, are open to all students who have met the necessary prerequisites as indicated in the course catalog description. Preparation should generally include completion of one lower division course in the given subject or completion of two years of college work.

Variable-Unit Courses

Subject to approval by the department chairperson, an instructor may arrange to give a special study course (numbers 90X, 92, 97T, 97TC, 98, 99, 190X, 192, 194H, 197T, 197TC, 198, 199) to interested students.

- 90X/190X (Seminar) are seminar courses for in-depth examination of a special topic within the subject area.
- 92/192 (Internship) courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units before enrolling in course 192.
- 97T/197T (Tutoring in the Community) and 97TC/197TC (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.
- 98/198 (Directed Group Study) courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.
- 99 (Special Study for Undergraduates) is a course arranged for an individual student who shares with an instructor an academic interest that cannot be accommodated within the formal course structure.
- 194H (Special Study for Honors Students) courses are for individual students with honors status, as determined by the department offering the course, and who have completed 84 units.
- 199 (Special Study for Advanced Undergraduates) courses are the upper division counterparts of course 99, and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Credit in courses 99, 194H, 199 is limited to a total of 5 units per term.

Autotutorial Courses are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 13AT, 141AT.

Research Conference Courses are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.
Graduate Courses

Courses numbered 200–299 are open to graduate students and to undergraduates who have completed 18 units of upper division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in 290C courses and variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory.

Professional Courses for Teachers and Nurse Practitioners

Courses numbered 300–399 are teacher-training courses in the Division of Education and in other departments and are especially intended for teachers or prospective teachers. Included are courses designed to provide instruction to teaching assistants. Also included are courses for certification of family nurse practitioners and physician assistants. These courses are open only to students enrolled in those programs.

Other Professional Courses

Courses numbered 400–499 are professional training courses. Graduate students should consult their faculty adviser or contact the Graduate Studies Office before registering in 400 series courses to determine if graduate credit may be awarded for the course in question.

Prerequisites

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests on the student. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you. However, the prerequisite that requires that you complete 84 units before registering in the course may not be waived.

Adding or Dropping Courses

You are officially registered in all courses listed on your individual study list. You will be held responsible for completing each of the courses. To confirm the courses on your official study list, call RSVP. You may adjust your schedule by adding or dropping courses via RSVP until the published deadlines.

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. Certain fees may apply. Graduate students must have their adviser’s approval in order to drop courses. A course that is on your study list and for which you did no work that could be graded is reflected on your official transcript by the notation “E-NWS” (Enrolled-No Work Submitted).

See the Academic Calendar in the front of this catalog for the deadlines each quarter to add or drop courses. The Class Schedule and Room Directory for each quarter explains how to use RSVP to add and drop courses, and what add/drop procedures and fees apply after the published deadlines.

Retroactive Drops

Occasionally, in exceptional circumstances, students are allowed to drop a course after the course is completed. Reasons for seeking a retroactive drop are very specific: medical problems, severe emotional difficulties, or death or severe illness in the immediate family. Petitions are available from the Office of the Registrar and should include a detailed account of the problem, appropriate documentation, and an adequate explanation of why an "I" grade or late drop was not taken during the quarter in which the problem occurred. The instructor’s signature is required on the petition. A $3.00 fee is applicable on all retroactive drops.

Retroactive Adds

In some rare circumstances, students are allowed to add a course after the course is completed. Petitions for retroactive adds are available from the Office of the Registrar. Each petition must include the reason for the student’s failure to add the course during the quarter in which it is offered. The petition must be supported by the instructor’s signed approval, together with a statement from the instructor indicating knowledge of the student’s participation and performance during the presentation of the course in question and the instructor’s understanding as to the reason for the student’s failure to add the course before the end of the quarter. A course grade must be assigned by the instructor. A $3.00 fee is applicable on all retroactive adds.

COURSE LOAD

Certification of Full-Time Status. Undergraduate students must carry a study load of at least 12 units (including workload units) each quarter in order to be certified as full-time students for insurance and financial aid purposes, or to compete in intercollegiate athletics. Graduate students must carry a study load of at least 8 units each quarter in order to be certified as full-time students for insurance and financial aid purposes.

Minimum Progress Requirements. Minimum progress is defined as an average of 12 units (including workload units) passed per quarter, calculated at the end of every quarter for the preceding three quarters of enrollment. Undergraduate students falling below this required average will be subject to academic disqualification. Minimum progress requirements do not apply to students who have part-time status or to students who have their dean’s approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a death in the immediate family, or an accident.

College of Letters and Science. Freshman students in their first year and transfer students in their first quarter of residence may not take more than 17 units each quarter. For all other Letters and Science students, the study list may not exceed 21 units each quarter. These unit limitations include non-credit remedial courses and repeated courses, but not make-up work to remove incomplete grades.

PART-TIME STUDENT STATUS

If, for reasons of occupation, family responsibility, health, or, for one term only, graduating senior status, you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Students may change status between full-time and part-time as their circumstances change. To be considered eligible, undergraduate students must be reg-
istered in ten units (including workload units) or fewer per quarter, and graduate students must be registered in six units or fewer per quarter. Minimum progress requirements are waived for part-time students. Undergraduate petitions are available at the Office of the Registrar and require approval by the Registrar. Graduate petitions are available at Graduate Studies and approved by the Dean of Graduate Studies. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Services, as full-time students.

ACADEMIC CREDIT

Academic work at the University is measured by "units of credit." In conjunction with the letter grade you receive from the course instructor, units of credit give a fairly accurate evaluation of the amount of time you have devoted to a given subject. Units of credit also make it possible to anticipate the amount of work involved in a particular course, and enable you to transfer from one campus or university to another without undue difficulty. (To convert quarter units to semester units, multiply by 0.66; from semester to quarter units, multiply by 1.5.)

Units of credit are assigned to courses 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 one unit of credit.

In most courses at Davis the standard procedure prevails, so that a three-unit course meets for three hours a week, a four-unit course for four hours, and so on. Courses that are an exception to this pattern may require additional class time or give more demanding assignments. If you have questions about the number of units assigned to a course, you should check the expanded course descriptions (if your college or department provides them) or ask the instructor what is required in terms of outside reading, term papers, problem sets, or field trips. These are not always spelled out completely in the General Catalog. By knowing the amount of work that will be required, you can plan your course load more systematically and realistically.

Credit by Examination

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

The completed petition, accompanied by a fee of $5.00, must be presented for final approval to the dean of your college or school, or if you are a graduate student, to the dean of Graduate Studies.

The credit received for the examination may not duplicate any credit you have already earned toward your degree. You may not use credit by examination to repeat any course you have taken previously, regardless of the grade you received in that course. The final results will be reported to the Office of the Registrar, which will assign you the appropriate grade and grade points. Since failure to pass the examination will be recorded as an F, you are encouraged to prepare fully for such an examination before attempting it.
You may also receive credit for learning in nonacademic settings through credit by examination.

**Concurrent Credit from Another Institution**

A student may not obtain transfer credit for courses taken at a non-University of California campus in a term during which the student is registered as a full-time student at UCD. A variance can be obtained only by petitioning the dean of your college well in advance of the desired registration. When a variance is granted, units earned are counted toward minimum progress for the term in which the dual registration occurs. Summer session courses are exempt from this regulation.

Students may gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. Assurance that such credit will be accepted, however, can be given only after the courses have been completed. You should arrange to have the transcripts of your summer session grades sent to the Admissions Office for evaluation.

See the Summer Sessions bulletin for detailed information.

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**THE MAJOR**

**Declaration of Major**

**College of Agricultural and Environmental Sciences.** Students must declare a major by the time they have completed 120 units. Failure to declare a major at this point will result in a hold on your further registration. In order to declare a major, you must meet with your faculty adviser and/or Advising Associate, fill out a Declaration of Major petition obtainable at the Office of the Registrar or the Dean’s Office, and file the petition with the Dean’s Office. If you have completed 120 units you must prepare a study plan with your adviser and/or Advising Associate at the same time. You are accepted into a major only after your major department and the Dean’s Office have approved the Change of Major petition. You’ll find a complete list of the majors offered at UC Davis in a chart at the front of this catalog.

**College of Engineering.** Students must declare a major when they apply to the College of Engineering. Their freedom to change majors thereafter may be limited.

**College of Letters and Science.** Students must declare a major by the time they have completed 90 units. If you have not declared a major by this point, a hold may be placed on your registration materials. Such a hold would be removed only when your Declaration of Major petition is filed in the Dean’s Office. Petitions can be obtained from faculty advisers, department offices, or the Office of the Registrar. As a part of the declaration procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the dean have approved the petition.

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. With the approval of the College Executive Committee, additional requirements, such as completion of a particular set of required courses with a specified grade point average (usually well above a C average), may be introduced as conditions for acceptance into any major at any time.

If your performance is unsatisfactory after you have declared a major program, you may be required 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.

**Change of Major Within a College**

To change from one major to another within a college, you will need the consent of the department or committee in charge of your proposed new major. Admission into a major program may be denied by the program or by the dean if your grade point average in courses required for the selected major is less than 2.0.

Procedures for change of major within a college are the same as for declaration of major and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). It is not possible to change or declare a major in the quarter you complete your degree work.

**College of Engineering.** The above provisions do not apply to students in the College of Engineering, whose freedom to change majors is limited.

**Change of Major Accompanied by Change of College**

Petitions for a change of major involving change of college must be filed within the first five weeks of the quarter. A change petition, available at the Dean’s Office and Office of the Registrar, 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 a GPA of less than 2.0 in courses that are required by the new major.

**College of Engineering.** You may submit petitions for a transfer into the College of Engineering from another UCD college only if you (1) are in good academic standing and are making minimum progress; (2) have completed at least 40 units as a registered student on the Davis campus; (3) have successfully completed Mathematics 21A, 21B, and 21C and Physics 9A (or their equivalents) on a letter-grade basis; (4) have a minimum GPA of 2.5 in all mathematics and physics coursework in the Mathematics 21 series and Physics 9A and above; and (5) have the minimum UC GPA specified for the year in which you wish to transfer. Additional restrictions may apply to students who want to major in Civil Engineering, a currently impacted major.

You must declare a specific major at the time you petition to transfer and must have the minimum GPA specified for transfer into that major in that year. Consult the Engineering Undergraduate Office for details on minimum GPAs for transfer to specific majors.
Multiple Majors

College of Agricultural and Environmental Science. Because of similarity in course requirements for many of the major programs in the College, requests for multiple majors are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major, or of adopting one or more of the minor programs offered by the College to supplement your major. If you complete two majors, you may also petition for recognition that you have completed all the requirements for study of a major in addition to your selected major. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of the other major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

College of Engineering. Enrollment in combinations of engineering majors other than the established double majors or in an engineering major and a non-engineering major may be possible. A change of major petition is required; this should be filed in the Undergraduate Office and is subject to approval. Double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

College of Letters and Science. Students choosing to major in multiple subjects must notify the Dean’s Office of their decision by submitting for approval a petition endorsed by faculty advisers in the majors. The dean’s approval of the declaration of more than one major is subject to the following conditions:

1. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and may not be counted towards the upper division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

If the major programs differ in the number of upper division units required, the major program requiring the smaller number of units will be used to compute the minimum number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter and at least two upper division courses in each major must have been successfully completed.

It should be possible to complete all degree requirements within the 225-unit limit.

Combination proposals that cannot be approved are two or more majors

1. in the following group: biochemistry, biological sciences, genetics, microbiology, physiology, plant biology (botany), and zoology;

2. offered by the same discipline, except art history and art studio.

A student who completes all requirements for approved multiple majors in which one major normally leads to an A.B. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

Cross-College Majors

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

College of Engineering. Enrollment in a combination of an engineering major and a non-engineering major may be possible. A change of majors petition must be filed in the Undergraduate Office and is subject to approval. Such double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

College of Letters and Science. The same conditions apply for cross-college majors as for multiple majors. Cross-college programs will not be approved if the majors involved are available within a single college as well. For example, cross-college programs between the Colleges of Letters and Science and Agricultural and Environmental Sciences will not be approved if one of the majors is biochemistry, biological sciences, genetics, microbiology, physiology, plant biology (botany), or zoology.

Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. Such a major requires the selection of interrelated courses totalling a minimum of 45 upper division units from two or more areas of study. If you choose this option you will work closely with faculty advisers to develop a coherent and rigorous academic program. This program is then submitted to a faculty committee for review and approval. Submit the proposed program to the committee at least four quarters before you plan to graduate. If you wish to undertake an individual major, request the appropriate forms from your dean’s office. Program requirements are outlined under Individual Major in the Programs and Courses section of this catalog. The College of Engineering does not offer an individual major.

THE MINOR

If you are interested in two or more areas of study, you should consider completing one or more minor programs. Minor program requirements are listed in the Programs and Courses section of this catalog under the department that offers them. You will find a complete list of the minors offered at UC Davis in a chart at the front of this catalog.
A minor consists of 18 to 24 units in upper division courses specified by the department or program offering the minor. 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 2.0 in all courses required for the minor. At most, one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, these minors may not have any courses in common.

If you want to have completion of a minor certified on your transcript, you must obtain a minor petition from your dean’s office and file it no later than the deadline for filing for graduation. You can elect only one minor in a subject area. Requirements for the minor must be met by the time of graduation.

No minors are available in the College of Engineering, although students in Engineering may, with the consent of their advisers, develop minors in either the College of Letters and Science or the College of Agricultural and Environmental Sciences. A minor is not required and may not be used to substitute for approved Humanities and Social Sciences (HSS) electives. The Undergraduate Office in the College of Engineering has the primary responsibility for certifying minors for engineering students and should be consulted before you begin the minor sequence.

If you are enrolled in the College of Engineering but elect a minor in either the College of Letters and Science or in the College of Agricultural and Environmental Science, you must pick up a minor petition in the office of the college that offers the minor you want, and have it certified by the Undergraduate Office of the College of Engineering.

EXAMINATIONS

Midterms

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

Final Examinations

Scheduling. The 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 in the Class Schedule and Room Directory each term so that you can avoid final examination conflicts.

The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student registered in the course. Any student who does not consent in writing to a different time must be permitted to take an examination (or submit the instructor-opted take-home examination) at the officially scheduled time. A student who consents in writing to a change in the final examination time waives the right to take the examination as originally scheduled. Departures from the published examination schedule should be carried out so as not to disadvantage students who are unable to accept the alternate schedule. An in-class final examination may not be rescheduled for a date earlier than the first day of finals week. The due date for a take-home final examination may not be earlier than the time and date published in the Class Schedule and Room Directory. A student who is improperly denied the right to take a required final examination on the published date (or submit the take-home examination as opted by the instructor) may file a petition with the Executive Council of the Davis Division of the Academic Senate by the end of the next regular term for appropriate action.

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

At the instructor's option, the final examination may be completely or in part a take-home examination. The writing time (in undergraduate courses) of a take-home and an in-class final examination together should not exceed three hours. In each course in which a final examination is required, the students have the right to take the final examination (and/or submit the take-home examination) at the time published in the Class Schedule and Room Directory.

An instructor may release each student's original examination, or a copy, at any time. Otherwise, the instructor will keep the exams, or copies thereof, until the end
of the next quarter and students may pick up their exams during this period.

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

Religious Observances. The University of California, Davis seeks to accommodate any student who, in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. It is the responsibility of the student to provide, in writing and at the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the test or examination and to request accommodation. Instructors will consider such requests on a case-by-case basis and determine whether such conflicts can be resolved without imposing on the instructor or the other students in the class an undue hardship which cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the test or examination without incurring a penalty or violation to the student's religious creed.

GRADES

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)

P, passed (grade C- or better)
NP, not passed
S, satisfactory
U, unsatisfactory
I, incomplete (work is satisfactory but incomplete for a good cause)
IP, in progress
E-NWS, enrolled—no work submitted

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

Grade Points

Grade points are assigned each letter grade as follows:

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<thead>
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<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
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<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>2.7</td>
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<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>C+</td>
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</tr>
<tr>
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<tr>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>D-</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Grade Point Average (GPA)

The grade point average is computed on courses taken at the University of California, with the exception of courses taken 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. Incomplete (I) grades are not included in the GPA at the end of the quarter, but are counted as F in determining if a bachelor's degree candidate has earned the minimum 2.0 GPA required for graduation.

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

Passed/Not Passed (P/NP) Grading

Subject to regulation by the faculties of the colleges and schools, an undergraduate student in good standing can request to take specific courses on a Passed/Not Passed basis. Such requests must be submitted and confirmed before the end of the fifth week of instruction.

The grade P is assigned for a grade of C- or better. Units thus earned are counted in satisfaction of degree requirements but are not counted in determining your grade point average.

The intent of this option is to encourage exploration in areas in which you have little or no previous experience by alleviating grading pressures. The maximum number of units graded P that will be accepted for degree credit is one third of the units completed in residence on the Davis campus. Consequently, at least two thirds of the units completed in residence at Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade.

In specific approved courses instructors will assign only Passed or Not Passed grades. Such courses count toward the maximum number of units graded P allowable toward the degree. If you are planning to take courses on a P/NP basis, you should also familiarize yourself with the requirements of your particular school or college which may have introduced conditions or restrictions in addition to the University requirements. If you plan to attend graduate or professional school, you should consult with Advising Services regarding Passed/Not Passed grading.

If you elect the P/NP grading option for courses graded upon completion of a two- or three-quarter sequence (In-Progress grading), a petition must be submitted before half of the time covered by the IP grading has elapsed. The P/NP grading will then be in effect for the entire course sequence.

If you receive a D or an F in a course you may not repeat it using the P/NP option. If you receive an Incomplete in a course you took for a letter grade, you may not complete the course on a Passed/Not Passed basis.

College of Agricultural and Environmental Sciences: The Passed/Not Passed option should be used only for elective courses, not for courses taken to fulfill major requirements. An NP grade in a course required by the major could prevent graduation. When in doubt, check with your faculty adviser before electing to take a course Passed/Not Passed.
College of Engineering: While registered in the College of Engineering, you may take a maximum of one course per quarter for which you choose the Passed/Not Passed grading option; you must be registered in at least 12 units. Courses that are graded P/NP only may be taken simultaneously with the courses for which you exercise the Passed/Not Passed option.

In the engineering curricula, only courses taken to satisfy (a) the unrestricted electives requirements, or (b) the Humanities–Social Sciences electives (not General Education), or (c) the English and rhetoric requirements, or (d) the technical electives requirement, may be taken on a Passed/Not Passed basis. In addition, certain design courses may be taken on a Passed/Not Passed basis. Consult the Undergraduate Office for information about which design courses may be taken on this basis. All other courses must be taken for a letter grade. Humanities–Social Science courses that you plan to offer in fulfillment of the campus General Education requirement must be taken for a letter grade.

You must meet the following conditions to exercise the Passed/Not Passed option:

- be in good academic standing (not on probation or subject to dismissal)
- carry at least 12 units, including the course to be taken P/NP, in that quarter
- have a P/NP petition approved by the Associate Dean for Undergraduate Studies or a designated representative

College of Letters and Science: Students enrolled in the College of Letters and Science are subject to an additional limitation on the number of units which may be completed employing the Passed/Not Passed option (see the College of Letters and Science entry in the “Bachelor’s Degree Requirements” chapter). 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.

Satisfactory/Unsatisfactory (S/U)

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. Graduate students, under certain circumstances, may be assigned grades of S or U, but units earned in this way will not be counted in calculating the grade point average.

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

In specific approved courses instructors will assign only Satisfactory or Not Satisfactory grades. Such courses count toward the maximum number of units graded S allowable toward the degree.

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. (See above for electing P/NP grading for a course graded in-progress.)

Incomplete Grades

The grade of I may be assigned when a student's work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause as determined by the instructor. (Good cause may include illness, serious personal problems, an accident, a death in the immediate family, a large and necessary increase in working hours, or other situation of equal gravity.)

You may replace an I grade with a passing grade and receive unit credit (and grade points if the instructor assigns a letter grade) provided you satisfactorily complete the coursework as specified by the instructor. In order to change your records, you must obtain a petition from the Office of the Registrar and present it to your instructor for completion and mailing.

An I grade must be replaced with a letter grade (or P or S grade) before the end of the third succeeding quarter (excluding summer sessions) of the student's academic residence, or the grade will revert to an F (or NP or U). If a student's degree is conferred before the expiration of the time limit for an I-grade conversion, and the grade is not replaced by the end of the third
quarter succeeding the quarter in which the I grade was assigned, the I grade will remain on the student's record.

You may not re-register for credit in a course for which an I grade has been assigned. An undergraduate student whose record shows more than 16 units of I grades will be subject to disqualification. A graduate student who accumulates more than eight units of I grades will be subject to probation.

Incomplete grades will not be included in your grade-point average at the end of a quarter. At the time of graduation, however, any remaining I grades are included when your grade point average is computed, in order to determine whether you have achieved the 2.0 average required for the bachelor's degree. An Incomplete grade, in these computations, has the same effect as a grade F, NP, or U, depending on which 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 quarter. No final grade except I may be revised by examination or the submission of additional work after the close of the quarter.

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

Repeating Courses
Undergraduates may repeat any course in which they received a D, F, or NP. Courses in which students received a grade of D or F may not be repeated on a P/NP basis. (Courses in which a grade of NP was received may be repeated on a P/NP basis.)

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of undergraduates who have received a grade of D, F, or NP, only the grade and corresponding grade points earned the second time a course is taken will be used, up to a maximum of 16 units for all courses repeated. After the 16-unit maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

Repeating a course more than once requires approval by the appropriate college dean. Departments may restrict the repetition of a course if it is a prerequisite to a course that the student has already completed with a grade of C- or better.

Graduate students, with the consent of the appropriate graduate adviser and the Dean of Graduate Studies, may repeat any course in which they received a C, D, F, or U, up to a maximum of 9 units for all courses repeated. Courses in which a grade of C, D, F has been earned may not be repeated on a S/U basis. (Courses in which a grade of U was received may be repeated on a S/U basis.)

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of graduate students who have received a grade of C, D, or F, only the most recently earned grade for each course and corresponding grade points will be used, up to the nine-unit maximum. After the nine-unit maximum is reached, the GPA will be based on all grades assigned and total units attempted.

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

Final Grades
Grades are generally available about three weeks after a quarter has ended. Students can call RSVP to hear their grades at the times and dates announced by the Office of the Registrar. If you wish to have your grades mailed to you, bring in a stamped, self-addressed envelope with your student photo I.D. card to the Office of the Registrar before the end of the quarter.

Transcripts
A record of each student's academic work at UCD is retained permanently by the Office of the Registrar. Copies of your official transcript may be obtained from that office for $4.00 a copy. Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University Extension Office, 1333 Research Park Drive. 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.

HONORS AND PRIZES

Deans' Honors Lists
According to Davis campus regulations, the quarterly Dean's Honors List includes names of students who have completed, for a letter grade, a minimum of 12 units in a specific quarter with a grade point average equal to or higher than the minimum grade point average attained by the upper 16 percent of those registered in the same class level and college during that quarter. Honors lists will be posted quarterly on bulletin boards outside deans' offices, and a notation of these honors will be placed on each student's permanent record by the Office of the Registrar.

Scholarships
Students with outstanding academic records who show promise of continued scholarly achievement are encouraged to apply for scholarship recognition and awards. Awards are accompanied by a financial honorarium or stipend. Information about scholarships is available from the Scholarship Office, 207 North Hall, 916-752-2393.

Graduation Honors
Honors at graduation are awarded to students who have a grade point average in the top percent of their college as shown in the table below. (The College of Letters and Science requires that additional criteria be met for high and highest honors—see explanation below.)
Grade point averages from the winter quarter previous to graduation are used to determine the averages that will earn an honors designation. Following are the averages for winter quarter 1994. These averages will be used through winter 1995.

### Grade Point Average by College

<table>
<thead>
<tr>
<th>Percent Determining Cut-Off Point</th>
<th>Agricultural and Environmental Sciences</th>
<th>Engineering</th>
<th>Letters and Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>2%</td>
<td>3.845</td>
<td>3.675</td>
<td>3.645</td>
</tr>
<tr>
<td>3%</td>
<td>3.815</td>
<td>3.826</td>
<td>3.818</td>
</tr>
<tr>
<td>4%</td>
<td>3.759</td>
<td>3.804</td>
<td>3.782</td>
</tr>
<tr>
<td>6%</td>
<td>3.671</td>
<td>3.743</td>
<td>3.701</td>
</tr>
<tr>
<td>8%</td>
<td>3.600</td>
<td>3.656</td>
<td>3.646</td>
</tr>
<tr>
<td>12%</td>
<td>3.491</td>
<td>3.567</td>
<td>3.550</td>
</tr>
<tr>
<td>16%</td>
<td>3.403</td>
<td>3.454</td>
<td>3.468</td>
</tr>
</tbody>
</table>

An honors notation is made on students' diplomas and on their permanent records in the Office of the Registrar.

### College of Letters and Science

Graduation with honors requires that a student meet the appropriate grade point requirement for all courses as described in the above table. Students who complete the College Honors Program and who meet the grade point requirement for graduation with honors may be recommended by their departments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. Graduating students will not be awarded honors with the bachelor's degree if more than eight units of grade I (Incomplete) appear on their transcripts. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the Dean's Office.

### The Honors Program of the College of Letters and Science

The Honors Program in the College of Letters and Science is designed to permit students to pursue a program of study in their major at a level significantly beyond that defined by the normal curriculum. It represents an opportunity for the qualified student to experience aspects of the major that are representative of advanced study in the field. Successful completion of the College Honors Program is a necessary prerequisite to consideration for the awarding of high or highest honors at graduation.

Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.5 in courses counted toward the major. Other prerequisites for entrance into the program are defined by the major. The program consists of a project whose specific nature is determined by consultation with the student's major adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment depending on the major. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of six units of credit be earned in coursework for the project.

### Prizes

The University Medal is the highest campus 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.

**College of Agricultural and Environmental Sciences**

Each year the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient. The Mary Regan Meyer Prize is awarded to an outstanding graduate who has demonstrated expertise and an interest in serving humanity.

**College of Engineering**

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.

**College of Letters and Science**

Graduating seniors with a distinguished academic record may be recommended by the faculty as nominees for the College's Herbert A. Young Medal. Each June, one medalist is selected from among the graduates of the current academic year. The Leon H. Mayhew Award is conferred upon the outstanding graduate from a disciplinary area other than that of the College medalist. Academic excellence is the primary basis for selecting the recipients of these awards.

The Lawrence J. Andrews prize is awarded to a student entering the senior year who not only has achieved academic excellence, but who also has demonstrated interests outside of pure scholarship.

### Honorary Societies

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

- Alpha Epsilon (Agricultural Engineering)
- Alpha Kappa Delta (Sociology)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (College of Agricultural and Environmental Sciences)
- Delta Phi Alpha (German)
- Dobro Slovo (Russian)
- Golden Key (All colleges and schools)
- Kappa Omicron Nu (Applied Behavioral Sciences)
- Omicron Delta Epsilon (Economics)
- Order of Omega (Fraternities–Sororities)
- Order of the Coif (Law)
- Phi Alpha Theta (History)
- Phi Beta Kappa (College of Letters and Science)
- Phi Kappa Phi (All colleges and schools)
- Phi Sigma (Biological Sciences)
- Phi Zeta (Veterinary Medicine)
- Pi Alpha Xi (Environmental Horticulture)
- Pi Delta Phi (French and Italian)
- Pi Mu Epsilon (Mathematics)
WITHDRAWALS AND LEAVES OF ABSENCE

Withdrawals may be granted by the University for emergency reasons or for good cause. In order to withdraw, you must first obtain approval from the dean of your college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades. Petitions for Withdrawal are available at the Office of the Registrar. Information on fee refunds can be found in the Fee Refund section of this catalog. The following signatures are required on withdrawal petitions: director of the Student Health Center; adviser, lab or course instructor; Student Aid Accounting Office; Cashier’s Office; and the dean of your college, division, or school.

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 Accounting Offices. If you are receiving veterans benefits, you must also report your withdrawal to the Veterans Affairs Office.

Retroactive Withdrawals

Petitions for retroactive withdrawals may be obtained from the Office of the Registrar. Reasons for seeking such are medical problems, severe emotional difficulties, or death or severe illness in the immediate family. Petitions should include a detailed account of the problem, appropriate documentation, and an adequate explanation of why withdrawal was not taken during the quarter in which the problem occurred.

Planned Educational Leave Program (PELP)

The Planned Educational Leave Program allows students 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.

To apply for PELP, file an application, including a brief written explanation of the reason for leaving the campus, and stating when you intend to resume academic work. Applications for Planned Educational Leave are available at the Office of the Registrar and should be filed with the Office of the Registrar (Admissions Office for new students) no later than the tenth day of instruction.

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

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

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

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

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

PROBATION AND DISMISSAL

The following provisions apply to all undergraduates. Graduate and professional students with scholarship deficiencies are subject to action at the discretion of their respective deans.

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

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

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

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

In the case of probation or disqualification the official transcript will state "not in good standing." Once a student has met quantitative standards for scholarship, the notation will be removed from the transcript.

The quantitative standards, referred to as minimum progress requirements, define scholarship in terms of the number of units that you must satisfactorily complete. Minimum progress is defined as an average of 12 units passed per quarter, calculated at the end of every quarter for the preceding three quarters. Minimum progress requirements do not apply to students who have part-time status or to students who have their dean's approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a death in the immediate family, or an accident.

The notation "warning—minimum progress" will be noted on the grade report for a quarter in which the student has passed less than 12 units. The notation "minimum progress—subject to academic disqualification," will be noted on the grade report the first time the total number of units passed at UCD is less than 36, calculated at the end of every quarter for the preceding three quarters of enrollment. Quantitative standards are not reflected on the official transcript.

It is assumed that a student will earn the 180-unit minimum degree requirement prior to completing 15 quarters of enrollment. Normal progress would achieve 180 units in 12 quarters.

The following courses may be counted toward unit minimum progress:

- Required non-credit courses, e.g., Mathematics B, will be evaluated according to the "Carnegie unit" rule and counted as units passed
- Repeated courses passed to improve D or F grades
- Courses passed during Summer Sessions at UCD or at another accredited school and transferred to UCD will be counted as units passed (applied to quarter of registration 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 that are IP (in progress) will be counted as units passed
- Courses graded I will be counted as units passed when replaced by a passing grade (applied to the quarter in which the I grade is received)

The dean of the student's college may grant a student a minimum progress variance of one or more quarters for an acceptable reason. See your faculty adviser or go to the dean's office of your college if you need academic advising about probation and dismissal.

Dismissal

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

Transfer with Scholastic Deficiencies

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

SUMMER SESSIONS

44 Mrak Hall
Davis, California, CA 95616-6715
(916) 752-1641 or 1-800-VIP-2738;
e-mail: summer-sessions@ucdavis.edu

Every summer, several thousand students (more than 6,800 in 1993) turn to the Office of Summer Sessions at the University of California, Davis for an opportunity to complete their undergraduate degrees, earn units, expand their knowledge, do research, take special study courses, meet prerequisites, or take courses that are often over-enrolled during the academic year.

Summer Sessions offers a wide range of lower and upper division courses (250 in 1993) that provide full University credit transferable to most campuses. Admission is open to virtually all mature adults, so Summer Sessions attracts students from a wide range of universities and colleges, high school graduates and juniors, and many other qualified applicants. Admission to a summer session, however, does not guarantee or imply admission to the University's regular academic quarters.

In 1995, the Office of Summer Sessions will offer two six-week sessions: June 19 to July 28 and July 31 to September 8. All UC Davis undergraduates will automatically receive our 1995 Summer Sessions Catalog and application materials by the end of April; non-UCD undergraduates should contact us at the address above, at (916) 752-1641, or through e-mail at summersessions@ucdavis.edu.

Special programs (including intensive language programs and the Summer Humanities Institute: An Honors Program for High School Juniors) as well as international programs will be offered in 1995. Last year, UC-registered students had the opportunity to study in England, Italy, Japan and Scotland. For more information on international programs, call (916) 752-0436; for more information on the Summer Humanities Institute, call (916) 752-7649.
You must satisfy four groups of requirements before you can become eligible for candidacy for the bachelor's degree. The four groups are as follows:

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

Detailed information on University requirements, the General Education requirement, and college requirements can be found in this chapter.

Every student is responsible for seeing that all degree requirements are fulfilled.

### UNIVERSITY REQUIREMENTS

#### Subject A: English Requirement

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

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

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

If you have not satisfied the requirement in one of the ways described above, you must register in English 57 during your first quarter of residence at the University, or as soon thereafter as space is available in the course. English 57, offered by Sacramento City College on the Davis campus, counts as 4.5 units on your study list and toward minimum progress but is not transferable as units towards graduation. To satisfy the requirement, students must pass the Subject A Examination offered as the final examination for English 57. Students failing the examination must repeat English 57. If the requirement has not been satisfied by the end of your third quarter of registration, a hold will be placed on your registration.

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

#### American History and Institutions

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

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

- By offering one high school unit in American history, or ½ high school unit in American history and ½ high school unit in civics or American government, with a grade of C or better in each course.
- By completing any one of the following courses:
  - African American Studies 10, 100, 120, 121
  - Asian American Studies 1, 2
  - Economics 111A, 111B
  - Native American Studies 1, 10, 55, 116, 130A, 130B, 130C
  - Political Science 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163
  (Students electing to offer one of the above courses are subject to the rules that apply for prerequisites and majors.)
- By presenting evidence that the requirement has been accepted as satisfied at another campus of the University.
- By presenting evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to the Davis campus.
- By successful completion of the Advanced Placement Examination in American History.

International students, regardless of the type of visa they hold, must meet the University's American History and Institutions requirement for graduation.

Unit Requirement

A minimum of 180 quarter units is required for graduation. These must be distributed according to the minimum requirements set forth by the faculty of your college.

A maximum of 12 units of Internship Courses (92, 192, or a combination) may be counted toward the 180-unit bachelor's degree requirement.

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

Students should refer to the Advanced Placement Examination chart and their transcripts to eliminate the possibility of duplication of credit.

Residence Requirements

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

Regularly approved courses (laboratory, field, or other individual work) done outside of a regular session but under the direction of a department of instruction may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree. Registration is with the consent of the instructor only.

University Extension courses are not accepted as part of the University residence requirement.

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

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

Scholarship Requirement

To receive a bachelor's degree, you must obtain twice as many grade points as units (a 2.0 GPA) for all courses you have attempted in the University. An exception to this rule is made for those students undertaking certain honors courses. Grades earned in University Extension courses are not used in calculating individual grade point averages. For specific college requirements consult the college sections following.

Filing for Graduation

Each candidate for an undergraduate degree must file an Announcement of Candidacy with the Office of the Registrar for the quarter in which the candidate plans to receive the degree. The dates for filing are published in the Academic Calendar at the front of this catalog.

College of Agricultural and Environmental Sciences. A Major Certification form must be received and evaluated by the Dean's Office before your candidacy for a degree can be finalized. A Major Certification is completed during the quarter a student plans to graduate. At that time, the adviser and student check to see that all major requirements have been completed. The Dean’s Office completes the degree certification by verifying that all College and University requirements have been satisfied.

GENERAL EDUCATION REQUIREMENT

The General Education Program promotes the intellectual growth of all undergraduates. The program's objectives are: (1) to offer a choice of courses in all major fields of learning; (2) to stimulate intellectual growth through the study of important methods as well as significant material in a particular discipline; (3) to involve students in the learning process by requiring considerable writing and participation in class activi-
ties; and (4) to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.

In designing the UC Davis General Education Program, the faculty specified that General Education courses should help students acquire skills that will serve them well beyond their undergraduate years. General Education (GE) courses are designed to encourage development of analytical reasoning and clear communication skills through active participation in the classroom. GE courses stress understanding of intellectual concepts and methods, connect their subject with other fields of knowledge, and discuss the social, ethical and aesthetic issues raised by their inquiry. In order to break away from traditional ways of categorizing the broad fields of inquiry and in order to encourage interdisciplinary connections, GE courses are grouped into three broad areas of knowledge:

1. Civilization and Culture. Courses in this area present dominant intellectual traditions, achievements, and socio-political institutions, and increase awareness of cultural diversity within the Western tradition and in other civilizations.

2. Contemporary Societies. Courses in this area create an awareness of critical economic, political, and social problems of the contemporary world.

3. Nature and Environment. Courses in this area provide students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations, and appeal of science.

GE courses may be either lower division or upper division. Courses numbered 0–99 are lower division and courses numbered 100–199 are upper division. You should consult the course descriptions contained in the Programs and Courses section of this catalog for the courses designated as prerequisite for upper division courses.

Determining Your General Education Requirement

You must complete three courses in each of the two General Education areas outside of the area of your major. Two of the three courses in each area must be certified General Education courses. One of the three courses in each area must be an upper division course.

Each academic major, minor, and degree program has been assigned to one of the three areas of General Education. Each GE course has also been assigned to one of the three areas. You must complete courses in those areas of General Education other than the one that contains your major field.

A minor in an area outside the area of your major will satisfy your GE requirement in that minor's area. Double majors will satisfy the GE requirement in two areas only if the majors are assigned to two different areas. You will still be responsible for completing the GE requirement in the third area. Double majors in the same area do not reduce your GE requirements.

If you have an approved individual major, it should have been assigned to one of the three General Education areas at the time it was approved by your college. If you have any questions concerning the GE area to which your major was assigned, consult your college dean's office. The specific General Education requirements for students entering UCD from the 1984-85 academic year and thereafter are detailed in the General Education Requirements table on the following page.

Transfer Credit. If you have transferred from a community college or other post-secondary institution, or enter with Advanced Placement (AP) units, you still have to complete some GE courses at UC Davis, but the number of required courses may be reduced depending upon the number of transfer or AP units you have brought with you.

The following courses and transfer credits will be used in determining the General Education requirement for transfer students:

- UCD Extension courses if they are accepted for transfer by the Office of Undergraduate Admissions.
- Advanced Placement credit.
- Transfer work from other community colleges and four-year institutions.

UCD Summer Sessions courses completed before entry do not count as "transfer credit" for determining your GE requirement. Successful completion of an approved GE course during a UCD Summer Session before entry, however, will count toward satisfaction of the GE requirement.

Consult the "Transfer Credit Evaluation" form prepared by the Office of Undergraduate Admissions to determine your transfer credits.

You are exempt from the UCD General Education Requirement if

- you come from a California community college or other institution of higher education and have completed the "Transfer Core Curriculum;"

OR

- you come from another campus of the University of California and have completed the lower division breadth or General Education requirements of that campus.

Your college dean's office can tell you whether you fall into either of these categories.

Fulfilling Your General Education Requirement

In addition to the requirements outlined above and in the GE requirements table, you must meet the following conditions:

1. Letter grading. All courses taken to fulfill the GE requirement must be taken for a letter grade. No GE credit will be awarded for a course that is taken on a Passed/Not Passed basis.

2. Subject A. This requirement must be completed before you begin your GE coursework. Exception: GE credit may be earned before completing the Subject A requirement for the following course sequences which have been approved for the General Education Program: Chemistry 2A-2B, Economics 1A-1B, Psychology 15-16, and Music 3A-3B.

If you completed a GE course before fall 1986 on a Passed/Not Passed basis or before having completed Subject A, you will receive GE credit for that course.
Approved General Education Clusters

General Education "clusters" are groups of closely related introductory GE courses. There are two approved clusters in the area of Civilization and Culture: History 4A, 4B, 4C; and Comparative Literature 1, 2, 3. There is one approved cluster in the area of Nature and Environment: Animal Science 1, 2, 42.

You may earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster. A cluster allows you to substitute lower division for any required upper division courses.

Selecting General Education Courses

Since GE courses must be chosen from the two areas of General Education other than the one containing your major field, you must begin by identifying the area of General Education to which your major has been assigned. The following list provides this information.

<table>
<thead>
<tr>
<th>Academic Year of Entrance to UCD</th>
<th>Freshman or transfer student with 40 or fewer transfer units</th>
<th>Transfer student with more than 40 but fewer than 84 units</th>
<th>Transfer student with 84 or more units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-85</td>
<td>2 GE courses:</td>
<td>2 GE courses:</td>
<td>2 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• may be in same or different areas;</td>
<td>• may be in the same or different areas;</td>
<td>• may be in the same or different areas;</td>
</tr>
<tr>
<td></td>
<td>• may be introductory or non-introductory</td>
<td>• may be introductory or non-introductory</td>
<td>• may be introductory or non-introductory</td>
</tr>
<tr>
<td>1985-86</td>
<td>4 GE courses:</td>
<td>2 GE courses:</td>
<td>2 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• maximum of 3 in one area;</td>
<td>• may be in the same or different areas;</td>
<td>• may be in the same or different areas;</td>
</tr>
<tr>
<td></td>
<td>• maximum of 2 introductory</td>
<td>• may be introductory or non-introductory</td>
<td>• may be introductory or non-introductory</td>
</tr>
<tr>
<td>1986-87</td>
<td>6 GE courses:</td>
<td>4 GE courses:</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• 3 courses in each of two areas;</td>
<td>• Option 1: 2 courses in each of two areas:</td>
<td>• 1 course in each of two areas:</td>
</tr>
<tr>
<td></td>
<td>• must have 1 introductory and 2 non-introductory courses</td>
<td>• only 1 course in each area may be introductory</td>
<td>• both courses must be non-introductory</td>
</tr>
<tr>
<td></td>
<td>in each area.</td>
<td>• Option 2: 3 courses in one area and 1 in the other:</td>
<td>Option 2: 3 courses in one area:</td>
</tr>
<tr>
<td></td>
<td>• the single course in the other area may be introductory</td>
<td>• must have 1 introductory and 2 non-introductory in the area with 3 courses;</td>
<td>• must have 1 introductory and 2 non-introductory courses;</td>
</tr>
<tr>
<td></td>
<td>• must come from a list of courses approved for GE credit</td>
<td>• the single course in the other area may be introductory</td>
<td>• must come from a list of courses approved for GE credit by your college;</td>
</tr>
<tr>
<td></td>
<td>by your college.</td>
<td>• the third course in each area may come from a list of courses approved for GE credit by your college.</td>
<td>• at least 1 course must be upper division;</td>
</tr>
<tr>
<td>1987-88 to 1991-92</td>
<td>Same as for 1986-87</td>
<td>Same as for 1986-87</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• both courses must be non-introductory</td>
</tr>
<tr>
<td>1992-93, and thereafter</td>
<td>6 GE courses:</td>
<td>4 GE courses:</td>
<td>2 or 3 GE courses:</td>
</tr>
<tr>
<td></td>
<td>• 3 courses in each of two areas;</td>
<td>• Option 1: 2 courses in each of two areas:</td>
<td>• 1 upper division course in each of two areas;</td>
</tr>
<tr>
<td></td>
<td>• at least 1 upper division course in each area;</td>
<td>• at least 1 course in each area must be upper division;</td>
<td>• both courses must come from the list of certified GE courses;</td>
</tr>
<tr>
<td></td>
<td>• at least 2 of the 3 courses in each area must come from a list of certified GE courses;</td>
<td>• at least 1 course in each area must come from a list of certified GE courses;</td>
<td>• at least 1 course must be upper division;</td>
</tr>
<tr>
<td></td>
<td>• the third course in each area may come from a list of courses approved for GE credit by your college.</td>
<td>• the second course in each area may come from a list of courses approved for GE credit by your college.</td>
<td>• 2 courses must come from the list of certified GE courses;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Option 2: 3 courses in one area;</td>
<td>• the remaining course may come from a list of courses approved for GE credit by your college;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• at least 1 course must be upper division;</td>
<td>and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2 courses must come from the list of certified GE courses;</td>
<td>1 upper division course in the other area,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the remaining course may come from a list of courses approved for GE credit by your college;</td>
<td>which must come from the list of certified GE courses.</td>
</tr>
</tbody>
</table>

1 For the academic years 1984-85 through 1986-87, this category of GE requirements applied to freshmen or transfer students with fewer than 41 units; the unit cut-off was changed fall 1987.

2 For the academic years 1984-85 through 1986-87, this category of GE requirements applied to transfer students with 41 or more but fewer than 84 units; the unit cut-off was changed fall 1987.
Civilization and Culture (CC)
- American Studies
- History
- Art History
- Italian
- Art Studio
- Landscape Architecture
- Chicana/Chicano Studies
- Latin
(Humanities emphasis)
- Linguistics
- Classical Civilization
- Medieval Studies
- Comparative Literature
- Music
- Design
- Philosophy
- Dramatic Art
- Religious Studies
- East Asian Studies
- Rhetoric and
- English
- Communication
- French
- Greek
- Russian
- German
- Spanish

Contemporary Societies (CS)
- African American and African (Afro-American) Studies
- Agricultural and Managerial Economics
- Anthropology (A.B. degree)
- Applied Behavioral Sciences
- Asian American Studies (non-degree program)
- Chicana/Chicano Studies (Sociology emphasis)
- Economics
- Environmental Policy Analysis and Planning
- Geography (A.B. degree—emphasis I, II, III, V)
- Human Development
- International Agricultural Development
- International Relations
- Native American Studies
- Political Science
- Political Science—Public Service
- Sociology
- Sociology—Organizational Studies
- Textiles and Clothing
- Women’s Studies

Nature and Environment (NE)
- Agricultural Systems and Environment
- Animal Science
- Animal Science and Management
- Anthropology (B.S. degree)
- Applied Science
- Atmospheric Science
- Avian Sciences
- Biochemistry
- Biological Sciences
- Chemistry
- Community Nutrition
- Computer Science
- Dietetics
- Engineering (all majors)
- Entomology
- Environmental and Resource Sciences
- Environmental Biology and Management
- Environmental Toxicology
- Fermentation Science
- Fiber and Polymer Science
- Food Biochemistry
- Food Science
- Genetics
- Geography (B.S. degree; A.B. degree—emphasis IV)
- Geology
- Mathematics
- Microbiology
- Nutrition Science
- Physical Education
- Physics
- Physiology
- Plant Biology (Botany)
- Plant Science
- Psychology
- Soil and Water Science
- Statistics
- Wildlife and Fisheries Biology
- Zoology

Approved General Education Courses
A list of the courses and course sequences that have been approved for offering under the General Education Program appears on the following page. This listing is subject to change. You should check the Class Schedule and Room Directory each quarter for the most current information.
GENERAL EDUCATION COURSES FOR 1994-95

Note: This list contains approved GE courses for the current academic year only. Please consult prior years' catalogs or the Deans' offices for the lists of courses approved in previous years. Please note that you cannot claim GE credit for a course you completed before it was an approved GE course.

### Civilization and Culture
#### Lower Division
- American Studies 1B, 1E
- Art History 1A/1AG, 1B/1BG, 1C/1CG, 1D/1DG, 252/252G
- Chinese 11
- Classics 4A, 15, 17A, 17B, 17C, 20, 50
- Comparative Literature 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 20, 25, 53B
- English 3, 4, 30A, 30B
- French 25
- German 48, 50, 52A, 52B, 52C
- History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 30, 72A, 72B
- History & Philosophy of Science 20
- Integrated Studies 2B, 2D, 3B, 3C, 8B
- Italian 50
- Landscape Architecture 40
- Linguistics 1, 50
- Medieval Studies 20A, 20B, 20C
- Music 3A-3B, 10
- Philosophy 1, 11, 13, 14, 21, 22, 23, 24, 31
- Political Science 4
- Religious Studies 3A, 3B, 3C, 21, 23, 40
- Russian 44
- Viticulture and Enology 3

### Contemporary Societies
#### Lower Division
- Agricultural Economics 15
- American Studies 1A
- Anthropology 2, 4
- Applied Behavioral Sciences 2
- Chicano Studies 40
- Economics 1A-1B
- Environmental and Resource Sciences 10-10G
- Environmental Studies 10
- Geography 2-2G, 5-5G
- History 10, 72B
- Human Development 15
- Integrated Studies 3A, 3D, 5E, 8C
- International Agricultural Development 10
- Native American Studies 10, 55
- Political Science 1, 2
- Psychology 15-16
- Religious Studies 1, 2
- Sociology 2, 3, 4, 25
- Women's Studies 50

### Civilization and Culture
#### Upper Division
- Art History 178C
- Chinese 110
- Classics 140, 141, 143, 150
- Dramatic Art 156, 157
- Education 120
- English 11B, 116, 162, 171A, 171B, 182, 184
- French 112, 113, 114
- History and Philosophy of Science 130A, 130B
- Humanities 110A
- Italian 140, 141, 142
- Landscape Architecture 140
- Medieval Studies 120A, 120D, 120E
- Music 105, 110A, 110B, 110C, 110D, 110E, 129
- Native American Studies 130A, 130B, 156, 181A, 181B, 181C
- Philosophy 101, 102, 104, 105, 107, 108, 151
- Religious Studies 141A, 141B, 141C, 142
- Rhetoric and Communication 110
- Russian 130, 131, 151, 166
- Spanish 149
- Veterinary Medicine 170

### Nature and Environment
#### Lower Division
- Agricultural Systems and Environment 1-3G
- Animal Science 1, 2, 42
- Anthropology 1, 25
- Astronomy 10
- Avian Science 11, 13
- Biological Sciences 10
- Chemistry 2A-2B, 10
- Engineering 20
- Engineering: Civil and Environmental 30
- Engineering: Computer Science 15
- Entomology 17
- Environmental and Resource Sciences 2, 3-3G
- Environmental Studies 30-30G
- Food Science and Technology 2
- Geology 1-1G, 3-3G
- Human Development 19
- Integrated Studies 1A, 1B, 8A
- Microbiology 20
- Molecular and Cellular Biology 10
- Nutrition 19-19, 20
- Philosophy 31
- Physics 10
- Plant Biology 10
- Plant Science 10
- Pomology 10
- Soil Science 10
- Statistics 10
- Viticulture and Enology 3
- Wildlife and Fisheries Biology 10

### Nature and Environment
#### Upper Division
- Agricultural Systems and Environment 121
- Anthropology 152, 153
- Atmospheric Science 100
- Engineering 160
- Engineering: Applied Science 137
- Engineering: Civil and Environmental 160
- Environmental Studies 101, 133, 161, 166
- Geography 124, 155, 170, 171
- History 165, 188B
- Linguistics 113
- Native American Studies 115, 130C, 160
- Philosophy 10B, 118
- Physics 137, 160
- Psychology 175, 177
- Russian 132
- Textiles and Clothing 107
- Veterinary Medicine 170

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1. These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.
2. This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.
3. Nutrition 10 and 11 must both be completed to satisfy the requirement for one GE course. These courses may be taken concurrently, if offered, or sequentially (10 then 11).
4. GE courses in Integrated Studies are open only to students in the Integrated Studies program.
COLLEGE REQUIREMENTS

College of Agricultural and Environmental Sciences

Unit Requirements
Of the required 180 units counted toward a degree, 54 UNITS MUST BE UPPER DIVISION WORK. In addition, the following unit limitations apply to all majors:

- Not more than 6 units can be Physical Education 1 and 6
- Not more than 20 units can be courses numbered 92, 99, 190C, 192, 197T, 197TC, or 199
- Not more than 12 units can be courses numbered 92 and/or 192 (credit will not be given for 192s taken before the completion of 84 units)
- Not more than 9 units of professional courses (numbers 300-499) may be used toward the 54 upper division units

Credit in University 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 before registering. 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.

Scholarship Requirement
Students in the College are required to attain a minimum grade point average of 2.0 for all courses specified as depth subject matter in their major. Each candidate must complete a program of study either as prescribed in (a) a major approved by the Committee on Majors and Courses and printed in this catalog, or (b) an individual major approved by the Individual Major Committee.

Residence Requirement
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 28 of these 35 quarter units may be completed in summer session courses at UC Davis.

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

1. by passing the English Composition Examination administered by the College of Letters and Science upon completion of 70 units of degree credit (the examination does not yield credit);

OR

2. by taking, before you have completed 120 units, either two courses emphasizing written expression or one course emphasizing written expression and one course emphasizing oral expression. The following UCD courses have been approved for satisfaction of this requirement:

(a) one course must be selected from English 1, 3, 20, or 103 (courses with primary emphasis in writing skills);

(b) one course selected from the courses not selected above, or from English 102, 104, Comparative Literature 1, 2, 3, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills).

General Education
You should consult your Dean's Office or department advisor in advance to determine exactly how your General Education courses will apply toward your major.

Degree Requirement Changes
On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the University, College, and major requirements in effect at the time you were registered at UC Davis. If you have transferred to UCD from a community college, state college, or university, you may follow the requirements as stated in any UCD catalog in effect either during the three years immediately preceding your transfer to Davis or at the time you first registered at that institution, whichever is most recent. Once you have chosen the year of the General Catalog under which you wish to be governed, you must satisfy all of the University, College, and major requirements specified in that catalog.

Study Plan Approval
A Study Plan provides for attainment of specific long-term goals and should allow for (a) the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters, (b) the fulfillment of College and major requirements, (c) a proper balance between the demands of the courses and your ability to master the subject matter, and (d) meeting the minimum progress regulation (see the Academic Information section).

In conjunction with a faculty adviser and/or staff adviser, you must plan and prepare a program that specifies your goals and shows how the graduation requirements will be met. It is a regulation that a written "study plan" be filed with your faculty adviser or staff adviser by the end of the second quarter of the junior year (having completed not more than 120 units either in residence and/or by transfer).

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

Major Degree Certification
A Major Certification is completed during the quarter you plan to graduate. At that time, you and your faculty adviser and/or staff adviser check to see that all major requirements have been completed. The Dean's Office completes the degree certification by verifying that all College and University requirements have been satisfied.
College of Engineering

Unit Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. Each curriculum consists of a specified Lower Division Program (or an approved equivalent program for students who transfer into the College with 84 or more quarter units) and a specified Upper Division Program. Detailed requirements for the approved curricula are given in the Programs and Courses section of this catalog.

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

<table>
<thead>
<tr>
<th>Subject Areas</th>
<th>Minimum Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (calculus, differential equations, linear algebra, vector analysis)</td>
<td>22</td>
</tr>
<tr>
<td>Physical and biological sciences (typically, at least 10 units must be in general chemistry and at least 12 units in physics courses designed for engineering and physical science students)</td>
<td>22-26</td>
</tr>
<tr>
<td>Engineering (lower division subjects such as graphics, properties of materials, surveying, computer programming, dynamics, statics, and circuit theory. These courses must include statics, dynamics, circuits and FORTRAN for all but Electrical and Computer Engineering and Computer Science majors, who must take Pascal. Students majoring in Mechanical, Aeronautical, Materials Science, Civil, Electrical or Computer Engineering, or Computer Science may have additional course requirements specific to their respective majors. Because of additional lower division chemistry requirements, Chemical Engineering majors may elect to take only 10 units of engineering in their lower division programs)</td>
<td>15-26</td>
</tr>
</tbody>
</table>

Written and oral expression  English 1 or 3, and Rhetoric and Communication 1 or 3, or courses that are their equivalents .............................................. 8

Humanities–Social Sciences (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study) .............................................. 5-12

Unspecified subjects (Chemical Engineering majors should cover quantitative analysis and one course in organic chemistry with laboratory during their sophomore year) .............................................. 7-8

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

Once you have completed the Lower Division Program and fulfilled these specified subject area requirements, you need not take additional lower division courses, except those that are prerequisite to upper division courses in your curriculum.

The minimum number of required units in the combined Lower and Upper Division Programs varies, with the curriculum, from 160 to 195.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, which are available in the Undergraduate Office, can be a valuable aid in resolving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Study Committee, a body of six professors and six (non-voting) students. A negative decision by the committee may be appealed to the College faculty for action at a regular meeting.

Credit in University Extension Courses. Appropriate courses taken through University Extension may be used for degree credit. Simultaneous registration in resident courses and Extension courses requires prior approval by the College's Associate Dean for Undergraduate Studies. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

Residence Requirement

In addition to fulfilling the University residence requirement, you must complete at least 35 of the final 45 units
characteristic of your curriculum in engineering while registered in the College.

Scholarship Requirement
In addition to meeting the University scholarship requirement, you are required to maintain a 2.0 grade point average for all engineering coursework.

English Composition Requirement (Upper Division)
After completing 70 quarter units, you may elect to satisfy the upper division English Composition requirement by passing the English Composition Examination administered by the College of Letters and Science. (You should take it early in your junior year and must take it before your last quarter. Units of credit are not given for passing this examination.)

OR,
upon completion of 84 quarter units, you may satisfy this requirement by
1. completing an English 102 adjunct to an approved upper division course in the College of Engineering with a grade of C– or higher; or
2. completing 3 units of English 104 with a grade of P (Passed).

This requirement is in addition to the expository writing course requirement (English 1 or 3, or Comparative Literature 1, 2, 3, or 4) specified in the Lower Division Programs.

During the 1994-95 academic year, the English Composition Examination will be offered on the following three Saturdays: October 29, 1994, January 28, 1995 and April 29, 1995. Sign-up rosters will be posted on the College of Letters and Science Advising Office's bulletin board, Social Sciences and Humanities Building, Monday through Thursday (or until they are filled) just preceding each Saturday examination date. You must sign up, in person, by Thursday. You must obtain the English Composition Examination form, available at the UCD Bookstore, to take the exam.

Engineering Design Requirement
Engineering design is the process of devising a system, component, or process to meet certain needs. Design involves a decision-making process (often iterative), in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. You must take at least 24 quarter units of such design coursework through a combination of required and restricted elective courses. Specific comments about design are included in individual curricula descriptions. You should also review the design content of your individual program with your adviser in the course of completing the upper division advising worksheet.

Electives
There are four kinds of elective courses in the engineering curricula: Humanities–Social Sciences, General Education, technical, and unrestricted. Transfer students have an additional set of electives: Physical and Biological Sciences electives or Mathematics/Science electives.

Humanities–Social Sciences electives: Because engineers are significant agents of social change, they must be sensitive to the human setting in which that change takes place. The Humanities–Social Sciences (HSS) electives have been selected within the engineering curricula to increase your awareness of the human and societal implications of engineering practice. The humanities include subject areas such as literature, philosophy, history, and the fine arts. The social sciences include areas such as anthropology, political science, sociology, psychology, and economics.

You must take at least 24 quarter units of coursework in the humanities and social sciences. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Foreign language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical skills. You may petition to have a non-literature course in a foreign language which is not your native language count as a humanities course. You may petition for HSS credit for 92, 98, 99, 192, 197, 198, and 199 courses in appropriate cases. If you repeat any of the courses which may be repeated for credit, not more than 4 units in any such courses can be counted toward your HSS requirement.

Your HSS electives should be designed to include a comprehensive and coherent set of courses and may, in some cases, be integrated with your General Education electives, as described in the next section. HSS electives must be selected from the following list:
Agricultural Economics 1, 100A, 100B, 120, 141, 141M, 148, 150, 175, 176
American Studies 1A, 1B, 1C, 1E, 1F, 2, 101A–H, 110, 120, 125, 130, 151, 152, 153, 154, 155
Anthropology 2, 3, 4, 20, 23, 101, 110, 112, 113, 117 through 149B, 170 through 179
Applied Behavioral Sciences 1, 2, 17, 18, 118, 140, 151 through 154, 157, 161 through 164, 170, 171, 172, 174 through 178, 190
Art History 1A, 1B, 1C, 1D, 10H, 10S, 15, 25, 150 through 188C, 190 (also Art History 1AG, 1BG, 1CG, 1DG, and 252G when taken concurrently with Art History 1A, 1B, 1C, 1D, and 25)
Asian American Studies 1, 2, 20, 100, 101, 110, 111, 112, 130, 136, 150, 155
Chicana/Chicano Studies 10, 30, 40, 50, 60, 70, 100 through 140
Chinese 10, 11, 104 through 109A-I, 110, 111 through 116, 130, 131, 132, 140, 160
Classics 4A, 10, 15, 17A, 17B, 17C, 20, 50, 140, 141, 142, 143, 150, 174, 175
Comparative Literature 1 through 53B, 120, 135 through 180
Consumer Science 100
Design 140, 142A, 142B, 143, 144
Dramatic Art 15 (but not 15L), 20, 115, 150 through 159
East Asian Studies 113
Economics 1A-1B, 100, 101, 103, 104, 105, 110A through 136B, 151A through 175
Education 110, 117, 120, 122, 123, 130, 132, 145, 153
Environmental Studies 101, 133, 160 through 162, 164 through 167, 175
French 25, 101, 102, 130, 137, 112 through 133, 140, 141, 162
Geography 2, 5, (2G, 5G when taken concurrently with 2 or 5), 6, 10, 50, 104, 120 (but not 120L), 121, 122A through 127, 131, 133, 141 through 162, 168, 170 through 173, 175
German 48, 50, 51, 52A, 52B, 52C, 106, 110 through 133, 140, 141, 142C, 160, 165, 166, 176, 185
Greek 100 through 116
History 3 through 86, 101 through 104A, 110 through 191, 191D, 193 through 196B
History and Philosophy of Science 20, 130A, 130B, 150
Human Development 15, 19, 100A through 103, 110, 130, 131, 132, 151, 160
Integrated Studies 1A, 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E, 8, 8B, 8C (Open only to students accepted to the Integrated Studies Program)
International Agricultural Development 10, 103
Italian 25, 50, 105, 107 through 145
Japanese 10, 15, 25, 101 through 106, 108, 131 through 135
Landscape Architecture 140
Latin 100 through 116, 125
Linguistics 1, 10 through 15, 50, 100, 102, 113, 115, 116, 120, 135, 138
Medieval Studies 20A, 20B, 20C, 120A-F
Military Science 21
Native American Studies 1, 10, 32, 33, 55, 70, 101 through 191
Nature and Culture 1
Nutrition 20, 118
Philosophy 1, 11, 13, 14, 17, 21, 22, 23, 24, 101 through 111, 114A through 127, 137, 143 through 177, 190
Physical Education 36A, 36B
Political Science 1 through 7, 100 through 113, 115 through 191
Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132, 135, 136 through 150, 165, 166, 171, 175, 177, 183
Religious Studies 1 through 75, 100 through 178A-E
Rhetoric and Communication 103 through 145, 152
Russian 41, 42, 44, 121 through 154, 166
Sociology 1, 2, 3, 4, 25, 107 through 185
Spanish 100, 130 through 176
Textiles and Clothing 107, 177
Women's Studies 20, 50, 70, 80, 102 through 187

General Education electives are used to satisfy a campus requirement and are chosen from the list of General Education Courses for 1994-95 given earlier in this chapter. Since all engineering majors are in the Nature and Environment GE area, you must fulfill the campus requirement by taking courses in the Civilization and Culture and Contemporary Societies areas which broadly overlap Humanities and Social Sciences, respectively.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) coursework is a College of Engineering requirement and is in addition to the campus General Education (GE) requirement of a fixed number of courses. You may satisfy the HSS and GE requirements simultaneously, provided that you take the courses that are listed on both the list of HSS courses above and the GE courses list shown earlier in this chapter. In general, a good academic strategy is to satisfy the campus GE requirement first and then to satisfy any remaining HSS requirements by taking courses from the HSS list. In this way, you can benefit from the breadth and depth of course coverage inherent in the GE program structure. (For example, courses from areas outside of your major field of study are required and you must take coursework at both the lower division and upper division levels.)

In satisfying the GE requirement, note that (a) you must take GE courses for a letter grade and (b) you must fulfill the Subject A requirement before you begin your GE coursework. In consultation with your academic adviser, you should attempt to design a comprehensive and coherent set of courses using both the HSS electives and GE electives.

Technical electives permit you to tailor a program to your own academic and career objectives. For some, the technical electives offer the opportunity to prepare for a specific occupation. For others, they offer an opportunity to broaden a background in the sciences and engineering.

You may receive technical elective credit up to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 197, 198, and 199. Academic credit for 199 courses is limited to a maximum of 5 units for each substantially different project. Academic credit for engineering internship courses (192s) is limited to a maximum of 5 units per quarter.

With the exception of the following courses, all upper division courses in engineering, physics, chemistry, mathematics, and statistics may be taken as technical electives. The courses which may not be used are:

- Applied Science Engineering 137 (restricted to one unit of technical elective)
- Physics 137 and 160 (restricted to one unit of technical elective), 194H, 195, 197T, 196, 199
- Chemistry 194H, 197, 198, 199
- Engineering 160 (restricted to one unit of technical elective)
- Mathematics 192, 197TC, 198, 199
- Statistics 102

In addition to engineering, physics, chemistry, mathematics, and statistics courses, the following courses may be taken as technical electives:

- Agricultural Economics 100A, 100B, 113, 118A, 118B, 120, 147, 148, 155, 157, 171A, 171B, 175, 176
- Animal Science 41, 41L, 104, 105
- Applied Biological Systems Technology 161, 163
- Art Studio 121A
- Atmospheric Science 121A, 121B, 124, 128, 133, 149, 158
- Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, 120, 120P, 121, 121P, 122, 122P
- Chemistry 2C, 2CH, 8A, 8B

Bachelor's Degree Requirements
College of Engineering
Unrestricted electives. You may count any course for which University credit is allowed as an unrestricted elective in the engineering curricula.

Physical and Biological Science electives. Engineering students are required to have 26 units in physical and biological sciences, typically 10 units of chemistry and 16 units of physics. Students who transfer into the College of Engineering with advanced standing are required to complete 26 units of physical and biological science by graduation, but need only have completed 5-10 units of chemistry (depending on major) and 12 units of physics by the time of transfer. Transfer students may make up the remaining 4 units by taking 4 additional units of chemistry, 4 additional units of physics, or 4 units in courses selected from any of the curricula listed below, with the restrictions that follow.

Atmospheric Science
Biological Science
Chemistry
Evolution and Ecology
Geology
Microbiology
Molecular and Cellular Biology
Neurobiology, Physiology, and Behavior
Physics
Plant Biology

All courses in these departments numbered 10 and 190-199 are excluded for credit, as are the following courses:

Evolution and Ecology 138
Geology 1-1G, 3-3G, 43, 113-113G, 116-116G, 131, 135, 144
Microbiology 20
Physics 137, 160
Plant Biology 191

Electrical Engineering and Computer Engineering students should also use this list to identify the courses to satisfy the mathematics/science electives. To identify additional courses that may also satisfy this requirement, please refer to the Electrical Engineering and Computer Engineering curricula outlines.

Degree Requirement Statements

Since engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. To ensure that you benefit from these changes, the College of Engineering has established a policy that you must fulfill the degree requirements stated in the catalog for the year in which you complete degree work or in the catalog for the year immediately preceding.

Degree Check

Use the Degree Requirement Check sheets for each of the curricula for monitoring your progress toward a degree. The Undergraduate Office will prepare only one unofficial degree check for you (preferably at the end of your junior year). To have this degree check prepared, submit a signed Degree Check Request and request an appointment. You can get further information concerning this service and the forms for requesting a degree check in the Engineering Undergraduate Office.
College of Letters and Science

Unit Requirements

A minimum of 180 units is required for the bachelor's degree. Of these units, 64 must be upper division units which include 48 units from Letters and Science teaching departments and programs. For the A.B. degree, a minimum of 12 of 48 units of upper division Letters and Science courses must be from outside the major department or program (see Area Requirement, A.B. degree entry, in this section for exceptions). All upper division General Education courses will be accepted in satisfaction of this latter requirement. Nonstandard courses (see Area Requirement, A.B. degree entry, in this section) do not count toward these 12 units.

Registration Beyond the 225-unit Limit. You are normally expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed (excluding units awarded for College Board Advanced Placement Examinations), you may register only with the permission of the dean. Such permission is only rarely granted, and then typically only to allow completion of minimum degree requirements. You will be expected to adhere to a program of courses agreed upon and to meet other conditions that may have been set. Approval must be obtained before you will be permitted to register for courses for the quarter following completion of 225 or more units.

If you are in good standing, you will be able to complete 12 quarters or the equivalent (e.g., four years) of college work even if you have earned more than 225 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.

Unit Credit Limitations

For certain courses, limits have been established on the number of units that can be counted towards the 180-unit minimum required for the degree. To avoid discovering just before graduation that you are short units, keep track of the number of units you have taken in each of the following categories.

Limitation on Credit for Graduate and Professional Courses. Undergraduates may enroll in graduate and professional courses in the 200, 300, and 400 series subject to the restrictions described in the Academic Information section in this catalog. Graduate and professional courses that have been completed will be listed on the student's transcript in the usual manner. However, the units earned may be counted toward degree requirements only under the conditions listed below.

Within the limitations A, B, and C given below, undergraduate students in the College may count an unlimited number of units in graduate 200 series courses and up to a combined total of 9 units in 300 and 400 series professional courses toward degree requirements. These units, however, are not counted as upper division units unless this is granted by petition to the dean.

A. The recommendations of the instructor in the course and the department chairperson—in addition to approval from the dean—must be obtained by petition in order to receive credit toward the degree for the following kinds of courses:

- all graduate courses 200–298 whether offered by a department or program outside of or within the College of Letters and Science
- all professional courses 300–398 for teachers offered outside of the College of Letters and Science
- all postgraduate professional courses 400–498 offered outside of the College of Letters and Science
- all variable unit courses 300–398 and 400–498 offered within the College of Letters and Science

B. The minimum eligibility conditions for an undergraduate student in the College to petition for degree credit for a 200, 300, or 400 series course are a UC grade point average of 3.3 and completion of 18 upper division units basic to the subject matter of the course. These eligibility conditions may be waived, however, upon the recommendation of the course instructor and concurrence of the department chairperson if the student's preparation warrants exception.

C. Undergraduates in the College cannot receive degree credit for special study courses 299, 399, or 499.

Limitation on Credit for Units Graded P. Excluding courses that are graded on a Passed/Not Passed (P/np) basis only, the number of units graded P that may be accepted towards a degree in the College of Letters and Science is limited to not more than one fourth of the units completed in residence on the 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.

Limitation on Credit for University Extension Courses. Students may apply credit earned in University Extension courses toward the 180-unit requirement only when written approval has been obtained from the dean before registration. 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 Residence requirements of the College. No grade points are assigned for courses completed in University Extension.

Other Unit Credit Limitations. The following are additional courses that have limits on the number of units that can be counted toward your degree.

Internship courses (numbers 92, 192): 12 units maximum including internship units taken at other institutions. (See under Nonstandard courses below.)

Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses): 30 units maximum or one-sixth of the units taken at UCD, whichever is the smaller. (Note the separate unit limits on internship, special study, and tutoring courses; and major limitations.)

Physical Education 1: 6 units maximum.
Special Study courses (99, 194H, 199): 5 units maximum in any one quarter. (See under Nonstandard courses above.)

Tutoring courses (97T, 97TC, 197T, 197TC): 10 units maximum. (See under Nonstandard courses above.)

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. (Work completed while registered in the Education Abroad Program does not satisfy campus or College Residence requirements.)

Scholarship Requirement
The minimum grade point average to satisfy the scholarship requirement is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. Only grades earned in courses taken at UCD will be included in the grade point computations. To obtain these minimal averages in the major, you may repeat courses that are graded D or F. If you have to repeat a course more than once, you need the dean's approval.

English Composition Requirement
The English Composition requirement can be met in one of two ways:
1. by passing the English Composition Examination upon completion of 70 units of degree credit (the examination does not yield credit);

OR
2. by completing with a grade of C- (or P) or better
   a. one course in English composition from English 1, 3, 20, Comparative Literature 1, 2, or 3;
      and
   b. English 102 or 103 (which must be taken after 84 units have been completed).

Transfer Courses in English Composition. Transfer courses considered by the dean to be equivalent or comparable to English 1, 3, 20, 103A-G, or Comparative Literature 1, 2, 3 will be accepted toward satisfaction of the English Composition requirement. Note that English 103 or the equivalent must be taken after you have completed 84 units of transferable degree credit.

If your transfer work does not include an acceptable English composition course taken after you had completed or accumulated 84 units, you may fulfill the requirement by examination (see below) or take English 102 or 103 at UC Davis.

English Composition Examination. This academic year, the no-fee examination will be offered on the following Saturday mornings:

   October 29, 1994
   January 28, 1995
   April 29, 1995

There are no examinations administered during the summer.

Sign-up rosters will be posted on the College of Letters and Science Advising Office's bulletin board.

Social Sciences and Humanities Building, Monday through Thursday (or until filled) just before each Saturday examination date.

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

Area (Breadth) Requirement
The College Breadth Requirement promotes the intellectual growth of students by asking them to acquire a broader background of knowledge than is provided by the usual major. The Breadth requirement also guides students in exploring the interdependence of knowledge and, in the case of the A.B. degree, provides students the opportunity to become acquainted with performance in the fine arts.

A.B. degree—satisfaction of the campus General Education requirements plus completion of one of the following options:

a. a "Mini Minor" consisting of a minimum of three approved upper division courses in a single Letters and Science department or program other than the major (and which are not offered in satisfaction of major requirements);

OR

b. a minimum of three approved lower or upper division courses in Art, Music, or Dramatic Art from outside the student's major;

OR

c. a certified minor from any UC Davis college or program.

The Letters and Science faculty believes that the completion of a certified minor is often the best way for a
student to obtain structure and coherence in pursuit of intellectual breadth.

For the purposes of options a and b above, all courses are considered as approved except: courses bearing less than 3 units of credit, internship courses, non-standard courses, directed group study courses, and courses used to satisfy the College English Composition Requirement.

Twelve units of upper division courses must be completed in Letters and Science teaching departments other than the major department or program. Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the 12-unit requirement. Not more than 10 units in special study courses (194H, 199) may be counted.

B.S. degree—a total of 90 units in natural sciences/mathematics; and satisfaction of the General Education requirement.

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the natural sciences/mathematics Area requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirements. Courses used to satisfy the English Composition and Foreign Language requirements may not be counted toward the area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling the 90-unit natural sciences/mathematics area requirement are as follows:

Natural Sciences and Mathematics

Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158
Astronomy
Avian Sciences 13
Biological Sciences: All courses except 19
Chemistry
Engineering 20
Engineering: Civil and Environmental 30
Engineering: Computer Science 10, 30, 40, 100, 110, 120, 122A, 140A, 170
Engineering: Electrical and Computer 170
Entomology 10, 100
Environmental and Resource Sciences 2, 131
Environmental Studies 30
Evolution and Ecology
Fiber and Polymer Science 110
Food Science and Technology 2
Geography 1, 3, 102, 108, 110, 112, 115, 116, 117, 118, 162
Geology
Human Anatomy 101
Integrated Studies 1A, 1B, 8A
Mathematics
Microbiology
Molecular and Cellular Biology
Neurobiology, Physiology and Behavior
Nutrition 10
Physical Education 101, 102, 103, 110, 111, 112, 113, 115
Physics
Plant Biology
Statistics
Wildlife and Fisheries Biology 10

Foreign Language Requirement (A.B. and B.A.S. degrees)

A.B. and B.A.S. degrees—15-unit level or the equivalent in one language.

B.S. degree—none.

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 (including American Sign Language).

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. Plan to complete the Foreign Language Requirement 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.

The Foreign Language requirement may be satisfied by examination or completion of language courses as follows:

1. Foreign Language Placement Test. This test does not yield unit credit—it only determines whether the Foreign Language requirement has been met, or at which point in the language sequence you should enroll.

You may validate your knowledge of a language learned in high school by taking this test. A test may not be taken, however, in a language for which you have already received degree credit. If you are a transfer student, consult your Status Card, which is issued by the Dean's Office within a quarter after admission.

2. College Board Achievement Test. Earning a qualifying score of at least 550 on a College Board Foreign Language Achievement Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at the Undergraduate Admissions Office, notify the Letters and Science Dean's Office so that satisfaction of the College requirement can be noted on your record.

3. College Board Advanced Placement Examination. A score of 5, 4, or 3 on any foreign language College Board Advanced Placement Examination, with the exception of Latin, taken in high school will satisfy the Foreign Language requirement.

4. Course Completion in College (or the equivalent). A.B. degree—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S. degree—as required in the major program.

If you have successfully completed (C- or better) the second or third year of a language in the tenth or higher grade in high school you may receive unit credit for course 1 of that language on a P/NP grading basis only. Although a passing or nonpassing grade will be
charged to your P/NP option, no petition is required. [See "Passed/Not Passed (P/NP) Grading" in the Academic Information section.]

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.

Major Program Requirements
Requirements for major programs are described in the Programs and Courses section of this catalog. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see the list of majors) or an individual major program approved by the College’s Committee on Individual Majors.

No more than 6 units in internship courses (numbered 92, 192, or similar internship courses), may be accepted in satisfaction of the requirements of major programs. Courses numbered 97T, 97TC, 197T, and 197TC do not satisfy unit or course requirements in the major.

Change in Requirements
On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the University and College requirements (see General Education requirement for an exception) as stated in any UCD General Catalog in effect at any time you were registered in a postsec-

ondary institution of higher education (i.e., community college, college, or university). Once you have chosen the year of the General Catalog under which you wish to be governed, you must satisfy all of the University and College requirements specified in that catalog.

With respect to the completion of your major requirements, most of the majors in the College of Letters and Science require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.

Degree Check
Before the beginning of your senior year, take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and to ensure that you get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements remain unsatisfied. To help you in these efforts, the Letters and Science Advising Office provides informational materials and instructions on how to evaluate your progress on College and University requirements. You should also obtain a check of major requirements from your faculty adviser.

Once you have completed 135 units of degree credit, you should contact the Letters and Science Advising Office and your faculty adviser for a degree check. The Letters and Science Advising Office will provide each student with one official degree check summarizing your progress in fulfilling College and University requirements. You may request this degree check any time during your final four regular quarters of registration before graduation.
UC Davis offers advanced degrees in more than 70 graduate programs. Students’ graduate study is guided by either departments or graduate groups. Graduate groups are composed of individual faculty members with similar disciplinary or research interests. The group structure, used extensively at Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students flexibility and breadth by crossing the administrative boundaries of the various departments, colleges, schools and sometimes campuses. In keeping with UCD’s progressive spirit, the group structure also allows for expansion of established degree programs and facilitates the development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups. You will find a list of the graduate degrees available at UC Davis in the front of this catalog.

Graduate study is administered by the Graduate Council, a standing committee of the Davis Division of the Academic Senate, and by the dean of Graduate Studies. A Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

PREPARING FOR AN ADVANCED DEGREE

Admission to a graduate program at the University of California requires a bachelor’s degree that is comparable to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by Universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, portfolios, or examples of written work to assist in selecting from among

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**DEADLINES**

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<td>Deadline for filing applications for admission to graduate standing, with complete credentials, with the Dean of Graduate Studies</td>
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<td>United States residents</td>
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<td>International students</td>
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<td>Deadline for students who expect to complete work for master’s degrees to file applications for candidacy with the Dean of Graduate Studies</td>
<td>Sept. 23</td>
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<td>Feb. 24</td>
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<td>Deadline for candidates for master’s degrees to file theses with the committee in charge</td>
<td>Nov. 1</td>
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<td>Deadline for candidates for master’s degrees to file theses with the Dean of Graduate Studies</td>
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<tr>
<td>Deadline for candidates for master’s degrees to file final report on comprehensive examination with the Dean of Graduate Studies</td>
<td>Dec. 16</td>
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<td>Deadline for students who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the Dean of Graduate Studies</td>
<td>Aug. 12</td>
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<td>Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Engineering to file theses with the committee in charge</td>
<td>Oct. 3</td>
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<td>Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Engineering to file theses with the Dean of Graduate Studies</td>
<td>Nov. 30</td>
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qualified applicants. Admission to graduate study is limited by the number of spaces available in major programs. Not all eligible applicants can be admitted.

UC Davis is committed to maintaining excellence, preserving fairness, and promoting diversity in its student population. In addition to an applicant's past scholastic achievement, admissions criteria include an applicant's potential for service in the field, keeping in mind the needs of our society and of underrepresented and disadvantaged communities. Criteria also attempt to take into account any prior disadvantages applicants have experienced that may bear on future achievements and services.

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

**These are the proposed fees for the 1994-95 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.**

**Graduate Student Fees**
University Registration Fee* ....................... $239.00
Memorial Union Fee ................................ 28.50
Graduate Student Association Fee ............... 6.50
Health Insurance Fee ............................. 142.50
Educational Fee** .................................. 1121.00
**Total for California residents** ............... $1,537.50
Tuition for nonresidents .......................... 2,566.00
**Total for nonresidents** ......................... $4,103.50

* University Registration Fee = $237.00 in winter and spring quarters.
 ** Educational Fee = $1120.00 in winter and spring quarters.

Graduate students must purchase the Graduate Student Health Insurance Plan unless they are able to prove comparable coverage under another plan.

The Graduate Student Association Fee is optional for students in the Schools of Law, Medicine, and Veterinary Medicine. Law students are required to pay a Law Student Association Fee of $6.00 per semester.

APPLYING FOR ADMISSION
Applications normally are accepted for fall quarter only. Combined admission and fellowship application forms are available from Graduate Studies, University of California, Davis, CA 95616. You should begin the application process as early as possible in the academic year, since many programs have early deadlines. In addition, your chances for employment as a teaching or research assistant or of receiving financial support are greatly enhanced by applying early. The application deadline is April 1, unless otherwise indicated by the program, or until your proposed graduate program is full, whichever occurs first.

The completed application form, along with the $40 nonrefundable application fee and official transcripts from each college and university you have attended, must be sent directly to Graduate Studies. Supplemental application materials required by the graduate program must be sent directly to the graduate adviser for that program.

When all application materials have been received by Graduate Studies, they will be forwarded to your proposed major program where they will be evaluated along with the supplemental materials you have sent to the program adviser. The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to Graduate Studies; final admission decisions rest with the dean of Graduate Studies. This approval procedure applies to all applicants, including those seeking a transfer to UC Davis from another UC campus.

Applications for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, Master of Business Administration, and Master of Preventive Veterinary Medicine must be filed directly with the appropriate professional school.

Readmission
If you were formerly registered at UCD as a graduate student and wish to return to the same degree program and major, you must apply for readmission and pay the readmission application fee of $40. The readmission application must be filed with Graduate Studies at least eight weeks before the beginning of the fall quarter (see the Academic Calendar at the front of this catalog). Readmission to quarters other than fall is granted on an exception basis by special petition to the dean of Graduate Studies. If you are seeking to return to a new degree program and/or new major, you must apply for admission along with other new applicants. Obtain an application from the Graduate Studies Office. Transcripts of all work undertaken since you were last registered in graduate status at Davis must be presented with the application. (There is no assurance of reentry, as applicants for readmission will be considered in competition with other applicants for the program.)

International Students
Assessment of a foreign degree is based on the characteristics of the national system of education, the type of institution attended, and the level of study completed. If you are an international student with credentials from universities outside the U.S., you should begin the application process as early as a year in advance. Official copies or certified copies of all transcripts in English and in the original language are required before your application can be processed. Completed applications along with the nonrefundable $40 application fee must be received from international students by March 1, unless your proposed program has an earlier deadline.

English Requirement. If English is not your native language and you have not studied at an institution where English was the language of instruction, you will be required to demonstrate proficiency in English by submitting your test scores from the Test of English as a Foreign Language (TOEFL). This test is given six times each year by the Educational Testing Service, CN6151, Princeton, NJ 08541-6151. The minimum score required for admission to graduate study at UC Davis is 550.

Visas. If you need a certificate of eligibility for a student visa issued by UC Davis, you will be required to complete a certification of finances form showing the availability of sufficient funding for your graduate program (see under "International Student Services" in the
Academic Advising section for complete details. No financial aid of any kind (grants, loans, fellowships, scholarships, or work-study awards) is available to international students during their first year of registration at UC Davis.

PROGRAM OF STUDY

New students are assigned an adviser within the appropriate department or graduate group who assists them in planning a program of study. The program will depend to some degree on the student's undergraduate training and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as published in the Graduate Program Directory, or as documented by the program. 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.

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 Graduate Studies, 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 12 concurrent units, or up to one half of the unit requirement if the courses were taken at another campus of the University—providing the units were not used to satisfy requirements for another degree.

A master's degree may be awarded upon completion of one of two basic plans in which either a thesis or a comprehensive examination is required.

Ph.D. Degree

The Doctor of Philosophy degree, as granted at the University of California, means that the recipient possesses knowledge of a broad field of learning and has given evidence of distinguished attainment in that field; it is a warrant of critical ability and powers of imagination and synthesis. It means, too, that the candidate has presented a dissertation containing an original contribution to the knowledge of the chosen field of study.

Students working toward a doctorate must be registered and in University residence for a minimum of six regular quarters. Experience indicates that it takes considerably longer than this to complete a degree program. Two consecutive regular Summer Sessions may count as the equivalent of one regular quarter.

There is no University unit requirement for the doctoral degree. However, individual programs have course requirements that must be completed before admission to the qualifying examination.

The qualifying examination is administered by a committee appointed by the dean of Graduate Studies. The examination is intended to demonstrate critical thinking ability, powers of imagination and synthesis, and broad knowledge of the field of study. Upon recommendation of the Qualifying Examination Committee, and with the approval of the Graduate Council, the examination may be repeated one time.

After successful completion of the Qualifying Examination, the student must file for Advancement to Candidacy for the degree. At this time, a committee is appointed to direct the research problem and guide in the preparation of the dissertation.

Graduate students in certain Ph.D. programs may participate in a Designated Emphasis, a specialization that might include a new method of inquiry or an important field of application which is related to two or more existing Ph.D. programs. The Designated Emphasis is awarded in conjunction with the Ph.D. degree and is signified by a transcript designation; for example, "Ph.D. in History with a Designated Emphasis in Critical Theory." Programs approved as Designated Emphases include: Feminist Theory and Research; International Nutrition; Computational Science; Critical Theory; Economy, Justice and Society; Native American Studies; and Social Theory and Comparative History.

INTERCAMPUS EXCHANGE PROGRAM

A graduate student registered on any campus of the University may become an intercampus exchange student with the approval of the graduate adviser, the chairperson of the department or group on the host campus, and the dean of Graduate Studies on both the home and the host campuses.

An intercampus exchange student has library, health service, and other student privileges on the host campus, but is considered a graduate student in residence on the home campus. The grades obtained in courses on the host campus are transferred to the home campus and entered on the student's official graduate transcript.

Application forms may be obtained at the Office of the Dean of Graduate Studies and should be submitted six weeks before the beginning of the quarter in which you wish to participate in the program.

FELLOWSHIPS, ASSISTANTSHIPS, AND LOANS

Fellowships are awarded on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants for admission who 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 grad-
GRADUATE CERTIFICATE PROGRAM FOR ENGINEERS

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of coursework 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:
1. 15 or 16 units of specified graduate coursework, or a combination of specified graduate and undergraduate coursework
2. Admission to Graduate Studies

Further information on the Graduate Certificate Program may be found in the College of Engineering Bulletin.

TEACHER CREDENTIAL PROGRAMS

The Division of Education offers programs for students interested in becoming elementary or secondary teachers. The elementary education program prepares you to teach all the subjects commonly taught in an elementary classroom. In addition, it offers the option of receiving in-depth training for teaching in a bilingual (Spanish) or English as a Second Language classroom. The secondary education program is designed to prepare teachers who will work in grades 7 through 12 in the following areas: agriculture, English, foreign language, (Spanish), physical and life science, math, music, phys-
To apply you need to have done the following:

- completed a bachelor's degree,
- completed most of the required course work in the area you want to teach, or have taken a National Teacher Exam (NTE) in the area you want to teach,
- taken the California Basic Education Skill Test (CBEST),
- worked with school-age children, and
- met Graduate Studies minimum GPA requirement (3.0).

There are additional requirements that we encourage you to take as undergraduates. Information is available in the Student Services Office, 2078 Academic Surge, 916-752-0758.

The teaching credential program starts in the fall quarter only and is nine months long. It is a full-time professional program with a rigorous schedule. Student teachers are in classrooms in the morning and early afternoon and back on campus in the afternoon and evening for coursework. The student teaching assignments generally are in the following communities: Davis, Winters, Woodland, Dixon, Vacaville, Fairfield, Sacramento, and West Sacramento. Student teachers are required to participate in the schools in the role of a regularly credentialled teacher. A typical course schedule follows:

student teaching

  teaching methods courses [on how to teach your subject area(s) and grade level(s)]
  reading methods course
  computer education course
  health education course
  special education course

Upon satisfactory completion of all requirements, you will be recommended to receive a California teaching credential.

Applications and filing deadlines should be obtained from the Division of Education, 2078 Academic Surge, University of California, Davis, CA 95616-8579 or the Department of Applied Behavioral Sciences (agricultural education), Hart Hall, University of California, Davis, CA 95616-8523.

The teacher education program is also available to upper division students who have a 3.3 GPA and room in their schedule for a full-time teaching program. Satisfactory completion of your degree and the credential program would entitle you to a nonrenewable preliminary credential. Within five years you must complete a graduate year of study to be eligible for an additional credential. Specific requirements may be obtained from the Student Services staff in the Division of Education.

Students considering teaching as a career should consult the Division of Education or the Department of Applied Behavioral Sciences as early as their freshman year. Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.

PROGRAM IN COLLEGE TEACHING

The Program in College Teaching provides graduate students interested in college and university teaching the opportunity to improve their teaching skills and gain familiarity with a wide range of issues important to a faculty career. The program focuses on teaching in the participant's own discipline area. Direction and instruction are predominantly provided by a faculty mentor selected by the participant. Successful participants earn a certificate of completion and an appropriate annotation is added to their University transcripts. They also have the opportunity to construct a well-developed teaching portfolio for prospective employers.

The heart of the program is co-teaching with a faculty mentor. Many participants choose UC Davis faculty members as their mentors and do their teaching on the Davis campus. Participants considering a career at a community college or at a four-year teaching college are encouraged to find faculty mentors and teaching opportunities at cooperating colleges nearby, thereby developing contacts and references at institutions similar to those at which they intend to eventually teach. Participants also complete individualized learning contracts and attend regularly scheduled "Teaching Roundtables."

The Program in College Teaching is administered through the Office of Graduate Studies and the Teaching Resources Center. The program begins in late spring quarter, lasts until the end of the following spring quarter, and is designed to fit into the student's existing schedule. Further information may be obtained from the Teaching Resources Center, 17 Wellman Hall, University of California, Davis, Davis, CA 95616-8717.
The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. In addition to the traditional professional curriculum, the School provides professional skills training in interviewing and counseling, negotiation and dispute resolution, and trial practice. It also offers opportunities for practical experience through clinical programs and for in-depth study of an area of law in an individualized program of classroom work, research, writing, or experience in the community. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

The School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools, and has a chapter of the Order of the Coif.

**PREPARATION FOR THE STUDY OF LAW**

No specific college major is required for admission to the School of Law, and there is no prescribed pre-legal program. Your college record and Law School Admission Test (LSAT) score must, of course, demonstrate that you are highly qualified for the study of law.

As a pre-law student, you should plan a course of study that will give you a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Pre-law students should develop the ability to think critically. They should gain an understanding of people and institutions and know how to gather and weigh facts, to solve problems, and think creatively. They should be able to read rapidly with comprehension, and express themselves clearly, completely, and concisely, both orally and in writing.

Assistance in program planning may be obtained from the Pre-Law Advising Office, South Hall, 916-752-3009.

For additional information, see the *Official Guide to U.S. Law Schools*, published annually and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law school, and the study of law, together with individualized information on all ABA approved law schools. It may be found at college bookstores or ordered from Law Services, Box 2400, Newtown, PA 18940-0977.

**FEES**

At the time of registration each semester, every student must pay the following fees.

*These are the proposed fees for the 1994-95 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.*

**Law School Fees—Entering Students**

- University Registration Fee .................................................. $356.50
- Memorial Union Fee ......................................................... 42.75
- Law Student Association Fee .............................................. 8.00

**Health Insurance Fee** ...................................................... 193.75

**Educational Fee** .......................................................... 1,680.50

**Professional School Fee** .................................................. 1,188.00

**Total for California residents** ......................................... $3,489.50

**Tuition for nonresidents** ................................................ $3,489.50

**Total for nonresidents** .................................................. $7,339.00

**Law School Fees—Continuing Students**

- University Registration Fee .................................................. $356.50
- Memorial Union Fee ......................................................... 42.75
- Law Student Association Fee .............................................. 8.00
- Health Insurance Fee ......................................................... 213.75
- Educational Fee .......................................................... 1,680.50
- Professional School Fee .................................................. 188.00

**Total for California residents** ......................................... $2,489.50

**Tuition for nonresidents** ................................................ $3,489.50

**Total for nonresidents** .................................................. $6,339.00

*Continuing students are those who were enrolled spring quarter 1994. PELP students are considered continuing students. Students who withdraw and later apply and are accepted as re-admitted students are considered new (entering) students. Entering students are those who were not previously enrolled in the School of Law.

**Students must purchase the Graduate Student Health Plan unless they are able to prove comparable coverage under another plan."

**APPLYING FOR ADMISSION**

**February 1** Deadline for filing applications for admission for 1995-96 to the School of Law

1. Request application forms and the School catalog from the Office of Admissions, School of Law, University of California, Davis, CA 95616-5201. *Return your completed application to that office, plus a $40 non-refundable 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 (LSAS) report, letters of recommendation, and certification of the year in which admission is sought. Early filing of all application materials is strongly recommended and will materially assist the School of Law Admissions Committee in its considerations. Applications postmarked after February 1 will be returned to the applicant.

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 no later than December preceding the year in which admission is sought.

Testing centers are located in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, October, and December. The completed test application blank, accompanied by the required fee, must be postmarked at least 30 days before the date of the test to ensure that you will be registered for that test date.

To obtain application forms, information about the test, specific test dates, and the location of testing centers, write to: Law Services, Box 2000, 661 Penn Street, Newtown, PA 18940-0998. The information booklet is also available in the Law School Admission Office and the Pre-Law Advising Office on campus.
3. Register with the LSDAS no later than December 1 by completing and mailing the registration form supplied in each LSAT information book. Have a transcript from each college or university you have attended sent directly to Law Services, Box 2700, 661 Penn Street, Newtown, PA 18940-0978.

4. Submit an official transcript of college work completed during the first semester or quarter of your senior year directly to the School of Law as soon as it is available. Failure to do so may delay consideration of your application materials. Successful applicants must submit directly to the School of Law a final transcript showing the award of a bachelor’s degree.

5. Provide two letters of recommendation from objective and responsible persons to whom you are well known. At least one of these letters should come from a faculty member under whom you studied while in college. These letters of recommendation should be enclosed in sealed envelopes, the recommender must sign across the seal, and the letters should be submitted along with the application for admission; or they may be sent directly from a college placement center, career center, or college pre-law office. Your application cannot be considered until two letters have been received.

Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by LSAT scores and the undergraduate grade point average (GPA). The committee seeks students of diverse backgrounds and considers ethnic and economic factors, advanced degrees or other advanced studies, significant work experience, and extracurricular and community activities during and after the college years. An applicant’s growth, maturity, and commitment to the study of law are also major considerations.

Students are admitted only on a full-time basis and only in August.

6. When accepted by the School of Law, you are simultaneously admitted to Graduate Studies on the Davis campus of the University for the program leading to the degree of Juris Doctor. If you intend to pursue studies leading to other graduate degrees, or wish to become a candidate for a Combined Degree Program (see below), you must make separate application to Graduate Studies before commencing such studies.

Admission to Advanced Standing

If you have completed at least one year of work in another approved law school, you may be considered for admission to advanced standing with credit for not more than one year of such work. The applications filing period is June 1–30. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

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

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

Recruitment of Underrepresented Groups

The students and faculty of the UCD School of Law recognize the great need for lawyers from under-
represented groups. The School, therefore, actively solicits applications from Asian, African American, Hispanic, American Indian, Filipino, and other underrepresented students.

The School of Law, in cooperation with the Association of American Law Schools (AALS) and the Council on Legal Education Opportunity (CLEO), participates in programs designed to increase the number of law students from underrepresented groups. CLEO applications may be obtained by writing to: Council on Legal Education Opportunity, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Scholarships for Indian and Alaskan natives are available from American Indian Graduate Center, 4520 Montgomery Blvd., N.E., Suite 1B, Albuquerque, New Mexico 87109, (505) 881-4584. Applicants must be members of federally recognized Indian tribes or Alaskan native villages and must demonstrate need. The deadline for the fall term is April 30.

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, 182 2nd Street, 2nd Floor, San Francisco, CA 94104.

PROGRAM OF STUDY

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

After satisfactorily completing the professional curriculum of 88 semester units, and the required period of residency, you will receive the degree of Juris Doctor.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, prerequisite to second- and third-year courses. The work of the second and third years is elective. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

The courses of the professional curriculum are listed in the Programs and Courses section of this catalog.

Combined Degree Programs

Students with interests in areas such as anti-trust, business, labor law, criminal law, or environmental law, may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. In order to encourage this kind of study, the School, in conjunction with other schools and University departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. In some instances it may be possible to work on a Ph.D. degree as well.

Normally, a Combined Degree Program will take at least four years. You will usually be able to earn up to 10 semester-hours of law school credit for work in the related discipline and normally 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, coursework 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 UCD departments for the M.A. degree in economics and sociology, and with the School of Management for the M.B.A. degree. The Law School will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time before the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should notify the School of Law if that application is accepted.

SCHOOL OF LAW CALENDAR

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

Academic Calendar 1994-95

<table>
<thead>
<tr>
<th>FALL 1994</th>
<th>SPRING 1995*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-year Introductory Program</td>
<td>Mon-Fri, Aug 15-19</td>
</tr>
<tr>
<td>Law School instruction begins</td>
<td>Mon, Aug 22, Mon, Jan 9</td>
</tr>
<tr>
<td>Labor Day holiday</td>
<td>Mon, Sept 5</td>
</tr>
<tr>
<td>Thanksgiving holiday period</td>
<td>Thurs-Fri, Nov 24-25</td>
</tr>
<tr>
<td>Martin Luther King, Jr. holiday</td>
<td>Mon, Jan 16</td>
</tr>
<tr>
<td>President's Day holiday</td>
<td>Mon, Feb 20</td>
</tr>
<tr>
<td>Spring recess</td>
<td>Mon-Fri, Mar 27-31</td>
</tr>
<tr>
<td>Law School instruction ends</td>
<td>Fri, April 26</td>
</tr>
<tr>
<td>Reading period</td>
<td>Sat-Thurs, April 29-May 4</td>
</tr>
<tr>
<td>Law School examination period</td>
<td>Fri, May 5-19</td>
</tr>
<tr>
<td>Last day of semester</td>
<td>Fri, May 19</td>
</tr>
<tr>
<td>Law School Commencement</td>
<td>Sat, May 20</td>
</tr>
</tbody>
</table>

*Today, February 24 is treated as a Monday for class schedule purposes.
The Graduate School of Management offers a full-time, two-year program leading to the Master of Business Administration degree. The program provides both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made. Successful completion requires not only a sophisticated understanding of a variety of functional skills in finance, marketing, production, program evaluation and accounting, but also an understanding of computers, information systems and the application of scientific methods to the identification and solution of management problems.

PREPARATION FOR THE STUDY OF MANAGEMENT

A bachelor’s degree and a strong interest in professional management are prerequisites for admission to the Graduate School of Management. The school seeks students from diverse professional and academic backgrounds and does not limit its consideration to applicants from any particular category of majors. Entry-level and mid-career applicants are considered, and women and minorities are encouraged to apply.

Although the program has no specific subject prerequisites, it is strongly recommended that students complete the following coursework before enrollment in the program:

Accounting—introductory course which discusses basic concepts.

Economics—introductory courses in micro- and macro-economics, and one upper division course in micro-economics.

English—a business communication course.

Mathematics—an introductory course in calculus.

Statistics—one course in elementary statistics.

FEES

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

These are the proposed fees for the 1994-95 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.

Graduate School of Management Fees—Entering Students*

<table>
<thead>
<tr>
<th>Fee</th>
<th>Amount</th>
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<tbody>
<tr>
<td>University Registration Fee**</td>
<td>$239.00</td>
</tr>
<tr>
<td>Memorial Union Fee</td>
<td>$28.50</td>
</tr>
<tr>
<td>Health Insurance Fee*</td>
<td>$142.50</td>
</tr>
<tr>
<td>Educational Fee†</td>
<td>$1,121.00</td>
</tr>
<tr>
<td>Professional School Fee§</td>
<td>$668.00</td>
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<td><strong>Total for California residents</strong></td>
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<tr>
<td>Tuition for nonresidents</td>
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<tr>
<td>Total for nonresidents</td>
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Graduate School of Management Fees—Continuing Students*

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*Continuing students are those who were enrolled spring quarter 1994. PELP students are considered continuing students. Entering students are those who were not previously enrolled in the School of Management. Students who withdraw and later apply and are accepted as re-admitted students are considered new (entering) students.

** University Registration Fee = $237.00 in winter and spring quarters.
† Students must purchase the Graduate Student Health Plan unless they are able to prove comparable coverage under another plan.
‡ Educational Fee = $1,120.00 in winter and spring quarters.
§ Professional School Fee = $668.00 in winter and spring quarters.

APPLYING FOR ADMISSION

April 1 Deadline for filing applications for admission for 1995-96 to the School of Management

Admission is for the fall quarter only. Application materials may be obtained from the Graduate School of Management, University of California, Davis, CA 95616. Complete and return your application, with all supporting documents, by April 1: The application fee is $40.00. Completed applications for fellowship and graduate scholarships must be filed by January 15.

Students interested in admission to the school are urged to request an Announcement of the Graduate School of Management at an early date so that all minimum academic requirements and deadlines are met.

In addition to your application, you will need to submit:

- Transcripts from all colleges or universities previously attended.
- Scores from the Graduate Management Admission Test (GMAT). Applicants must take the GMAT no later than March. In order to be considered for fellowships and scholarships, applicants must take the October test to meet the January 15 deadline. For fur-
ther information and registration forms contact: Graduate Management Admission Test, Educational Testing Service, CN 6108, Princeton, NJ 08541-6108, 609-771-7330.

- Three letters of recommendation. Applicants currently enrolled in school should include one recommendation from a professor. For individuals who are out of school, recommendations from employers or business associates are acceptable.
- A writing sample and a personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not required, although visits from applicants are welcomed.

**International Students**

Foreign students for whom English is a second language must take the Test of English as a Foreign Language (TOEFL) by March 1, and receive a score of 600 or better. Registration forms may be obtained by writing to: TOEFL, Educational Testing Service, Box 899, Princeton, NJ 08541-6108.

**Criteria for Admission**

The major criterion of the committee granting admission is what an applicant has to gain from, and offer to, the program. Consideration of an applicant's undergraduate performance includes a review of trends in scholastic performance and areas of academic strength as well as an assessment of overall grade point averages. Admissions standards and grading policies of the schools attended are also considered. Both verbal and quantitative scores on the GMAT are used to evaluate measurable general aptitude for management. Background and maturity as indicated by employment history, service and activity records, recommendations, and the applicant's personal statement are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

**PROGRAM OF STUDY**

In the first year, the program offers a series of core courses that focus on all the basic disciplines of business—accounting, economics, finance, marketing, organizational behavior, decision sciences, and information systems.

The second year of the program allows students to take courses in individually selected concentrations. These concentrations include accounting, agricultural management, environmental and natural resource management, finance, management information systems, management science, marketing, public sector management, and science and engineering management. Students may also design their own concentration.

In addition to the above full-time program, the Graduate School of Management offers an evening M.B.A. program for working professionals (WPMBA). If you would like more information about the evening program, please contact the Graduate School of Management Admissions Office at 752-7399.
The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study composed of 15 consecutive quarters. Course work is conducted on the Davis campus, at the University of California, Davis, Medical Center, Sacramento; and in nearby affiliated hospitals.

**PREPARATION FOR THE STUDY OF MEDICINE**

When you apply to the School of Medicine, you must submit the results from the New Medical College Admission Test (MCAT), so it is recommended that you take the MCAT by the spring before application. Information can be obtained at your undergraduate institution or directly from MCAT Program, Box 24720, Oakland, CA 94623-1720. To be acceptable for the entering class of fall 1995, the new MCAT must be taken no later than fall 1994. No scores before 1991 will be accepted.

Applicants must also meet the following academic requirements:

A. Must have completed at least three years of study in an accredited college or university in the United States or Canada. A minimum of 90 semester hours or 135 quarter units of college-level work is required. Courses in highly specialized fields are acceptable only at the discretion of the medical school.

B. Must have completed satisfactorily before matriculation each of the following courses:

1. English, 1 year or its equivalent.  
   - Quarter Units: 12  
   - Semester Units: 6

2. Biological science, 1 year including laboratory, or its equivalent.  
   - Quarter Units: 12  
   - Semester Units: 6

3. General chemistry, 1 year including laboratory, or its equivalent.  
   - Quarter Units: 12  
   - Semester Units: 6

4. Organic chemistry, 1 year or its equivalent. If two or more undergraduate organic chemistry courses are offered, it is recommended that you elect the more rigorous option.  
   - Quarter Units: 12  
   - Semester Units: 6

5. Physics, 1 year or its equivalent.  
   - Quarter Units: 12  
   - Semester Units: 6

6. Mathematics, coursework sufficient to satisfy prerequisites for integral calculus. (Coursework through integral calculus is recommended).  
   - Quarter Units: 6  
   - Semester Units: 4

C. Must demonstrate the potential to perform academically at least as well as the average of the current first year class. This reflects the School of Medicine's generally higher standards and our emphasis on potential as judged from the application as a whole, including but not limited to MCAT and GPA scores.

For additional information, contact the School of Medicine Admissions Office and request A Guide for Prospective Students.

**FEES**

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

These are the proposed fees for the 1994-95 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.

**School of Medicine Fees—Entering Students**

- University Registration Fee**$239.00**
- Memorial Union Fee...................$28.50
- Disability Insurance Fee§...........$61.00
- Health Insurance Fee†...............$142.50
- Educational Fee‡.....................$1,121.00
- Professional School Fee...............$792.00

**Total for California residents $2,384.00**

Tuition for nonresidents................$2,566.00

**Total for nonresidents $4,950.00**

**School of Medicine Fees—Continuing Students**

- University Registration Fee............$239.00
- Memorial Union Fee....................$28.50
- Disability Insurance Fee§.............$61.00
- Health Insurance Fee†................$142.50
- Educational Fee‡......................$1,121.00
- Professional School Fee..............$1,126.00

**Total for California residents $7,718.00**

Tuition for nonresidents................$2,566.00

**Total for nonresidents $4,284.00**

*Continuing students are those who were enrolled spring quarter 1994. PELP students are considered continuing students. Entering students are those who were not previously enrolled in the School of Medicine. Students who withdraw and later apply and are accepted as re-admitted students are considered new (entering) students.

** University Registration Fee = $237.00 in winter and spring quarters.

† Students must purchase the Graduate Student Health Plan unless they are able to prove comparable coverage under another plan.

‡ Educational Fee = $1120.00 in winter and spring quarters.

§ An annual fee of $61.00 will be assessed fall quarter—applies to medical students only; does not apply to interns and residents or health science academics.

**APPLYING FOR ADMISSION**

**November 1** Deadline for filing applications for admission for 1995-96 to the School of Medicine

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). Application request cards are available from the Admissions Office, School of Medicine, University of California, Davis, CA 95616, after April 1 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. Submit the
completed application and other required credentials 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 a secondary application, and two letters of recommendation along with a nonrefundable application fee of $40. Send these items 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. We recommend that one letter be from a science instructor and the other from a non-science instructor.

Applications are accepted by AMCAS between June 15 and November 1. We strongly recommend 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 requests them. The Committee reviews only complete application files and schedules interviews for highly qualified applicants throughout the application period and beyond.

A personal interview is usually required before a place in the first-year class can be offered. However, because of the large number of applicants, it is not possible to interview each one, and for this reason interviews are held only at the invitation of the Admissions Committee. 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.

As decisions are made, letters of acceptance are sent; this can be as early as mid-October and as late as September of the following year.

**Applicant Selection.** The class entering in the fall will be limited to 93 students selected on the basis of academic achievement, academic promise, and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to intellectual capacity, motivation, emotional stability, and personal dedication.

The majority of openings in the entering class will be awarded to students who are California residents. However, the School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE) and residents of participating states will be considered as residents for purposes of admission. For more information, write the WICHE at Post Office Drawer P, Boulder, CO 80302.

The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession, and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School’s commitment to expand opportunities in medical education for individuals from groups underrepresented in medicine as the result of societal discrimination and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of cultural backgrounds and which is representative of a broad spectrum of medical sciences, evaluates applicants in terms of all relevant factors. These include academic credentials, with due regard to how they may have been affected by disadvantages experienced by the applicant, such personal traits as character and motivation, experience in the health sciences and/or the
community, career objectives, and the ability of the individual to make a positive contribution to society, the profession, and the School.

Transfer with Advanced Standing

Currently enrolled students in good standing at approved medical schools in the United States or Canada may apply for admission to the third year of study. In order to provide the best facilities and clinical resources, however, we must limit the number of students in our clinical clerkships. Therefore, applications for transfer to the third year are considered on a space-available basis.

Deadline for application is April 1 of the year of transfer. A nonrefundable application fee of $40.00 is required. Applicants must provide medical school transcripts, and if accepted, must pass Part I of the USMLE at their current institution. Available spaces may be filled by the Admissions Committee based upon the entire content of an application, or they may request additional information including letters of recommendation and a personal interview. All applicants for transfer must meet the usual requirements for admission, as well as satisfactorily completing the equivalent of two years of study at the medical school. Applicants will be notified of the Admissions Committee’s decision starting April 30.

PROGRAM OF STUDY

The curriculum for the M.D. degree is normally a four-year program that provides comprehensive training for the practice of medicine. The curriculum has been designed to provide a blend of basic sciences training and clinical experience. Although the emphasis during the first two years is on the basic-science foundations of medicine, medical students are introduced to patient care during their very first quarter of study, reflecting the school’s commitment to the training of highly skilled clinicians. Several volunteer clinics, largely staffed by UCD medical students, provide an ideal setting for hands-on clinical experience.

In addition to the Doctor of Medicine degree, the School of Medicine at Davis offers a combined M.D./Ph.D. program whose target is to train physicians to meet, respond to, and solve the broad diversity of problems and dilemmas facing current and future health care. Meeting this challenge requires those capable of advancing our biological sciences knowledge base, and others who can recognize and solve the ethical, political and humanitarian issues that confront the broad delivery of health care to all. Hence, the field for the Ph.D. in the joint degree program at UC Davis can be any graduate program offered on the Davis campus, extending beyond the traditional biological sciences boundaries, and strongly encouraging candidates to seek degrees in social sciences and humanities. All requirements for both degrees are met in a course of study that usually lasts six years. To be admitted, and be concurrently enrolled in both degree programs, students are required to apply for separate admission to both the M.D. and Ph.D. programs, and also obtain permission of the School of Medicine M.D./Ph.D. Advisory Committee. Inquiries about admission to graduate education should be directed to the Dean of Graduate Studies, University of California,

Davis, CA 95616. For more information concerning the M.D./Ph.D. program, contact Ms. Suzanne Mink, Office of Curricular Support, Room 2431, MS 1A, School of Medicine, University of California, Davis, CA 95616.

SCHOOL OF MEDICINE

Academic Calendar 1994-95

The School of Medicine operates on a different schedule from the rest of the campus. A more detailed academic calendar may be obtained from the Office of Curricular Support, 2431 Medical Sciences 1A, University of California, Davis 95616.

SUMMER QUARTER 1994

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction begins for 2nd-year students</td>
<td>Mon, June 27</td>
</tr>
<tr>
<td>Instruction begins for 3rd- and 4th-year students</td>
<td>Tues, July 5</td>
</tr>
<tr>
<td>Instruction begins for 2nd-year (regular curriculum)</td>
<td>Mon, July 25</td>
</tr>
<tr>
<td>Instruction ends for 2nd-year students</td>
<td>Fri, Sept 2</td>
</tr>
<tr>
<td>Final exams for 2nd-year students</td>
<td>Sept 9-9</td>
</tr>
<tr>
<td>Instruction ends for 3rd- and 4th-year students</td>
<td>Fri, Sept 23</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, July 4</td>
</tr>
<tr>
<td></td>
<td>Mon, Sept 5</td>
</tr>
</tbody>
</table>

FALL QUARTER 1994

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction begins for 3rd- and 4th-year students</td>
<td>Mon, Sept 26</td>
</tr>
<tr>
<td>Instruction begins for 1st- and 2nd-year students</td>
<td>Thurs, Sept 22</td>
</tr>
<tr>
<td>Exam and study period for 1st-year students</td>
<td>Oct 31-Nov 4</td>
</tr>
<tr>
<td>Exam and study period for 2nd-year students</td>
<td>Oct 28-Nov 4</td>
</tr>
<tr>
<td>Instruction ends for 1st-year and 2nd-year students</td>
<td>Fri, Dec 2</td>
</tr>
<tr>
<td>Final exams for 1st-year and 2nd-year students</td>
<td>Dec 5-9</td>
</tr>
<tr>
<td>Instruction ends for 3rd- and 4th-year students</td>
<td>Fri, Dec 16</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Nov 24-25</td>
</tr>
<tr>
<td></td>
<td>Dec 23-26</td>
</tr>
<tr>
<td></td>
<td>Dec 30, Jan 2</td>
</tr>
</tbody>
</table>

WINTER QUARTER 1995

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Instruction begins for 1st-, 2nd-, 3rd-, and 4th-year students</td>
<td>Tues, Jan 3</td>
</tr>
<tr>
<td>Exam and study period for 1st- and 2nd-year students</td>
<td>Feb 6-10</td>
</tr>
<tr>
<td>Instruction ends for 1st-year students</td>
<td>Fri, Mar 10</td>
</tr>
<tr>
<td>Instruction ends for 2nd-year students</td>
<td>Fri, Mar 17</td>
</tr>
<tr>
<td>Final exams for 1st-year students</td>
<td>Mar 13-17</td>
</tr>
<tr>
<td>Final exams for 2nd-year students</td>
<td>Mar 20-24</td>
</tr>
<tr>
<td>Instruction ends for 3rd- and 4th-year students</td>
<td>Fri, Mar 24</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Jan 16</td>
</tr>
<tr>
<td></td>
<td>Mon, Feb 20</td>
</tr>
</tbody>
</table>

SPRING QUARTER 1995

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction begins for 1st-, 3rd-, and 4th-year students</td>
<td>Tues, Mar 28</td>
</tr>
<tr>
<td>Instruction begins for 2nd-year students</td>
<td>Wed, Mar 29</td>
</tr>
<tr>
<td>Exam and study period for 1st-year students</td>
<td>April 24-28</td>
</tr>
<tr>
<td>Instruction ends for 2nd-year students</td>
<td>Fri, May 6</td>
</tr>
<tr>
<td>Final exams for 2nd-year students</td>
<td>May 10-17</td>
</tr>
<tr>
<td>Instruction ends for 1st-year students</td>
<td>Fri, June 2</td>
</tr>
<tr>
<td>Instruction ends for 4th-year students</td>
<td>Thurs, June 8</td>
</tr>
<tr>
<td>Final exams for 1st-year students</td>
<td>June 5-9</td>
</tr>
<tr>
<td>Instruction ends for 3rd-year students</td>
<td>Fri, June 16</td>
</tr>
<tr>
<td>Academic and administrative holidays</td>
<td>Mon, Mar 27</td>
</tr>
<tr>
<td></td>
<td>Mon, May 29</td>
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</tbody>
</table>
The mission of the School of Veterinary Medicine is to provide the best possible health care for animals through teaching, research, and public service. Students are offered a rigorous four-year program of study that prepares them for diverse career opportunities in veterinary medicine.

**PREPARATION FOR THE STUDY OF VETERINARY MEDICINE**

To be considered for admission to the School, you must have completed 108 quarter units (72 semester units) in an accredited college or university and have completed the following courses:

<table>
<thead>
<tr>
<th>Lower Division Required Sciences</th>
<th>Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Chemistry</td>
<td>15</td>
</tr>
<tr>
<td>Organic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>Physics</td>
<td>6</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upper Division Required Sciences</th>
<th>Quarter Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embryology</td>
<td>4</td>
</tr>
<tr>
<td>Genetics</td>
<td>4</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>Physiology</td>
<td>5</td>
</tr>
<tr>
<td>Required English</td>
<td>12</td>
</tr>
<tr>
<td>Required Humanities and Social Sciences</td>
<td>12</td>
</tr>
<tr>
<td>Required Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>

(To convert quarter units to semester units, multiply by 3/4. For example, a 4-unit quarter course is equivalent to a 6-unit course in the quarter system.)

You should plan your pre-veterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. 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) that 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.

**Examinations.** All applicants must take the General Aptitude Test and the Subject Test in Biology of the Graduate Record Examination (GRE) by the October test date. GRADUATE RECORD EXAMINATION SCORES RECEIVED FROM THE NOVEMBER TEST OR LATER TESTS FOR THE YEAR THE APPLICATION IS FILED WILL NOT BE ACCEPTED FOR CONSIDERATION. Applications for the exams and additional information may be obtained from the Educational Testing Service, Box 23470, Oakland, CA 94623-0470. The GRE must be taken within five years of the time you submit your application. The highest scores will be used when the GRE is taken more than once.

**Grade Point Average.** To be considered for admission, you must have a minimum grade point average of 2.50 for both the required sciences and the cumulative grade point average. Applicants who do not meet the minimum grade point average can qualify for admission by receiving GRE scores in the upper 30th percentile for the combined General Aptitude Test and Subject Test in Biology. Applicants who do not have transcripts with letter grading can qualify for consideration with these same scores or by receiving a bachelor's degree with honors.

**Practical Experience.** Admission to the School requires extensive experience with animals. This experience should entail more than having family pets and should include experience with several animal species if it includes relevant experience with types of activities that give an applicant an appreciation and understanding of the veterinary profession. The minimum requirement for animal, veterinary and biomedical science experience is 180 hours (4.5 weeks). This experience should also include working with veterinarians, so that the applicant understands the duties and responsibilities of a practitioner and the breadth of veterinary medicine.

### FEES

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

*These are the proposed fees for the 1994-95 academic year. Because they are subject to legislative and gubernatorial action, these fees may change without notice.*

**School of Veterinary Medicine Fees—Entering Students**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>University Registration Fee**</td>
<td>$239.00</td>
</tr>
<tr>
<td>Memorial Union Fee</td>
<td>$28.50</td>
</tr>
<tr>
<td>Health Insurance Fee†</td>
<td>$142.50</td>
</tr>
<tr>
<td>Educational Fee‡</td>
<td>$1,121.00</td>
</tr>
<tr>
<td>Professional School Fee§</td>
<td>$668.00</td>
</tr>
<tr>
<td><strong>Total for California residents</strong></td>
<td><strong>$2,199.00</strong></td>
</tr>
<tr>
<td><strong>Total for nonresidents</strong></td>
<td><strong>$4,765.00</strong></td>
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<td><strong>Total for California residents</strong></td>
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</tr>
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<td><strong>Total for nonresidents</strong></td>
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*Continuing students are those who were enrolled spring quarter 1994. PELP students are considered continuing students. Entering students are those who were not previously enrolled in the School of Veterinary Medicine. Students who withdraw and later apply and are accepted as re-admitted students are considered new (entering) students.*

** University Registration Fee = $237.00 in winter and spring quarters.

† Students must purchase the Graduate Student Health Plan unless they are able to prove comparable coverage under another plan.

‡ Educational Fee = $1,120.00 in winter and spring quarters.

§ Professional School Fee = $668.00 in winter and spring quarters.
APPLYING FOR ADMISSION

November 1  Deadline for filing applications for admission for 1995-96 to the School of Veterinary Medicine

Students are admitted to the School of Veterinary Medicine in the fall only. Applications may be obtained any time after July 15 by writing to the Office of the Associate Dean—Student Programs, School of Veterinary Medicine, University of California, Davis, CA 95616-8731 or by calling 916-752-1383. Applications, accompanied by a nonrefundable application fee of $40 must be received by this office no later than November 1.

Students interested in admission to the School of Veterinary Medicine are urged to request an Announcement of the School of Veterinary Medicine at an early date so that all minimum academic requirements and deadlines are met.

Applicants with disadvantaged backgrounds (cultural, economic, social, educational, disabled, and other factors) are encouraged to apply to the Veterinary Medical Opportunity Program (VMOP). For further information and advising services, contact the Director of Student Affirmative Action by writing to the Office of the Associate Dean—Student Programs or by calling 916-752-1383.

Letters of Evaluation. Three letters of evaluation are required in addition to your application and should be requested from persons who know you well, understand academic and professional demands, and have had the opportunity to evaluate your personal qualities and potential as a professional person. The evaluator should be willing to write a thorough, comprehensive letter on your behalf.

Interviews. Interviews may be requested, as deemed necessary, by the Dean and Admission Committee to obtain additional information. The Dean and Admission Committee may require additional evaluation procedures for selecting candidates for admission.

Out-of-State and Foreign Applicants. California residents are given priority for admission to the school. A small number of uniquely qualified applicants who are not California residents may be admitted as nonresidents. Residents of states participating in the Western Interstate Commission for Higher Education (WICHE) will be considered as residents for purposes of admission. Based on agreements with WICHE, a small number of applicants from WICHE states may be admitted with WICHE financial support. Other applicants from WICHE states may be admitted but only as nonresidents. For information related to the WICHE program, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302. The criteria for determining residency are explained in the Appendix of this catalog. Specific questions should be addressed to the Legal Analyst—Residence Matters, 300 Lakeside Dr., 7th Floor, Oakland, CA 94720. No other persons are qualified to give rulings on residency.

If you attended college out-of-state, you must include course descriptions of all required science courses with your application. You can do this by sending the current college catalog or by copying the relevant pages.

If you are from a country other than the United States, you must include a certified English version of your college transcript, and, if English is your second language, the official scores from the Test of English as a Foreign Language (TOEFL) taken within five years of the date when your application is submitted.

Criteria for Selection

I. Academic Factors (50-60%)  
A. College coursework:
   1. GPA of all undergraduate and graduate coursework
   2. GPA of required science coursework
   3. GPA of last two years of undergraduate work (minimum of 72 quarter units)

B. Graduate Record Examination:
   1. General Aptitude Test (Verbal, Quantitative and Analytical)
   2. Subject Test in Biology

II. Non-Academic Factors (40-50%)

A. Narrative (5-20%)
B. Letters of Evaluation (5-20%)
C. Interviews (0-20%)

Applicants will also be evaluated for their understanding of the profession and the responsibilities of being a veterinarian, interest in serving the public, maturity, motivation, and other qualities necessary for successful academic and professional work.

PROGRAM OF STUDY

Doctor of Veterinary Medicine. To receive a Doctor of Veterinary Medicine degree, students must 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). A grade point average of 2.0 (C), computed on all courses taken in the School, is required and students must satisfactorily complete all required work as determined by the faculty of the School.

Master of Preventive Veterinary Medicine. Applicants for candidacy to the Master of Preventive Veterinary Medicine (M.P.V.M.) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the Admissions Committee, MPVM program. For advising purposes, an option should be selected from the seven listed below at the time of application. Application deadlines for fall quarter admission are as follows: International students—March 1; Domestic students—May 1. (Please note that the deadline for applications for Non-Resident Tuition Fee Fellowships is January 15.) International applicants are encouraged to apply as early as possible. Students wishing to enter winter or spring quarter should contact the MPVM Program Director concerning application deadlines. Application forms can be requested from the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.
Candidates for the MPVM degree must satisfactorily complete a total of 50 units of coursework while in residence. This includes 31 units of required courses and 19 units of approved electives which include up to 10 units of research in a field appropriate to the chosen option. One requirement of the MPVM program is to complete a research study which culminates in a written report and oral presentation. A committee, consisting of three faculty members, reviews each paper for acceptability and assigns an appropriate grade.

The degree program extends over a minimum of twelve months to a maximum of two years. Students who intend to complete the program in one calendar year must register in August unless they have recently completed and performed satisfactorily in a statistics course that has been approved by the MPVM Director and the instructor of the “Orientation to Statistics” course at the time of the student’s acceptance into the program. Students meeting this requirement may register at the beginning of the fall quarter in late September. Students who intend to remain in the program for more than one year may register in the optimal course sequencing, but arrival in August is recommended.

Seven options offered under the MPVM Program permit students to select an area of study that best identifies their individual interests and needs. The options and advisers are as follows:

1. *Epidemiology and Herd Health:* study of quantitative methods used in the design and analysis of epidemiologic, economic, herd health, and production studies
   Adviser: I. A. Gardner, P. H. Kass

2. *Veterinary Public Health:* study and control of zoonotic diseases
   Adviser: B. Chomel

3. *Food Safety:* study of food safety and products of animal origin processing and technology
   Adviser: H. Riemann

4. *Laboratory Science:* design and execution of a laboratory or a laboratory/field-based project relevant to animal health
   Adviser: K. M. Lam

5. *Environmental Health:* study of the distribution of environmental determinants and their effects on health outcomes in populations
   Adviser: P. H. Kass

   Advisers: W. M. Boyce, T. E. Carpenter

7. *Veterinary Programs Administration:* administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service. (As the intent of this option is to permit veterinarians to spend a mid-career sabbatical leave for leadership training, enrollment is limited to individuals with demonstrated record of success in some area of veterinary medicine.)
   Adviser: R. H. McCapes

Inquiries regarding the program should be directed to the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

**Combined Program.** Students may enroll in the combined DVM/MPVM program in which the M.P.V.M. degree may be awarded by the end of the fall quarter of the fifth year or as soon thereafter as all requirements for both the D.V.M. and M.P.V.M. degrees are completed. The advantage of the combined program resides in the ability of the student to complete the MPVM program within six months after normal completion time of the D.V.M. degree, rather than 15 months, as would be the case if taken sequentially.

**Master of Science and Doctor of Philosophy.** General information regarding these degrees will be found in the Annoucement of Graduate Studies, which may be obtained from Graduate Studies, University of California, Davis, CA 95616. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.

**SCHOOL OF VETERINARY MEDICINE**

**Academic Calendar 1994-95**

**FALL QUARTER**
- Orientation for 1st-year students: Thur-Fri, Sept 15-16
- Instruction begins for 4th-year students: Tues, Sept 6
- Instruction begins for 1st-, 2nd-, and 3rd-year students: Mon, Sept 19
- Schalm Lecture: To be announced
- Thanksgiving Holiday: Thur-Fri, Nov 24-25
- Instruction ends: Fri, Dec 9
- Finals end: Fri, Dec 16

**WINTER QUARTER**
- Instruction begins: Tues, Jan 3
- M. L. King Holiday: Mon, Jan 16
- President’s Holiday: Mon, Feb 20
- Research Day: To be announced
- Instruction ends: Fri, Mar 17
- Finals end: Fri, Mar 24

**SPRING QUARTER**
- Instruction begins: Mon, April 3
- Memorial Day Holiday: Mon, May 29
- Instruction ends: Fri, June 9
- Finals end: Fri, June 16
- Commencement: Sat, June 10
COURSE DESIGNATIONS

Here is a sample of how a course is listed in this catalog.

\textbf{190. Proseminar in Nutrition (1)} I, II, III. The Staff Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and didactic problems of community, national, and international scope. May be repeated for credit with consent of instructor. (P/NP grading only.)

\textbf{Top line:} course number; title; units; quarters offered; instructor(s).

\textbf{Paragraph following:} course instructional format; prerequisite; course description; grading if other than letter grading.

\textbf{Quarters offered:} the quarter in which a course is intended to be given is shown as follows:

I. Fall Quarter (September to December) or Fall Semester (August to December), School of Law

II. Winter Quarter (January to March) or Spring Semester (January to May), School of Law

III. Spring Quarter (April to June)

IV. Summer Quarter (July to September) for students in the School of Medicine only

\textbf{Alternate Year Designation}

Some course descriptions will include the phrase “Offered in alternate years.” If the course number is marked with an asterisk (*), this indicates that the course will not be offered this academic year, but will be offered the following year. If the course number is not marked with an asterisk, this indicates that the course will be offered this academic year, but will not be offered the following year.

\textbf{Multi-Quarter Courses}

A series of course numbers followed by two or three letters (for example, Animal Science 49A-49B-49C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is a prerequisite to the second, and the second to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 160A and 160B), the A course is not a prerequisite to B, unless it is specifically mentioned in the list of prerequisites.

\textbf{Expanded Course Descriptions}

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

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

The course offerings and instructors listed in this catalog are subject to change without notice. For more current quarter offerings and instructors, refer to the \textit{Class Schedule and Room Directory}, available in the UCD Bookstore.
African American and African Studies

(College of Letters and Science)
John Stewart, Ph.D., Director
Program Office, 280 Kerr Hall (916-752-1548)

Committee in Charge
Desmond Jolly, Ph.D. (Agricultural Economics)
Carl C. Jorgensen, Ph.D. (Sociology)
Jacqueline O'Donnell, Ph.D. (African American and African Studies)
Mark A. Reif, Ph.D. (African American and African Studies)
John H. Starfield, Ph.D. (African American and African Studies)
John Stewart, Ph.D. (African American and African Studies)
Patricia Turner, Ph.D. (African American and African Studies)
Clarence E. Walker, Ph.D. (History)
David Scott Wilson, Ph.D. (African American Studies)

Faculty
Michele Foster, Ph.D., Associate Professor
Jacqueline O'Donnell, Ph.D., Associate Professor
Mark A. Reif, Ph.D., Associate Professor
John H. Starfield, Ph.D., Professor
John Stewart, Ph.D., Professor
Patricia Turner, Ph.D., Associate Professor

The Major Program
The African American and African Studies Program provides courses through which students learn about the history and culture of African Americans. The program is committed to providing students with a multidisciplinary learning experience. Majors are required to take selected courses in other programs and departments that complement those offered within African American Studies. Majors and minors are also encouraged to take advantage of internship programs.

The Program. Students are encouraged to combine an examination of African American history and culture in the U.S.A. with African or diaspora studies. The emphasis in African American (U.S.A.) culture includes courses on the history, culture, arts, literature of African Americans, the patterns of their socio-political and cultural movements, and the struggle against racism as a social and psychological problem. The emphasis in African Studies includes courses on the social, political, economic, and cultural history of African societies. The diaspora emphasis includes courses on the African heritage in The Americas, in Africa and in the Americas, African religion in the diaspora and cinema studies. In addition, students may choose to do special research projects.

Career Alternatives. African American and African Studies majors are well prepared for employment opportunities in the Office of Education, human service units, county social service programs, and counseling services. African American and African Studies is also an appropriate background for work in community organizations like the Urban League, NAACP, Urban Affairs, and Office of Economic Opportunity. The major also provides a strong background for future study in graduate school.

African American and African Studies (African-American Studies)

A.B. Major Requirements:

Preparatory Subject Matter ........................................ 36

American African Studies 10 ................................ 4
Two courses from Anthropology 2; Economics 1A, 1B; Geography 2; Sociology 1; Political Science 1, 2; Psychology 1 ............ 8
Two courses from Chicano Studies 10; Native American Studies 1, 10; American Studies 45; Asian American Studies 1, 2; History 37A, 37B ........................................... 8
Music 39 ................................................................. 4
One course from Statistics 13, Sociology 46A, or Psychology 41 ......................................................... 4

Depth Subject Matter ............................................... 36
A coordinated program of upper division courses, selected and approved in consultation with the major adviser, is included:
Core courses: African American Studies 101, 110, 120 ........................................ 12
Additional units chosen to reflect the student's major emphasis ........... 24

Total Units for the Major ........................................... 72

Major Program Emphasis
The following areas of emphasis are offered as a guideline for students interested in majoring in African American Studies:

Cultural and History of African American emphasis: African American Studies 107, 120, 121; Anthropology 140A, 140B; History 177A, 177B; Political Science 167.

African American emphasis: African American Studies 107, 120, 121; Anthropology 140A, 140B; History 115A, 116; Political Science 134, 146.

The above areas of emphasis are not the only areas of study that may be chosen for the African American and African Studies major. However, it should be noted that the major program must be approved in consultation with an African American and African Studies faculty member, and (b) be approved by the Program's Major Adviser.

Related Upper Division Courses
The following courses are offered by faculty members in other disciplines and focus on African American people and their culture:

Anthropology 104, 139A, 139B, 140, 153; Applied Behavioral Sciences 151, 152, 153, 159A, 159B, 172; Art History 150; Dramatic Art 155; Education 150; English 179, 181; Geology 125A, 125B; History 102, 115A, 115B, 116, 117; Music 133B; Political Science 134, 138, 146, 151, 167, 176; Sociology 129, 130.

Major Adviser: Patricia Turner

Minor Program Requirements: 24

American African and African Studies 10, 15, or 80 ........................................ 4
Select five courses from African American Studies 100, 101, 107, 110, 120, 121, 123, 145A, 145B, 151, 152, 153, 160, 162 .................................................. 20

American History and Institutions. This University requirement can be satisfied by completion of African American Studies 100, 120, 121. (See also under University requirements.)

Courses in African American and African Studies (AAS)

Lower Division Courses

10. Introduction to African-American Culture and Society (4). Turner
Lecture—4 hours. Introduction to the contemporary Black American experience by critically examining historical, political and social and economic factors that have affected the development and status of African-American populations.

12. Introduction to African Studies (4). Iluopuna
Lecture/discussion—4 hours. Introduction to African Studies which will focus on the various disciplinary perspectives through which African society and culture are generally viewed. A survey of methods, resources and conceptual tools for the study of Africa.

15. Introduction to Afro-American Humanities (4)
Lecture—4 hours. Introduction to Afro-American cultural tradition as it evolved from West Africa to the African Diaspora, South America and North America via slavery.

50. Black Images in Popular Culture (4)
Lecture—4 hours: discussion—2 hours. A survey of depictions of Blacks in popular culture (popular press, stage, radio, film, television, advertising) from the middle of the sixteenth century to the present.

51. History of Afro-American Dance (4)
Lecture—2 hours; discussion—2 hours. Evolution of African American dance, tracing its history and development from West Africa through the Caribbean and to the United States. Investigates the social relevance of African American dance and the artistic merits and contributions of African American choreographers and performers.

52. African Traditional Religion (4)
Lecture—2 hours; discussion—2 hours. Evolution of African American religion, tracing its history and development from West Africa through the Caribbean and to the United States. Investigates the social relevance of African American religion and the artistic merits and contributions of African American choreographers and performers.

80. Introduction to Black Politics (4)
Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences.

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

Upper Division Courses

100. Survey of Ethnicity in the U.S. (4)
Lecture—4 hours. The history, culture, philosophy, and current problems of groups considered ethnic minorities in the United States as viewed by the groups themselves. General Education credit: Contemporary Societies.

101. Introduction to Research in the Afro-American Community (4)
Lecture—4 hours. The Staff
Prerequisite: consent of instructor. Introductory survey of Afro-American Studies programs and techniques; problems and methodology in Afro-American Studies.

107. African Cultural Heritage in the Americas (4)
Lecture—4 hours. The Staff
Prerequisite: course 101 or consent of instructor. Analysis of African cultural systems as they adapted to the slave regimes in the antebellum and their continuing mechanisms in the postbellum Americas.

110. West African Social Organization (4)
Lecture—4 hours. The Staff
Prerequisite: course 101 or consent of instructor. Analysis of African cultural systems as they adapted to the slave regimes in the antebellum and their continuing mechanisms in the postbellum Americas.

120. Afro-America: Pre-Emanicipation (4)
Lecture—4 hours. The Staff
Prerequisite: course 101 or consent of instructor. Ecology, social organization, and survival culture of Afro-America. Historical and comparative study of Afro-American populations in relation to other groups.
Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

The major in agricultural and managerial economics teaches students to apply economics and quantitative principles to problems in agricultural production, management, and marketing.

The Program. Each student must specialize in at least one of three options: agricultural economics, which focuses on topics related to the production and marketing of foods and fibers; consumer economics, which focuses on issues related to consumer decision making, protection, and welfare; or managerial economics, which focuses on topics related to evaluating, financing, and managing business activities.

Internships and Career Alternatives. Students in agricultural and managerial economics have opportunities to gain additional career information and preparation through internships in a variety of private business and governmental agencies. Graduates qualify for management training positions in farm and ranch production, food and agricultural processing, agricultural sales and service, banking, finance, commodity and stock brokers in the private sector, and a variety of agency career positions in local, state, and federal government. Students who desire additional training are well qualified to enter graduate programs in agricultural economics, economics, business administration, or law.

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

English Composition Requirement ..... 3-12
See College requirement ............... 0-8
Additional English (English 1, 3, 20, or 103A-G) ....... 0-4
Preparatory Subject Matter ......... 65-68
Accounting (Management 11A-11B) ............... 8
Computer Science (Agricultural Systems and Engineering 10 or 30) ............... 3-4
Economic principles (Economics 1A-1B) .......... 10
Calculus (Mathematics 16A-16B or 21A-21B) .......... 8-6
Statistics (Statistics 13, 103) .......... 8
Social Science, Natural Science, Agricultural Science .......... 40
(See undergraduate handbook in Department Advising Office for complete list of courses.)

Breadth/General Education .......... 5-24
Note: Approved General Education courses may be used to simultaneously satisfy Social, Natural, and Agricultural Science courses as defined in the Preparatory Subject Matter for the major and the campus General Education requirement.

Depth Subject Matter ↑ ............... 19-21
Micro theory, Agricultural Economics 100A, 100B .......... 8
Quantitative methods, Agricultural Economics 106, 155 .......... 8
Macro theory, Economics 101 or 105 .......... 4-5
Restricted Electives ............... 26-32
Options (choose at least one):
(a) Agricultural Economics .......... 28
At least 15 units must be chosen from Agricultural Economics 120, 130, 131,

*Course not offered this academic year.
Select additional upper division Agricultural Economics courses to complete the 18-unit total for the minor.

**Managerial Economics** emphasis Agricultural Economics 100A or the equivalent

Additional upper division courses in Agricultural Economics

Select 9 or more units from Agricultural Economics 112, 116A, 116B, 136, 157A, 171A, 171B.

Select additional upper division Agricultural Economics courses to complete the 18-unit total for the minor.

**Environmental and Natural Resource Economics** emphasis Agricultural Economics 100A or the equivalent

Additional upper division courses in Agricultural Economics

Select 9 or more units from Agricultural Economics 175 and 176, and either 100B or 120.

Select additional upper division Agricultural Economics courses to complete the 18-unit total for the minor.

Graduate Study. See the Graduate Studies section in this catalog.

### Agricultural Economics

(Continued)

**Agricultural Economics**

(College of Agricultural and Environmental Sciences)

_Hoy F. Carman, Ph.D., Chairperson of the Department_

**Department Office:** 118 Voorhis Hall (916-752-1517)

_Student Information, University House Annex: Undergraduate, 916-752-6195_

**Graduate, 916-752-6986**

**Faculty**

Richard Alcainskas, J.D., Lecturer
Julian M. Aiston, Ph.D., Associate Professor
Steven Bann, Ph.D., Lecturer
Oscar A. Barrios, Ph.D., Lecturer
Bayford D. Butler, M.S., Lecturer
Leslie J. Butler, Ph.D., Lecturer
Michael R. Caputo, Ph.D., Associate Professor
Hoy F. Carman, Ph.D., Professor
Colin A. Carter, Ph.D., Professor
James A. Chaffin, Ph.D., Professor
Robert L. Cook, Ph.D., Lecturer
Richard D. Green, Ph.D., Professor
Arthur Havner, Ph.D., Professor
Thomas W. Hazlett, Ph.D., Associate Professor
Dale M. Heiine, Ph.D., Professor
Gloria E. Hellend, Ph.D., Associate Professor
Garth J. Holladay, Ph.D., Assistant Professor
Richard E. Howitt, Ph.D., Professor
Lovell S. Jarvis, Ph.D., Professor
Warren E. Johnston, Ph.D., Professor
Desmond A. Jolly, Ph.D., Professor
Karen Klonosky, Ph.D., Lecturer
Douglas M. Larson, Ph.D., Assistant Professor
Samuel H. Logan, Ph.D., Professor
Philip E. Martin, Ph.D., Professor
Ricard E. McCalla, Ph.D., Professor
Quinno Paris, Ph.D., Professor
Refugio J. Rochin, Ph.D., Professor
Reflections: A Rother Economics, Chicana/o Studies
Richard J. Sexton, Ph.D., Professor
Lawrence E. Shepard, Ph.D., Professor
Joe J. Stastny, Ph.D., Lecturer
Daniel A. Summer, Ph.D., Professor
J. Edward Taylor, Ph.D., Associate Professor

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*Course not offered this academic year.*

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*Advising Center for the major is located in University House Annex (916-752-6195).

**Major Advisor:** T.W. Hazlett (Agricultural Economics).

**Minor Program Requirements:**

The Department of Agricultural Economics offers five minor emphases open to students majoring in other disciplines who wish to complement their study programs with agricultural, consumer, and economic courses, plus any other upper division courses taken at the University in the depth subject matter.

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1. **Economic Basis of the Agricultural Industry** (4 units)
   - Lecture: 4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California.

2. **Population, Resources and World Agriculture** (4 units)
   - Lecture: 3 hours. Discussion: 1 hour. Economic analysis of interactions among human populations, natural resources and development of world agriculture. Introduction to economic thinking about population growth, its causes and consequences for world food demand, and environmental and ecological limits to increasing food supplies. General Education credit: Contemporary Societies.

3. **Business Law** (4 units)
   - Lecture: 4 hours. Prerequisite: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system.

4. **Agricultural & Economic Policy** (4 units)
   - Field Practice (1 hour), (3 units). The Staff
   - Discussion: 1 hour. Three field trips. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding and awareness of economics and management and their application in agricultural production. (P/N grading only.)

5. **Directed Group Study** (1-5 units)
   - The Staff
   - Chairperson in charge
   - Prerequisite: consent of instructor. (P/N grading only.)

6. **Special Study for Undergraduates** (1-5 units)
   - The Staff
   - Chairperson in charge
   - Prerequisite: consent of instructor. (P/N grading only.)

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**Upper Division Courses**

100A. Intermediate Microeconomics: Theory of Production and Consumption (4 units)

- Lecture: 3 hours. Discussion: 1 hour. Prerequisite: Economics 1A, 1B; Mathematics 16B. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. (Not open for credit to stu...
109. Futures and Options Markets (3) I. The Staff Lecture—3 hours. Prerequisite: course 100A; Statistics 103. Literature and derivations, hedging strategy, options problems; pricing, input determination, and prices of futures options; market-making; theory of inter-temporal price formation and behavior of futures and options prices; market forecasting; futures and options markets.

110B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4) I, II, III. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

106. Quantitative Methods in Agricultural Economics (4) I, II, III. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 103. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

112. Fundamentals of Business Organization (4) I, III, summer. The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing or consent of instructor. The role of organizational design and behavior in business and public agencies, principles of planning, decision making, individual behavior, motivation, organization; informal groups; conflict and change in the organization.

113. Fundamentals of Marketing Management (4) I, The Staff Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing, and distribution development; marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. (Not open for credit to students who have completed course 136.)

118A-118B. Tax Accounting (3-3) II-III. The Staff Lecture—2 hours; discussion—1 hour, Prerequisite: Management 11B. Determination of the federal income tax of employees, proprietors, partners, and corporations and the tax implications of alternative business decisions and methods of accounting.

120. Agricultural Policy (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of American agriculture. General Education credit: Contemporary Societies.

130. Agricultural Economics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

131. Agricultural Markets, Prices and Trade (3) II. The Staff Lecture—3 hours. Prerequisite: course 100B; course 130 recommended. Analysis of economic interdependencies among industries, geographically dispersed markets, alternative product forms and markets separated in time.

132. Cooperative Business Enterprises (3) I. The Staff Lecture—3 hours. Prerequisite: Economics 1A. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation.

136. Managerial Marketing (4) II. The Staff Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and statistics in the study of marketing. Marketing measurement and forecasting, market planning, market segmentation, determination of optimal product market mix, sales and cost analysis, conduct of marketing research, marketing models and systems.

143. Investments (3) III. The Staff Lecture—3 hours. Prerequisite: Economics 1B. Case studies, Government regulation of the market and the effects of its performance on consumers. Agencies affecting consumer expenditure. Sources of information available to consumers. (Students who have had or are taking course 100A, Economics 100, or the equivalent may receive only 2 units of credit, so must enroll in course 141.) General Education credit: Contemporary Societies.

142. Personal Finance (3) I, II, summer. The Staff Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning. (Same course as Consumer Economics 142.)

147. Resource and Environmental Policy Analysis (3) II. The Staff Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, may receive only 2 units of credit, so must enroll in course 147.)

147M. Resource and Environmental Policy Analysis (3) II. The Staff Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, must enroll in this course for 2 units) rather than course 147.)

148. Economic Planning for Regional and Resource Development (3) II. The Staff Lecture—3 hours. Prerequisite: Economics 1A and 1B; Mathematics 15A recommended. Relation of resources to economic growth, including regional problems; planning economic development with particular emphasis on resource use in agriculture; regional and national planning by both centralized and decentralized governments.

150. Agricultural Labor (4) I. The Staff Lecture—3 hours; discussion—1 hour. Importance of family and hired labor in agriculture; farm labor market; unions and collective bargaining in California agriculture; simulated collective bargaining exercise; effects of unions on farm wages and earnings.

155. Quantitative Analysis for Business Decision Making (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, probability, regression analysis.

156. Introduction to Mathematical Economics (4) I, III. The Staff Lecture—4 hours. Prerequisite: course 100A and 155. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumption models.

157. Analysis for Production Management (4) III. The Staff Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and quantitative methods in analysis of production management problems including inventory control, production scheduling, quality control, simulation, systems approach, and won measurement.

171A. Financial Management of the Firm (4) I, II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Management 11B; Management 11A-11B. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; interest and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. (Students who have had or are taking Economics 134 may not receive credit for this course.)

171B. Financial Management of the Firm (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: co-requirement: Finance 100B. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance.

175. Natural Resource Economics (2) I, II. The Staff Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries and wildlife populations), and non-renewable resources (minerals and energy resources, soil). (Same course as Environmental Studies 175.)

176. Environmental Economics (3) III. The Staff Lecture—3 hours. Prerequisite: course 100B or Economics 100 or the equivalent. Analytical treatment of the role of the environment in economic activity and methods for protecting and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement.

190A. Senior Research Project (2) I. Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A; Statistics 103 or consent of instructor. Senior standing. Individual student-defined research project conducted under faculty guidance. Problem definition, study objectives, procedure, method of analysis, and working outline, and preliminary elements of report writing to be completed in the first quarter. (Deferred grading only, pending completion of sequence.)

190B. Senior Research Project (2) III. Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A or consent of instructor. The research
report begun in course 190A will be completed and, after evaluation by the instructor, be revised and resubmitted by the student prior to the end of 190B. (Deferred grading only, pending completion of sequence.)

192. Internship (1-6) I, II, III, summer. The Staff (Chairperson in charge)
Internship—3-6 hours. Internship experience off and on campus related to areas offered in the Department of Agricultural Economics. Internships are supervised by a member of the staff. (PNP grading only.)

197T. Tutoring in Agricultural Economics (1-3) I, II, III. The Staff (Chairperson in charge)
Hours and courses vary depending upon the course being selected. Preference is given to students taking Agr 197T in Agricultural Economics and consent of Department Chairperson. Tutor will lead small discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of the instructor in charge of the course. (PNP grading only.)

198. Directed Group Study (1-5) 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. (PNP grading only.)

Graduate Courses

200A. Microeconomic Theory (5) I. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization applied to the development of the theory of profit-maximizing, efficiency-maximizing, and welfare-maximizing consumer. (Same course as Economics 200A.)

200B. Microeconomic Theory (5) II. Heims (Economics) Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Economic theory under imperfect competition, simple monopoly and monopoly. Emphasis on general equilibrium and welfare economics. The sources of market success and market failure. (Same course as Economics 200B.)

200C. Microeconomic Theory (5) III. Makowski (Economics) Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Economics 200C.)

204. Microeconomics Analysis (5) I. The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or courses 100A-100B and Mathematics 16A-16B. Open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Economics 204.)

214. Development Economics (4) II. The Staff Lecture—4 hours. Prerequisite: course 100A, 100B, Economics 101: Agricultural Economics/Economics 204 and Economics 160A, 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics as an analytical science. Development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Economics 214.)

215A. Agriculture and Economic Development (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204 and 214. Agricultural development theory and application. Analyze of rural-urban linkages and their role in economic development, food price policy, and interactions between economic development and the environment. Analytical focus on household-farm and intersectoral models. (Same course as Economics 215A.)

215B. Open Macroeconomics of Development (4) II. Kaneda Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204 and 200D or 205, and 214 or 215A. Models and policy approaches towards trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic development model of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Economics 215B.)

215C. Empirical Approaches to Development Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 215A, 215B. Extension of development models for policy analysis including Household-Farm models, models of resource allocation and under uncertainty. Social Accounting Matrix and Computable General Equilibrium models. Analysis and case studies of methods of project evaluation with and without income distribution. (Same course as Economics 215C.)

220. Economics of Consumer Policy (3) III. The Staff Lecture—3 hours. Prerequisite: one graduate course in economic theory and one course in economics or the equivalent. Problem of public policy. Policy criteria; sources of market failure; consumer policy analysis; empirical evaluation of selected economic policies.

221. Agricultural Policy in Developed Countries (4) III. The Staff Lecture/discussion—4 hours. Economic policy, its nature, form, and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies related to production, marketing, price, income, rural poverty, and resource adjustment; international policies for temperate zone agricultural commodities.

222. International Agricultural Trade and Policy (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 204 Economics 160B or the equivalent. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world trade; national policy choice in an open economy and multinational policy issues. Offered in alternate years.

240A. Econometric Methods (4) II. The Staff Lecture—4 hours. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares and instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Economics 240A.)

240B. Econometric Methods (4) III. The Staff Lecture—4 hours. Prerequisite: course 240A. Topics include analysis of variance, pooled time-series, cross-section estimation, seemingly unrelated regressions, classical hypothesis tests, and identification and estimation of simultaneous equation models. (Same course as Economics 240B.)

240C. Econometric Theory (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Finite sample theory; nonlinear and dynamic econometric models; asymptotic distribution theory. (Same course as Economics 240C.)

240D. Topics in Econometrics (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Economics 240D.)

252. Applied Linear Programming (4) I. The Staff Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing uses for business decisions (inventory, diet, blending, network and related problems.


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

263. Applied Econometrics (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Master students in agricultural economics or economics, or consent of instructor. Application of statistical tools to economic and business analysis. Emphasis on regression analysis, problems of specification, and model development. (Same course as Economics 263.)

257. Analysis and Applications in Production Economics (4) IV. The Staff Lecture—4 hours. Prerequisite: courses 204, 252, and 256 or the equivalent. Micro-level analysis of decision problems in agricultural production processes, e.g., investment, resource conservation, pest management, and irrigation scheduling; covers static and dynamic models under risk and uncertainty and some aggregate aspects of production.

258. Demand and Market Analysis (3) III. The Staff Lecture—3 hours. Prerequisite: courses 204 and 256 or consent of instructor. Quantitative and theoretical analysis of the factors affecting supply, demand and price determination for agricultural products. Emphasis on analytical tools for assessing the impacts of changes in government policies and macroeconomic variables.

261. Case Problems in Management (3) II. The Staff Lecture—1 hour; discussion—2 hours. Case problem analysis and discussion of business policy and strategy including organization, planning, production, marketing and financing issues. Emphasis is on problem definition and solution using current examples drawn primarily from agriculturally oriented firms.

270. Institutional and Economic Analysis of Natural Resources (4) IV. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: course 204/Economics 204 or consent of instructor. Natural resources are developed and allocated in a milieu of institutional arrangements that significantly affect their economic yields: definition/enforcement of property rights; information and search costs; market externalities, transactions and adjustment costs. Application to the water policy.

280. Analysis of Research in Production Economics (4) IV. The Staff Lecture—3 hours; discussion—1 hour. Current problems and methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

281. Analysis of Research in Agricultural Marketing (4) II. The Staff Lecture—4 hours. Current problems and methods in agricultural marketing analysis with emphasis on marketing firm behavior; price setting, demand and market definition, marketing margins and derived demand, spatial markets, technology analysis, models of imperfect competition, cooperatives, and marketing orders.

283. Analysis of Research in Natural Resource Economics (4) II. The Staff Lecture—3 hours. Prerequisite: course 254. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and planning including efficiency and welfare criteria, technological externalities, public goods, extramarket goods, indivisibilities, and intertemporal problems, benefit cost analysis and public and private investment criteria.
284. Applied Demand Analysis (4) III. The Staff Lecture—4 hours. Prerequisite: courses 202A, 240A, and 240B. Issues, techniques and methodology currently used in applied demand analysis. Demand parameters estimates will be used to answer various policy questions. Problem identification, model specification, hypothesis stipulation, and econometric estimation of various demand models.

290. Introduction to Research in Agricultural Economics (1) III. The Staff Seminar—1 hour. Prerequisite: graduate standing in Agricultural Economics. Seminar to familiarize entering students with research issues, research applications, research methodology, information sources and problem identification. Focus is on underlying motivations, usefulness and scope of agricultural economics research. (SU grading only.)

291. Advanced Research Development (1) I. The Staff Seminar—1 hour. Prerequisite: second-year Ph.D. standing. Current research problems and activities; guidance on the selection, design, funding and management of projects. (SU grading only.)

293. Analysis of California Agriculture and Resources (3) III. The Staff Lecture—1.5 hours; fieldwork—45 hours total of field trip, including one 8-day summer field trip. Review of analysis of production, marketing, and resource issues facing agricultural firms in California. Application of economic theory and measurement to individual firm and industry decisions in an applied setting. (SU grading only.)

298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Advertised study through special seminars, informal group studies, or group research on problems for analysis and experimentation. Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis.

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis; and (7) Dissertation Research Prospectus. (SU grading only.)

2990. Special Study for Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Courses

300. Directed Field Experience in Teaching (2) III. The Staff Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated once for credit. (P/NP grading only.)

301. Planning for Instructional Programs (3) III. Leising Lecture—3 hours. Prerequisite: course 100; course 300 may be taken concurrently. Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and resources.

302. Teaching Methods in Education (3) III. Leising Lecture—1 hour; discussion—2 hours. Prerequisite: courses 100, 200 and 301. Development of teaching strategies, special emphasis on the designing of learning experiences, instructional execution, teaching aids.

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4) I. Leising Lecture/discussion—2 hours; field work—6 hours. Prerequisite: acceptance into the Teacher Education Program; course 306B (concurrently). Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

306B. Field Experience in Teaching Vocational Agriculture (5-16) I. Leising Student teaching (corresponds with public school session). Prerequisite: acceptance into the Teacher Education Program; course 306A (concurrently); courses 100, 300, 301, 302. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges.

307. Teaching in Secondary Schools (5-16) I. The Staff Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. (Deferred grading only, pending completion of course.)

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

390. Seminar: Issues in Agricultural and Home Economics Education (2) II. The Staff Seminar—2 hours. Prerequisite: acceptance into the Teacher Education Program; courses 306A-306B or 307. Discussion and evaluation of current issues, theories and research in home economics and agricultural education. (SU grading only.)

Agricultural Systems and Environment

College of Agricultural and Environmental Sciences

Faculty

See under the Department of Agronomy and Range Science.

Major Program

An undergraduate program leading to a bachelor of science degree is offered in Agricultural Systems and Environment with a specialization in Agricultural and Environmental Education.

Advising Center for the major is located in 132 Hunt Hall (916-752-1715).

Teaching Credential Subject Representative. You may make an appointment with a credential counselor and obtain a statement of the complete requirements for the credential at the Agricultural Education Program, 132 or 261 Hunt Hall (916-752-1865 or 4369). Since many majors in the College do not offer the minimum preparation necessary for entering the Agriculture Teaching Credential program, you are encouraged to seek counseling as early as possible. See also the Teacher Education Program.

Graduate Study. For graduate study refer to the Graduate Studies section in this catalog. The Department of Applied Behavioral Sciences offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the Graduate Announcement.


Courses in Agricultural Education (AED)

Questions pertaining to the following courses should be directed to the instructor or to the Agricultural Education Program Office, 132 Hunt Hall.

Lower Division Courses

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

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

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

Upper Division Courses

100. Concepts in Agricultural and Environmental Education (3) I. Leising Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Philosophy and nature of formal and informal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs.

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

163. Measurement and Evaluation in Teaching (3) II. The Staff Lecture—3 hours. Prerequisite: elementary statistics; upper division standing. Development of selection, use and assessment of evaluation procedures for measuring cognitive, affective and psychomotor growth.

171. Audio Visual Communications (2) II. The Staff Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Theory and principles of audio-visual communications. Comparison of audio-visual materials such as transparencies, slides, computer-generated graphics, and videos. Operation and use of audio-visual equipment.

172. Multi-Media Productions (3) III. The Staff Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 recommended. Design and production of educational, technical, and professional multi-media presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics.

190. Seminar in Agricultural Education (2) II. The Staff Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

198. Directed Group Study (1-5) 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.)

*Course not offered this academic year.
encompasses both natural science and social science disciplines. Students will acquire a core understanding of agricultural production systems as managed ecosystems, how they function, how they interact with the natural environment and how they are intimately connected with human society and social changes. In addition, students will develop an area of specialization. Within each of these areas of specialization, students choose between a broad-based education and one focused in selected areas.

The Program. Specialization in Sustainable Production Systems covers food and agricultural production, agroecology, pest ecology and management, crop improvement and propagation. Students may also develop an emphasis in particular production areas such as agronomy, environmental horticulture, pomology, vegetable crops or viticulture. Specialization in Agricultural and Environmental Management encompasses agricultural and environmental resource management, agricultural and economic economics, pest management, animal and range management. The Agricultural and Environmental Education specialization provides preparation in educational foundations, teaching and learning strategies, with development of an agricultural and environment emphasis. Specialization in Agricultural and Environmental Communication offers preparation in agricultural and environmental science, along with in-depth understanding of communication and information management.

All students will gain practical experience through a combination of internships and practice. In addition, students may take an Honors thesis in their senior year.

Career Alternatives. Graduates from the program will be prepared to pursue a wide range of careers, including various technical and management positions in agricultural business enterprises; farming; state and federal agencies concerned with land and resource management; Cooperative Extension; international development; teaching; nonfarm education; human resource management; and agricultural and environmental journalism, information and communication services. Students will also be qualified to pursue graduate studies in the natural and social sciences, such as agroecology, environmental studies, pest management, education, business management.

B.S. Major Requirements:

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

UNITs

English Composition/Rhetoric Requirement..................................................11-12

English and rhetoric (English 1 or 3 and Rhetoric and Communication 1)........8

Additional English requirement (English 102 or 103).................................9-12

Perspectives on Agriculture and the Environment......................................19

Agriculture, Nature and Society (Agricultural Systems and the Environment 1).....4

Botany (Agricultural Plants (Agricultural Systems and the Environment 2)........4

Introduction to Agricultural Ecosystems (Agricultural Systems and the Environment 2).........4

Agriculture and the Environment (Agricultural Systems and the Environment 101)........3

Animals and People (Animal Science 1 or 2)..............................................4

Preparatory Subject Matter.................................................................40-43

Biological sciences (Biological Sciences 1A-1B)........................................10

General chemistry (Chemistry 2A-2B)....................................................10

Physics (Physics 1A-1B or Physics 5A-5B)................................................6-8

Mathematics (Mathematics 16A)...........................................................3

Computer skills (Agricultural Systems and the Environment 21).......................3

Statistics (Agricultural Systems and the Environment 120 or Statistics 13 or 120)....3

Economics (Economics 1A).........................................................................5

Breadth/General Education........................................................................16-24

To include two courses from each of the following two groups of courses:

Social Studies: Anthropology 2, 101, 125, 133; American Studies 1, 2, 101; Chinchoy 130, 132; Native American Studies 10, 70; Sociology 1, 3, 110, 129, 132, 144; Women's Studies 101.

History, Policy, & Philosophy of Science: History 135A or B, 136, 188A, B; History and Philosophy of Science 130A, B, 150; Philosophy 106; Political Science 3, 123, 124.

Recommended: to meet the Civilization and Culture general education requirement, minor in History and Philosophy of Science or a foreign language; courses in anthropology, cultural geography and nutrition (Anthropology 1; Geography 2, 50; Nutrition 10); geology and physical geography (Geology 1, 20, 50; Geocology 1); and climate and weather (Atmospheric Science 105; Geography 1, 3) to compliment one's area of specialization.

Depth Subject Matter.............................................................................20-21

Crop biology and ecology (Agricultural Systems and the Environment 150 or Plant Science 105, 125, 145)...............................................................4

Agricultural economics (Agricultural Economics 113 or 140).............................4

Ecological principles (Plant Biology 117 or Environmental Science 101)...........4

Agricultural practice (Agricultural Systems and the Environment 92, 99; Agricultural Economics 49A, 49B, 49C; Animal Science 101, 102; Geological and Biological Systems Technology 49, 52, 145).........................................4

Internship (Agricultural Systems and the Environment 192, 199)....................2

Seminar (Agricultural Systems and the Environment 196)..................................2

Senior Thesis. The Senior Honors Thesis includes two or three successful, refereed scientific and/or scholarly research on an agricultural and/or environmental subject of special interest to the student.

With adviser approval the Senior Thesis can satisfy up to 12 units of restricted electives in the major.

Areas of Specialization (choose one):

Sustainable Production Systems.....................................................................42-56

Includes food and agricultural production, agroecology, crop improvement, propagation, and pest management. Restricted electives allow students to choose between a broad education in sustainable agriculture or to focus on one or two areas of agriculture (e.g., agronomy, crop improvement, environmental horticulture, pest management, pomology, vegetable crops, viticulture).

Ecology of cropping systems (Plant Science 101 and Agricultural Systems and Environment 101).................................................................4

Genetics (Plant Science 105 or Biological Science 101)....................................4

Soils (Soil Science 100).............................................................................4

Restricted electives chosen with approval of the academic adviser from the following groups ..........................................................30-40

Agricultural production systems (Agronomy 100, 111, 128, 129; Animal Science 41; Animal Science 120, 130, 131; International Agricultural Development 101, 102; Pomology 101, 122, 103, 107; Range Science 134, 135; Vegetable Crops 101; Viticulture and Enology 101A, 101B, 101C, 111, 115, 116).........................................................12-16

Plant improvement and propagation (Plant Science 103, 105, 107, 109, 113, 146; Vegetable Crops 118).................................................................3-4

Plant physiology or plant nutrition (Botany 111, 113, 125, 131, 132, 133, 102, 110, 112, 126, 135; Viticulture and Enology 110).................................3-4

Agricultural meteorology and management (Botany 120, 121; Entomology 110, 115, 135; Nematology 100; Plant Pathology 120; Viticulture and Enology 110).........................................................6-8

Policy, social science and ethics (Agricultural Economics 147, 176; Agricultural Systems and Environment 121; Economics 123; Environmental Studies 161, 175; Geography 142; Plant Pathology 140; Political Science 107; Water Science 150).........................................................3-4

Unrestricted Electives...............................................................................6-31

Recommended courses: Mathematics 165, 166, Physics 5A-5B; Biological Technology 49 and courses listed under Plant, Animal and Environmental Sciences.

Agricultural and Environmental Management...........................................51-61

Includes agricultural and environmental resource management, natural resource and agricultural economics, agricultural production, pest management, animal and range management. Restricted electives will allow students to choose between a broad education in resource management or to focus on one or two specific areas.

Computer and quantitative skills (Agricultural Systems and Environment 121).........4

Economics (Soil Science 148; Economics 1B, Management 11A and 11B)........13

Restricted elective courses chosen with approval of the academic adviser from the following groups:

Environment and resource management (Environmental and Resource Sciences 103, 121, 131; Environmental Studies 125, 127, 133, 135, 142; Agriculture 112A, 114A, 131; Landscape Architecture 183, 184; Range Science 100, 134, 135; Soil Science 112; Wildlife and Fisheries Biology 110, 111, 112; Hydrologic Science 103, 122).........................................................6-8

Economics and business management (Agricultural Economics 100A, 112, 113, 118A, 130, 136, 140, 146, 171A, 175, 176).........................................................6-8

Agricultural production systems (Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 118, 150; Animal Science 41; Agricultural Horticulture 125, 130, 133; International Agricultural Development 101, 102; Plant Science 115, 116; Range Science 134, 135; Viticulture and Enology 101A, 101B, 101C, 111, 115, 116).........................................................6-8

Plant science (Agricultural Systems and Environment 118; Plant Biology 111, 135; Plant Science 101, 103, 105, 109, 110, 112, 113, 126, 135, 140, 145; Viticulture and Enology 110).........................................................3-4

Agricultural meteorology and management (Agricultural Meteorology 100, 115, 135; Nematology 100; Plant Biology 120, 121; Plant Pathology 120; Viticulture and Enology 118).........................................................3-4

*Course not offered this academic year.
Policy, social science and ethics (Economics 147, 176; Agricultural Systems and Management 144); Geography 140; Hydrologic Science 150; Plant Pathology 140; Political Science 107) 3-4

Unrestricted Electives 1-22
Recommended courses: Mathematics 165, Physics 1A, 1B, and courses listed under Plant, Animal and Environmental Sciences.

Agricultural and Environmental Education...38-45
The Agricultural and Environmental Education Specialization includes preparation in educational foundations, planning and teaching strategies, and development of an agricultural and environmental science emphasis. This option, along with a broad preparation in the natural sciences, social sciences and agriculture, prepares the student for entry into the graduate agriculture teaching credential program, for employment in the private sector in areas of training and human resource development, for working in informal educational programs involving environmental education, outdoor education, 4-H and other youth organizations, and pursuing further graduate study in the social or natural sciences.

Soil science 10 or 100) 3-4
Concepts in agricultural and environmental education (Agriculture Education 100) 3
Directed field experience in teaching (Agriculture Education 300) 2
Educational foundations (Agriculture Education 120) 3
Planning and teaching strategies (Agricultural Systems and Environment 101 or Education 180; Agricultural Education 171, 301 and 302) 12-13
Agricultural and environmental science emphasis 10-15
Courses to be selected in consultation with academic adviser. Students typically will select one area of agriculture to develop a strength by taking three to four courses. Students pursuing the Graduate Agricultural Teaching Credential Program need to take at least 10 units of Animal Science, 10 units of Plant and Soil Science, 8 units of Agricultural Economics, and 8 units of Agricultural Mechanics. See adviser for list of required courses.

Unrestricted Electives 17-35
Recommended courses listed under Plant, Animal and Environmental Sciences.

Agricultural and Environmental Communications and Information Management...40-52
This specialization provides broad preparation in the agricultural and environmental sciences along with in-depth understanding of communications and information management. The option is intended to prepare individuals for careers in agricultural and environmental science journalism, newscasting, information services and industrial communications.

Soil science (Soil Science 10 or 100) 3-4
Management of information (Agricultural Education 101) 3
Technical writing (Agricultural Education 192) 3
Upper division internship (Agricultural Education 192) 3
Information media (Agricultural Education 171, 172; Rhetoric and Communication 140, 140A, 1428) 12-13
Communications and information transfer (Applied Behavioral Sciences 170; Rhetoric and Communication 130, 136) 3
Agricultural and environmental communications and information emphasis 10-15
Courses to be selected in consultation with academic adviser. Students typically will select one area to develop a strength by taking three to four courses.

Unrestricted Electives 10-33
Recommended courses listed under Plant, Animal and Environmental Sciences.

Total Units for the Major 180

Major Adviser: Carol Sherman
Advising Center located in 132 Hunt Hall (916-752-1719).

Minor Program Requirements:

Agricultural Computing and Information Systems Minor

Agricultural Computing and Information Systems—core courses: Agricultural Systems and Environment 120, 121, Animal Science 192. 11
Minimum of 7 units from two of the three following groups:
(a) Computer systems, statistics, and simulation: Biological Systems Engineering 165, Applied Behavioral Sciences 101, 110, 140, Agricultural Economics 106, 112, 155, Hydrologic Science 165. 3-4
(b) Communication and business organization: Agricultural Economics 112, Applied Behavioral Sciences 168, Rhetoric and Communication 103, 136. 3-4
(c) Instrumentation and control: Food Science and Technology 156, Biological Systems Engineering 165. 3-4

Advising Center located in 132 Hunt Hall (916-752-1719).

Courses in Agricultural Systems and Environment (ASE)

Lower Division Courses

1. Agriculture Nature and Society (3) [Gradziel (Pomology)]
   - Lecture: 3 hours. Multiple perspectives and connections between the natural sciences, social sciences, and agriculture. Emphasis on agriculture's central role in society and its key role in our search for a sustainable and acceptable environment. Not open for credit to students who have completed Agrarian Studies 2. General Education credit with concurrent enrollment in course 1.

1G. Agriculture Nature and Society: Discussion (1) [Gradziel (Pomology)]
   - Discussion: 1 hour. Prerequisite: Concurrence enrollment in course 1.

2. Botany and Physiology of Cultivated Plants (4) [Salvet (Animal Science)]
   - Lecture: 3 hours; discussion/laboratory: 3 hours. Prerequisite: High school course in biology and chemistry recommended. An introductory course to the following topics in botanical and physiological principles of cultivated plants and their response to the environment. Includes concepts behind plant selection, cultivation, and utilization. Laboratories include discussion and interactive demonstrations.

21. Applications of Microcomputers in Agriculture (3) [Zibert (Animal Science)]
   - Lecture: 1 hour; laboratory/discussion: 4 hours. Prerequisite: High school algebra. Concepts of computing and applying personal computers to spreadsheets, databases, management, word processing and communications.

3. Unrestricted Electives...10-33

4. Recommended courses listed under Plant, Animal and Environmental Sciences.

*Course not offered this academic year.*
110. Cereal Crops of the World (4) (II). Quaest Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L. Contributions of cereal crops to human development. Adaptation, production, utilization, and factors determining quality of wheat, oats, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements. Half-day field trip will be required. Offered in alternate years. Not open for credit to students who have completed Agronomy 111. (Former course Agronomy 111.)

112. Forage Crop Ecology (3) (III). The Staff. Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L, Biological Sciences 1C. Principles of plant ecology, with emphasis on forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth, and management of perennial and annual forages, including pasture, rangelands, and hay; aspects of forage quality which affect feeding value to livestock. Offered in alternate years. Not open for credit to students who have completed Agronomy 112. (Former course Agronomy 112.)

113. Fiber, Oil and Sugar Crops in a Changing World (4) (I). Rains Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L, Biological Sciences 1C, Industrial Chemistry 1A. Production and utilization of fibers, oils, and consumer goods. The relationship of crops to their physical and biotic environment; technological changes; world and national policies affecting the production and utilization of crops. Offered in alternate years. Not open for credit to students who have completed Agronomy 113. (Former course Agronomy 113.)

118. Seed Production and Quality (4) (II). Bradford Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L, Biological Sciences 1C, Industrial Chemistry 1A. Protein and oil composition of food, feed, and consumer goods. Measurement and quality control of quality; methods of analysis and interpretation. Technological aspects of crop establishment from seed, laboratory includes field trips to seed industry facilities. Offered in alternate years. Not open for credit to students who have completed Vegetable Crops 118. (Former course Vegetable Crops 118.)

120. Applied Statistics in Agricultural Science (4) (I). Geng (Agronomy and Range Science) Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: courses 181A or 181B. Principles of crop production, storage and utilization. Biological and environmental factors influencing seed quality. Selection and procedures for the selection of varieties. Statistical analysis of data. Offered in alternate years. Not open for credit to students who have completed Agricultural Science and Management 120. (Former course Agricultural Science and Management 120.)

121. Systems Analysis in Agriculture and Resource Management (4) (I). Plant (Agronomy and Range Science) Lecture—2 hours; discussion/laboratory—2 hours. Prerequisite: courses 211 or computer experience. An integrated systems approach to the analysis and interpretation of research data and information. (Former course Plant (Agronomy and Range Science) Lecture—2 hours; discussion/laboratory—2 hours. Prerequisite: course 211 or equivalent computer experience. The process of systems analysis and dynamic simulation of both agricultural and environmental systems, use of systems analysis for development of optimal management strategies for agricultural and environmental systems. Not open for credit to students who have completed Agricultural Science and Management 121. General Education credit: Nature and Environment.

122. Management of Information for the Agricultural and Environmental Sciences (4) (II). Zilbert (Agronomy and Range Science) Lecture—3 hours; laboratory—3 hours. Prerequisite: course 211 or consent of instructor. Introduction to systems and technology for acquiring, storing, manipulating and communicating various types of information including numerical data, text, graphics and multimedia images. Laboratory exercise introduce a wide variety of information management systems used in offices and laboratories. Not open for credit to students who have taken course 101.

150. Cropping Systems of the World (4) (II). Shenan Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Biological Sciences 1C, and course 102 or Plant Science 101. World food production systems: concepts and assessment of sustainability; evaluation of mechanization and technology and comparison of annual and perennial cropping systems. One week-end session for simulation games.

170A. Fruit and Nut Cropping Systems (2) (I). McGrath Lecture—2 hours; laboratory—2 hours. Prerequisite: course 2 or Biological Sciences 1C, or consent of instructor. Principles of production and management of major fruit and crop species, including problems of current cultural and harvesting systems and concerns associated with commercial fruit growing. Offered in alternate years. Not open for credit to students who have completed Pomology 170A. (Former course Pomology 170A.)

170B. Fruit and Nut Cropping Systems (2) (II). Deheng Lecture—2 hours; laboratory—2 hours. Prerequisite: course 2 or Biological Sciences 1C, or consent of instructor. Principles of production and management of major fruit and crop species, including problems of current cultural and harvesting systems and concerns associated with commercial fruit growing. Offered in alternate years. Not open for credit to students who have completed Pomology 170B. (Former course Pomology 170B.)

190. Seminar on Alternatives in Agriculture (2) (II). Van Horn (Agronomy and Range Science) Seminar—2 hours. Prerequisite: upper division standing. Seminar on topics related to alternative theories, practices, and management strategies in agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. (Former course Seminar on Alternatives in Agriculture 190.)

190H. Senior Honors Thesis (2-5) (II, III). The Staff Independent study. Prerequisite: senior standing. General Education credit: Writing and Communication. Senior Honors Thesis. An independent study in major field. Includes research, preparation of a manuscript, and presentation to the department. Not open for credit to students who have completed Agrarian Studies 188H. (Former course Senior Honors Thesis 190H.)

195. Field Study of Vegetable Industry (1) (I). Jackson Field Study. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research institutions, farm operations, field stations, Extension Service, marketing, processors, etc. To be offered between winter and spring quarters. Considered a spring course for pre-registered students. Not open for credit to students who have completed Vegetable Crops 195. (Former course Field Study of Vegetable Industry 195.)

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

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

Agronomy
(College of Agricultural and Environmental Sciences)

Faculty. See Under Department of Agronomy and Range Science.

Graduate Program. See the major in Agronomic Systems and Environment.

Graduate Study. A program of study is offered leading to the M.S. degree in Agronomy. Information can be obtained in the Advising Office at 137 Hunt Hall. Also see the Graduate Study sections in this catalog.

Graduate Adviser: L. Jackson.


Courses in Agronomy (AGR)
Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 132 Hunt Hall.

Concordance
The following courses in Agronomy have been transferred to other subject areas.

Former Course Number Equivalent new course and number

Agriculture and Environment 110 (Principles of Agronomy)
Agricultural Systems and Environment 110L (Principles of Agronomy Laboratory)
Agricultural Systems and Environment 111 (Cereal Crops of the World)
Agricultural Systems and Environment 112 (Forage Crop Ecology)
Agricultural Systems and Environment 113 (Fiber, Oil, and Sugar Crops in a Changing World)

Lower Division Course
92. Agronomy Internship (1-12) (I, II, III). The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses
192. Internship (1-12) (I, II, III). The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

197T. Tutoring in Agronomy (1-5) (I, II, III). The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: consent of tutor or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student will assist in classes under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/NP grading only.)
198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

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

Graduate Courses

205A. Design, Analysis and Interpretation (4) II. Geng
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 120 or the equivalent; Agricultural Systems and Environment 21 recommended. Planning and analysis of field and laboratory experiments with emphasis on concept and technique of designing experiments. Randomized block, factorial, incomplete block and multivariate designs discussed together with appropriate methods of data analysis and interpretation.

205B. Design, Analysis and Interpretation (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 120 or the equivalent; Agricultural Systems and Environment 21 recommended. Planning and analysis of field and laboratory experiments with emphasis on use of multiple regression, multivariate analysis, and dynamic simulation techniques in the biological interpretation of results.

207. Plant Population Biology (3) II. Rice
Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Evolution and Ecology 105, Plant Biology 117, or Entomology 104); advanced undergraduate course in genetics and/or evolution (e.g., Biological Sciences 101 or Evolution and Ecology 100). Provides entry-level graduate students with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Ecology 207.)

211. Principles and Practices of HPLC (2) III. Goyal
Lecture—1 hour; laboratory—3 hours. Prerequisite: undergraduate physics and chemistry; Biological Sciences 102, 103 recommended. Principles and theory of HPLC involving various modes of separation and detection, optimization of separation using isocratic and gradient elution. Develop practical knowledge about the use, maintenance and troubleshooting of HPLC equipment, including HPLC columns. Development of new HPLC methods.

213. Advanced Plant Breeding (4) III. Teuber
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 205A; Evolution and Ecology 102; Plant Science 113. Philosophy, methods, and problems that developed in improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data. Offered in alternate years.

222. Quantitative Genetics and Plant Improvement (4) II. Quaile
Lecture—4 hours. Prerequisite: Plant Science 113; Evolution and Ecology 102; or consent of instructor. Genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in alternate years.

223. Selection Theory in Plant Breeding (3) II. Quaile
Lecture—2 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructors. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis of quantitative character expression and methods for obtaining maximum efficiency in plant breeding schemes. Offered in alternate years.

224. Chromosome Evolution (3) I. Dvorak
Lecture—3 hours. Prerequisite: Genetics 201A and 201B or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in alternate years.

225. Advanced Topics in the Physiology of Crop and Range Plants (3) III. The Staff
Lecture—3 hours. Prerequisite: Botany 111 or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crop and range plants in relation to nitrogen utilization and photosynthesis.

226. Physiology of Crop Growth and Development (3) J. Jernstedt
Lecture—3 hours. Prerequisite: Plant Biology 111 or the equivalent. Selected aspects of plant growth and development. Utilization of physiology to relate to productivity. Analysis of current literature on shoot and root growth and function, reproduction, senescence, hormonal and environmental controls of development. Offered in alternate years.

226. Seminar in Crop Growth, Production and Utilization (1-2) J. Goyal
Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of cultivated food, feed and fiber crops.

227. Seminar in Plant Breeding and Evolution of Cultivated Plants (1-2) III. The Staff
Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins and evolution of cultivated plants.

227. Tutoring in Agronomy (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: graduate standing; consent of instructor and course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated for credit for a total of 5 units. Same course may not be tutored more than once. (SU grading only.)

228. Group Study (3) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

229. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

American Studies

(College of Letters and Sciences)
David Scofield Wilson, Ph.D., Program Director
Program Office, 816 Sproul Hall (916-752-3377)

Committee in Charge
Michael Kramer, Ph.D. (English), Chairperson
Ruth Frankenberg, Ph.D. (American Studies)
Suei Han, Ph.D. (Art History)
Lyn Low, Ph.D. (Sociology)
Claire Mehl, Ph.D. (American Studies)
Patricia Turner, Ph.D. (African American Studies, American Studies)

Faculty
Ruth Frankenberg, Ph.D., Assistant Professor
Michael Kramer, Ph.D., Professor, Academic Senate
Patricia Turner, Ph.D., Associate Professor
David Scofield Wilson, Ph.D., Senior Lecturer

The Major Program
American Studies offers an alternative approach to the study of American experience for students who feel too limited by departmental approaches. Lower division, introductory classes explore the ways in which cultural systems shape and reflect life in the United States. These classes pay close attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and sexual orientation unequally affect American lives.

The Program. American Studies majors take five upper division, in-depth classes (see below) and participate in three smaller seminars limited to majors and devoted to close study of major thinkers and issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to emphasize a period, a problem, or a subject tailored to his or her own individual educational goals.

Career Alternatives. As an interdisciplinary program, American Studies offers a wide variety of career choices to students of all backgrounds. Options include law, journalism, writing, publishing, teaching, social work, business management, and community service. Some students discover new
1E, Nature and Culture in America (4) I. Wilson Lecture—3 hours; fieldwork—3 hours. Uses and abuses of nature in America; patterns of inhabitation, exploitation, appreciation, and neglect; attention to California; emphasis on metaphor as a key to understanding ourselves and the natural world; attention to models of healing: stewardship, ecology, the "rights" movement. Offered in alternate years. General Education credit: Civilization and Culture.

1F. The Popular Image of Women in America (2) II. The Staff Lecture—2 hours; discussion—1 hour: directed analysis of popular media. Lecture; media exposure; special projects. Emphasis on the image of women as presented in popular media. Emphasis on the politics of gender roles and the connection between the popular feminine image and the demands of the larger American culture.

1G. Forms of American Wisdom (3) III. Mechling Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America: folk knowledge, popular belief, prophetic wisdom, public religion, common sense, literature; special attention to special peoples. Interdisciplinary study of wisdom as a gender, generation, ethnic identity, and region. (P/NP grading only.)

1H. Freshman Seminar (2) II, III. The Staff (Program Director in charge) Seminar—2 hours. Prerequisite: open only to students who have completed fewer than 40 quarter units. Investigation of a special topic in American Studies through shared readings, discussions, writing, assignments, and special activities (such as fieldwork, site visits). Emphasis on student participation in learning. Limited enrollment.

89. Directed Group Study (1-5) II, II, III. The Staff (Chairperson in charge). Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5) II, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

101A-H. Special Topics (4) I, II, II, III. The Staff (Chairperson in charge) Seminar—3 hours, intensive reading, writing, and special projects. Interdisciplinary study of special topics in American Studies; cultures designed for non-majors as well as majors. Content will vary according to the instructor and in accord with the following titles: (A) American Culture Study; (B) Women's Studies; (C) Material Aspects of American Culture; (D) American National Character; (E) American Lives through Autobiography; (F) Interdisciplinary Study of American Studies; (G) Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area only.

110. A Decade in American Civilization (4) I. The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: one course of American Studies 1A, 1B, 1C, 1D, 1E or 1F. Close examination of a single decade in American civilization; the connections between the history, literature, arts, customs, and ideas of Americans living in the decade.

120. American Folklore and Folklife (4) II. Mechling Lecture—3 hours; fieldwork—1 hour. Theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture; the uses and meanings of those traditions in various folk communities, including families, ethnic institutions, voluntary organizations, and occupational groups. General Education credit: Contemporary Societies.

125. Corporate Cultures (4) III. Haggerty Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: one course chosen from course 120, Anthropology 16, or Sociology 1; or consent of instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with foreign corporations.

130. American Popular Culture and Urban Life (4) III. The Staff Lecture/discussion—3 hours; fieldwork—1 hour. Prerequisite: course 1 or upper division standing. American popular expression and experience as a cultural system, and the relationship between this system and elite and folk culture. Exploration of the theories and methods for discovering and interpreting patterns of meaning in American popular culture. General Education credit: Contemporary Societies.

181. American Landscapes and Places (4) II. Wilson Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 1 or upper division standing. Comparative study of some American cultural populations inhabiting a region, including their relationships to the natural environment, their cultural and social environments, and their relationships to the dominant American popular and elite culture and folk traditions.

152. The Lives of Children in America (4) I. Mechling Lecture—2 hours; discussion—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches.

153. The Individual and Community in America (4) II. Frankenberg Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought.

154. The Structure of Men in America (4) III. Mechling Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of the lives of men in America, toward understanding cultural definitions of masculinity, the ways individuals have accepted or resisted these definitions, and the broader consequences of the struggle over the social construction of gender.

155. Symbols and Rituals in American Life (4) II. Wilson Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Interdisciplinary examination of selected, richly expressive events (parades, festivals, holidays) and the symbols (flags, memorials, temples) which encode nationwide values and understandings (Thanks-giving, New Year’s, etc.) or which are regionally intense, special meanings (Mardi Gras, rodeo, Kwanza, graduation, bar mitzvah, etc.). Offered in alternate years.

156. Race, Culture and Society in the United States (4) I. Frankenberg Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Interdisciplinary examination of the significance of race in the making of America; how race shapes culture, identities and social processes in the United States; the interweaving of race with gender, class and nationhood in self and community.


190A-190B. Senior Thesis (4-4) II, III. Mechling, Turner, Frankenberg, Wilson Seminar—2 hours; independent study—2 hours. Prerequisite: senior standing in American Studies major. In consultation with advisor, student contracts to write an extended research paper on a topic mutually agreed upon and enunciated in a prospectus reviewed and accepted by faculty. (Deferred grading only; pending completion of sequence.)
Anatomy, Physiology and Cell Biology (Veterinary Medicine, below); Cell Biology and Human Anatomy (Medicine, School of)

Anatomy, Physiology, and Cell Biology

(School of Veterinary Medicine)
Dallas M. Hyde, Ph.D., Chairperson of the Department
Department Office, 1321 Harling Hall (916-752-1174)

Faculty
Hillary P. Benton, Ph.D., Assistant Professor
Michael L. Bruss, D.V.M., Ph.D., Professor
George H. Cardinal III, D.V.M., Ph.D., Professor
Sharen L. Cummings, Ph.D., Assistant Professor
Donald L. Curry, Ph.D., Professor
Leslie J. Faulkin, Ph.D., Professor
Dorothy W. Geisten, Ph.D., Associate Professor
Benjamin L. Hart, D.V.M., Ph.D., Professor
Dallas M. Hyde, Ph.D., Professor
Kent Pinkerton, Ph.D., Associate Professor in Residence
Charles G. Popper, Ph.D., Professor
Susan M. Stover, D.V.M., Ph.D., Associate Professor
Fern Tablin, V.M.D., Ph.D., Associate Professor
William Thurber, M.D., Adjunct Professor
Reen Wu, Ph.D., Professor in Residence

Emeriti Faculty
Alfred A. Heusner, Docteur-en-Sciences, Professor Emeritus

Ralph L. Ketchell, D.V.M., Ph.D., V.M.D. (Nc), Professor Emeritus, Academic Senate Distinguished Teaching Award
Walter S. Tyler, D.V.M., Ph.D., Professor Emeritus

Courses in Anatomy, Physiology, and Cell Biology (APC)

Upper Division Courses

106. Comparative Organology of Vertebrates (4) II, III, Fall
Lecture—3 hours; laboratory—2 hours. Prerequisite: Biologie Sciences 1B. A course in the comparative anatomy of organs and systems in vertebrates. (Offered alternate years.)

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

119. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and Chairperson of American Studies Program. (P/NP grading only)

Graduate Courses

202. Organology (2) I. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: course 100 or the equivalent and consent of instructor. Comparative development, growth, patterns, and morphology of selected organ systems; liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in alternate years.

205. Ultramicroscopic Anatomy (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: histology. The electron microscope and its application to the study of internal structures and surfaces and lengths of organs and their components (e.g., vessels, ducts, and airways). Offered in alternate years.

207. Perspectives in Morphological Research (3) III. The Staff (Chairperson in charge)
Lecture—2 hours, discussion—1 hour. Consideration of the principles and applications of modern morphological methods and their role in biomedical research. Examination of sample methods include stereology, computer analysis of images, scanning and transmission electron microscopy, histology, electrophysiology, and function and test.

215. Veterinary Histology (6) II. The Staff (Chairperson in charge)
Lecture—3 hours; laboratory—2 hours. Prerequisite: Biologie Sciences 1B. The microscopic anatomy of tissues and organs of domestic animals. (Offered in alternate years.

220. Physiology of the Liver (3) II. The Staff (Chairperson in charge)
Lecture—2 hours; laboratory—1 hour. Prerequisite: Physiology 106 or Veterinary Medicine 421 or the equivalent. Basic function of several systems will be described, using a general model. Discussions will cover species differences for each system. Mammals, birds, and amphibians that are commonly kept as companion or production animals will be compared. (Same course as 425.)

230. The Secretory Process (2) I. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: consent of instructor. Structural and intracellular events involved in secretion, including in particular the general system of endocrine glands. Offered in alternate years.

283. Tissue Biology (3) I. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Growth, division, and differentiation and genetic factors. Offered in alternate years.

284. Ruminant Nutrition and Physiology (3) III. The Staff (Chairperson in charge)
Lecture—2.7 hours, laboratory—0.9 hours. Prerequisite: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110). Upper division livestock physiology (e.g., Physiology 206, Physiology and Behavior 101). (Offered in alternate years.

285. Morphology of Cells, Tissues and Organs (2) III. The Staff (Chairperson in charge)
Lecture—1 hour, laboratory—2 hours. Prerequisite: consent of instructor. Topics include: living cells and their environment, their growth and division, and their function. Offered in alternate years.

291. Topics in Biology of Respiratory System (1) I, II, III, Tyler, Hyde, Popper, W. Pinkerton Seminar—1 hour. Prerequisite: consent of instructor. Topics include: the anatomic and functional organization of the respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. (Offered in alternate years.

292. Topics in Neuroscience Research (1) III. Cummings Seminar—1 hour. Prerequisite: consent of instructor. Students will examine current research topics in neuroscience research literature, as well as evaluate research methods, results, interpretation of data, and relevance of studies. Possible topics include: pain, autonomic nervous system, neuroendocrinology, neurotransmitter regulation. (Offered in alternate years.

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Laboratory—6-15 hours. Prerequisite: consent of instructor. (Offered in alternate years.

Professional Courses

425. Comparative Neural Function in Domestic Animals (2) I. Giezien Lecture—1 hour, discussion—1 hour. Prerequisite: Biologie Sciences 1B or the equivalent, and Psychology 106 or Veterinary Medicine 421 or the equivalent. Basic function of several nervous systems will be described, using a general model. Discussions will...
Animal Behavior

(A Graduate Group)

Benjamin L. Hart, D.V.M., Ph.D., Chairperson of the Group

Group Office, 1064 Haring Hall (Animal Behavior Program) (916) 762-4863; FAX (916) 762-8391

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

Graduate Study. The Ph.D. program in Animal Behavior is an interdisciplinary program which trains students for teaching and research in a variety of areas including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students register for core courses in the three areas of specialization:

1. Ethology and evolutionary bases of animal behavior
2. Physiological basis of animal behavior
3. Applied animal behavior

All three specializations emphasize the adaptive evolutionary bases of animal behavior. Resources available to students in addition to various departmental facilities, include those of the California Regional Primate Research Center, Bodega Bay Marine Laboratory, and the Agricultural Field Stations.

There is an early application deadline of January 15 for fall quarter.

Preparation. Appropriate preparation is a bachelor's or master's degree in one of the several disciplines relevant to behavior, such as psychology, zoology, entomology, anthropology, physiology, wildlife biology, ecology, animal science, veterinary medicine, genetics, or animal behavior. In addition, at least one course from each of the following four areas must be taken before admission into the program or before the end of the first year in the program.

General education: Genetics 100 or the equivalent
Animal behavior: Psychology 150, Wildlife and Fisheries Biology 140, or Neurobiology, Psychology, and Behavior 155, or the equivalent

Students are encouraged to engage in some form of research as early as possible during the first year. This pre-dissertation research may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.

Breadth Requirement. The following core courses or the equivalent (22 to 24 units) are required of all students.

Graduate Courses

201. Scientific Approaches to Animal Behavior Research 3.1. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Analysis of literature and design of research studies. Topics are varied. Topics will vary from year to year.

202. Interdisciplinary Approaches to Animal Behavior 3. The Staff
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Analysis of literature and design of research studies. Topics are varied. Topics will vary from year to year.

Anesthesia

See Medicine, School of

Animal Genetics

(11) M. Farnsworth
Lecture—3 hours. Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/N grade only.)

204. Theory of Quantitative Genetics 3.1. Gall
Lecture—3 hours. Prerequisite: consent of instructor. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Offered in alternate years.

206. Advanced Domestic Animal Breeding 3.1. Farnsworth
Lecture—3 hours. Prerequisite: courses 107 and Animal Science 205. Course recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and multiple traits. Methods of estimating genetic trends. Offered in alternate years.

208. Estimation of Genetic Parameters 3.1. The Staff (Animal Science)
Lecture—3 hours. Prerequisite: courses 107 and Animal Science 203; courses 204 and 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Spe-
Animal Science 119

Animal Science
(College of Agricultural and Environmental Sciences)
Edward D. Price, Ph.D., Chairperson of the Department
James L. Murray, Ph.D., Vice Chairperson of the Department
Department Office, 2223 Meyer Hall (916-752-1250)
Bodega Marine Laboratory (BML)
Bodega Bay, CA (707-875-2211)

Faculty
Theresa M. Adams, Ph.D., Professor
Gary B. Anderson, Ph.D., Professor, Academic Senate Distinguished Teaching Award
R. Leland Baldwin, Jr., Ph.D., SENSON Professor of Animal Science
Patricia J. Berger, Ph.D., Associate Professor
C. Christopher Calvert, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor (Biological Sciences, Bodega Marine Laboratory)
Dalgas E. Conklin, Ph.D., Associate Professor
Frederick R. Faden, Ph.D., Associate Professor
Fred S. Conlo, Ph.D., Lecturer
Edward J. DePeters, Ph.D., Professor
Serge Doroshov, Ph.D., Professor
James G. Fadel, Ph.D., Associate Professor
Thomas R. Famula, Ph.D., Associate Professor
Graham E. Gall, Ph.D., Professor
Ian Garnett, Ph.D., Senior Lecturer
Dennis Hedgescock, Ph.D., Lecturer (Bodega Marine Laboratory)
Silas S. O. Hung, Ph.D., Associate Professor
Yu-Bang Lee, Ph.D., Professor
Joan M. Macy, Ph.D., Professor
Juan F. Medrano, Ph.D., Professor
Gary P. Moberg, Ph.D., Professor
James L. Murray, Ph.D., Associate Professor
Anita M. Oberbauer, Ph.D., Assistant Professor
James W. Ojif, Ph.D., Lecturer
Edward D. Price, Ph.D., Professor
Janet F. Roser, Ph.D., Associate Professor
Roberto D. Salguero, Ph.D., Assistant Professor
Richard A. Zinn, Ph.D., Professor
Emeriti Faculty
C. Robert Ashmore, Ph.D., Professor Emeritus
G. Eric Bradford, Ph.D., Professor Emeritus
Floyd D. Carroll, Ph.D., Professor Emeritus
Wallis H. Clark, Jr., Ph.D., Professor Emeritus
Perry T. Cupp, Ph.D., Professor Emeritus
William N. Garrett, Ph.D., Professor Emeritus
Robert C. Laby, Ph.D., Professor Emeritus
Glen P. Lofgren, Ph.D., Professor Emeritus
James H. Meyer, Ph.D., Professor Emeritus
Chancellor Emeritus
Wade C. Robins, Ph.D., Professor Emeritus
Robert W. Touchberry, Ph.D., Professor Emeritus
William C. Welsh, Ph.D., Professor Emeritus

The Major Program
The animal science major gives students an understanding of the proper care of animals and their utilization by people for food, fiber, work, research, companionship, and recreation. Aquaculture, companion animals, laboratory species, and domestic animal agriculture are included in animal science. 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.

The Program. Two options are available in the major: Animal Biology and Aquaculture. The Animal Biology option is designed for students with interests in the biology of domestic animals, covering the range of study from the molecular and cellular levels to the whole animal and populations of animals. Course requirements emphasize domestic animal biology and production. Course requirements in the Aquaculture option emphasize biotechnology and production of fresh- and saltwater aquatic animals. The Aquaculture option is appropriate for students interested in applying principles of animal production to aquatic species.

Internships and Career Alternatives. Career opportunities for graduates cover a wide range of options from farming and ranching to all of the industries, institutions, and professions involved with domestic animals and aquaculture. These include positions in management, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research. Preparation for veterinary medicine or other professional schools or graduate study can be achieved by careful planning in the major.

B.S. Major Requirements:

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<th>Courses in Animal Science (ANS)</th>
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<tbody>
<tr>
<td>Lower Division Courses</td>
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<tr>
<td>1. Domestic Animals and People (41)</td>
</tr>
<tr>
<td>2. Introductory Animal Science (4)</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.
Growth, reproduction, lactation, inheritance, nutrition, and diseases. Endangered species used in aquaculture; the application of sciences to animal production. General Education credit: Nature and Environment.

15. Introductory Horse Husbandry (3) I. Roser Lecture—3 hours; laboratory—3 hours; one-all day Saturday field trip required. Prerequisite: course 2. Environmentally and economically sound methods are presented to manage and develop limited resource ani- mal agriculture systems. Range systems, small farms, Third World systems and urban enterprises are considered. Same course as International Agricul- tural Development (102).


21. Livestock and Dairy Cattle Judging (2-3) III. Van Liew Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, and carcass quality. Proficiency in cattle and sheep judging. PNP grading only.

22A-22B. Animal Judging (2-3) I. Van Liew Laboratory—6 hours; weekend field trips. Prerequisite: course 21 or the equivalent. Study of individual and group classes of animals with emphasis on visual appreciation, comprehension and accurate description. Course is required for intercollegiate judging competition. PNP grading only.


41L. Domestic Animal Production Laboratory (2) I. DePeters Laboratory—8 hours. Prerequisite: course 41 may be taken concurrently. Animal production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus labora- tories. PNP grading only.

42. Introductory Comparative Animal Biology (4) II. Obergauer Lecture—3 hours; discussion—1 hour. Companion animal domestication. Historical, contemporary per- spectives, and experiments concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific methods in studying the human-animal bond. Discussions on ethical and social concerns related to companion animals. General Education credit: Nature and Environment.

49A-49B-49C. Animal Management Practices (2-2-2) II-III. The Staff Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the art and science of management of beef and dairy cattle, dairy goats, horses, sheep, swine, and laboratory ani- mals. PNP grading only.

92. Internship in Animal Science (1-12) I, II, III. The Staff (Department Chairperson in charge) Internship—3-18 hours. Prerequisite: consent of instructor. Internship 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. (PNP grading only.)

99. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PNP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PNP grading only.)

Upper Division Courses

102. Limited Resource Animal Agriculture (4) III. Brown Lecture—3 hours; laboratory—3 hours; one all-day Saturday field trip required. Prerequisite: course 2. Environmentally and economically sound methods are presented to manage and develop limited resource ani- mal agriculture systems. Range systems, small farms, Third World systems and urban enterprises are considered. Same course as International Agricul- tural Development (102).

104. Principles of Domestic Animal Behavior (3) II. Price Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B or the equivalent. Basic principles of animal behavior as applied to domestic species. Emphasis will be placed on behavioral development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. Offered in alternate years. (Students who have received credit for Zoology 155 may receive only 2 units for this course.)

105. Behavioral Adaptations of Domestic Ani- mals (2) I. Price Lecture—2 hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management. Offered in alternate years.

106. Domestic Animal Behavior Laboratory (2) II. Price Laboratory—6 hours. Prerequisite: course 104 or the equivalent. Research experience with the behavior of large domestic animals. Experimental design, meth- ods of data collection and analysis, and reporting of experimental results.

115. Advanced Horse Production (4) I. Roser Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15; Biological Sciences 101; Nutrition 110 or 115; Neurobiology, Physiology and Behavior 110, or consent of instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry.

116. Fish Production (4) II. Beer, Dorehov Lecture—3 hours; discussion—1 hour. Prerequisite: Wildlife and Fisheries Biology 120 and 121. Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California.

118. Invertebrate Aquaculture (4) I. Conklin, Conte Lecture—3 hours; laboratory—1 hour. Prerequisite: Evolution and Ecology 112 or Neurobiology, Physiology and Behavior 142, or the equivalent; Applied Biolo- gical Systems and Technology 161 recommended. Management, breeding and feeding of economically important aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies.

120. Principles of Meat Science (3) III. Bandman (Food Science and Technology), Lee Lecture—3 hours. Prerequisite: Biological Sciences 103, or equivalent. General anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products. (Same course as Food Science and Technology 120.)

120L. Meat Science Laboratory (2) III. Lee, Band- man (Food Science and Technology) Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103; course 120L taken concurrently. Emphasis on student participation in transformation of live animal to car- cass and meat, structural and biochemical changes related to meat quality, chemical and sensory evalu- ation of meat in the evaluation of processing plant and pro- cessing plant. (Same course as Food Science and Technology 120L.)


124. Lactation (4) III. Baldwin Lecture—3 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110; Nutrition 110, or the equivalent background knowledge. Consideration of the biochemical, genetic, physio- logical, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational perform- ance.

141. Linear Programming in Animal Agriculture (3) II. Fadel Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing; Nutrition 110, 115 or the equivalent; understanding of animal production, or consent of instructor. Linear programming in animal agriculture emphasizing farm planning and ration formulation. Provides experience in understanding, developing and applying linear programs.

131. Reproduction and Early Development in Animals (4) I. Sainz Lecture—3 hours; laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 150; Wildlife and Fisheries Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction, breeding and fertilization of ani- mals commonly used in agriculture.

135. Experimental Biochemistry Laboratory (4) I. Gaivetz Lecture—2 hours; laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology; consent of instructor. Course designed to introduce student to concepts of research. Experience in research animal care, tissue sampling and handling techniques, a variety of commonly used laboratory analytical meth- ods, cost analysis, literature review and publication writing are provided. (Not open to students who have received credit for Biochemistry 103.)

140. Management of Laboratory Animals (4) I. Adams Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 or 115; Neurobiol- ogy, Physiology and Behavior 110. Application of the concepts of nutrition, physiology, and genetics to maintenance of experimental animals. Management procedures will be examined in view of experimental needs, government regulations, and animal health.

141. Equine Enterprise Management (4) II. Roser/Garnett Lecture/discussion—4 hours. Prerequisite: course 115; Economics 1A, 1B recommended. Examination of the concepts and practices in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equin e law, marketing, cash flow analysis and impact of state and federal regulations.

143. Pig and Poultry Care and Management (4) I. Garnett, Ernst, Berger Lecture—3 hours; laboratory—3 hours; Saturday field trips. Prerequisite: Nutrition 115 or 110; Neurobiol- ogy, Physiology and Behavior 110; or consent of instructor. Care and management of swine broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction.

144. Beef Cattle and Sheep Production (4) I. Sainz Lecture—3 hours; laboratory—3 hours; one or two Saturday field trips. Prerequisite: course 111; Animal Genetics 107, Nutrition 115, or consent of instructor; a course in Range Science and a course in computer are recommended. Genetics, physiology, nutriti- on, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock.

145. Meat Processing and Marketing (4) II. Lee Lecture—3 hours; laboratory—3 hours. Prerequisite: course 143 or 144 or consent of instructor. Distribu-
Animal Science and Management

Science at the University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratory instruction, sections, and evaluation of student work. An evaluation letter sent to the Graduate Adviser with a copy to the student. (SU grading only.)

298. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (Graduate credit; from Section 4 on—SU grading only.)

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

Animal Science and Management
(College of Agricultural and Environmental Sciences)

The Major Program
The animal science and management major combines a thorough education in the basic biology of domestic animal species with a strong background in management economics. Graduates of this program manage farms and participate in a wide variety of other businesses related to agriculture. Many graduates enter graduate, veterinary and medical schools, while others become teachers and extension personnel.

The Program. The interdisciplinary program in animal science and management is designed for students who want a fundamental background in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), as well as in business economics and humanities. After completion of preparatory courses, students focus on both the animal species that interest them (horses, cattle, sheep, companion animals, goats, fish, crustaceans or mollusks, among others) and principles of managerial economics (marketing, finance, business organization or systems analysis).

Career Alternatives. Job opportunities for successful animal science and management graduates are plentiful. Banking and financial institutions, agribusiness, Peace Corps, farms of all sizes, and related businesses are eager to interview graduates with this major. Most animal science and management graduates are well prepared for professional school (medical, law, veterinary, and graduate business schools) as well as graduate research programs leading to the M.S. or Ph.D. degrees. Advanced degrees open doors to work as extension specialists, farm advisers, school teachers, and prepare students for international service and a host of other fulfilling careers. Graduates of this interdisciplinary major will be well positioned to adjust to our rapidly changing world and job market.

B.S. Major Requirements:
For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equal courses or more comprehensive courses on the same subjects are acceptable. Students preparing for medical or veterinary school 2, and can easily match professional entrance requirements with those of this major if they plan ahead.

UNITS
English Composition Requirement...............7-8
See College requirement.........................7-8
Preparatory Subject Matter.......................73-74
Animal Science (Animal species that interest student or either 15 or 18 or 41 or 42
Biological sciences (Biological Sciences 1A, 1B, 1C)..................15
Chemistry (Chemistry 2A, 2B, 8A, 8B)..................16
Computer science (Agricultural Systems and Environment)..................3

Course not offered this academic year.
Economics (Economics 1A, 1B, Management 111A, 111B, 112) 18
Mathematics (Mathematics 16A-16B or the more advanced mathematics courses) 6
Statistics (Agricultural Systems and Environment 120 or Statistics 102, or other courses in quantitative skills with prior approval of the Master Adviser) 4

Breath/General Education Subject Matter 6-24

Depth Subject Matter 43-44

Biological Sciences 101 4
Nutrition, Physiology, and Behavior 110 5
Business Management 19-20
Agricultural Economics 100A, 130, 140, Animal Science 128

Production/Management/Processing
Marketing/ 11

At least one course from:
Animal Science 115, 118, 119, 140, 143, 144, 146;
and Animal Science 148.

Restricted Electives 5-9

At least two additional courses (minimum 5 units; duplicate from Depth courses not counted) selected with approval of adviser from:

Unrestricted Electives 21-46

Total Units for the Degree 180

Major Adviser J.G. Fadel.

Upon entering the major, students should contact the Advising Center for assignment of a faculty adviser.

Advising Center for the major (including peer advising) is located in 1202 Mayer Hall (916-752-6118).

Anthropology
(College of Letters and Science)
Aram A. Yengoyan, Ph.D., Chairperson of the Department
Department Office, 330 Young Hall
(916-752-0745)

Faculty
John M. Beaton, Ph.D., Associate Professor
Robert L. Bettinger, Ph.D., Professor
Monique Borgerhoff-Mulder, Ph.D., Assistant Professor
David J. Boyd, Ph.D., Associate Professor
Richard T. Curley, Ph.D., Lecturer
William G. Davis, Ph.D., Professor
Jack D. Forbes, Ph.D., Professor (Anthropology, Native American Studies)
Charles R. Hale, Ph.D., Assistant Professor
Sarah B. Hrdy, Ph.D., Professor
Suad Joseph, Ph.D., Professor
Smeder Lavee, Ph.D., Assistant Professor (Anthropology, Native American Studies)
Martha J. Macri, Ph.D., Assistant Professor (Anthropology, Native American Studies)
Henry M. McHenry, Ph.D., Professor

Peter S. Rodman, Ph.D., Professor
G. William Skinner, Ph.D., Professor (Anthropology, Center for Comparative Research)
Carol A. Smith, Ph.D., Professor
David G. Smith, Ph.D., Professor
Janet S. Smith, Ph.D., Associate Professor
Caryn F. Wall, Ph.D., Senior Lecturer
John T. Walton, Ph.D., Professor (Anthropology, Sociology)

Emeriti Faculty
Daniel J. Crowell, Ph.D., Professor Emeritus
David L. Orlofsky, Ph.D., Professor Emeritus
Debtei L. True, Ph.D., Professor Emeritus

The Major Program

Anthropology is the systematic study of human beings as they live in groups. It is a diverse field and the courses at Davis are subdivided into four categories—biological, social/cultural, linguistics, and archaeology. The student of anthropology learns about human social life—past and present—and gains a broad understanding of humans and society.

The Program. 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 ethology of selected culture areas or linguistics (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeology (prehistoric and the techniques and methods of archaeology) should consult an adviser before choosing one degree program or the other.

Career Alternatives. Although most practicing anthropologists are specialists, thebachelor's degree in anthropology can lead to work in museums, in the Park Service, or in other aspects of public archaeology. A Bachelor of Science degree is a suitable major for medical and premedical preparation. A degree in anthropology with appropriate courses in education also can be good preparation for high school teaching in social sciences or natural sciences.

A.B. Major Requirements:

Preparatory Subject Matter 24-39

Anthropology 1, 2, 3, 4 16
Statistics 131, 132, 135, 137 16
Geography 1 or Environmental Studies 30 4
Foreign language (15 units or the equivalent in one language) 0-15

Depth Subject Matter 20-40

Anthropology 101, 102, 103, 104, 105, 137 10
Linguistic anthropology, one course 4
 Biological anthropology, one course 4
Ethnography, one course 4
Archaeology, one additional course 4
An additional 8 units selected from the following:
any upper division anthropology course, Art History 150, 151, Genetics 100 8

Total Units for the Major 64-79

B.S. Major Requirements:

Preparatory Subject Matter 55-56

Anthropology 1, 2, 3, 4 12
Biological Sciences 1A, 1B, 1C 15
Chemistry 2A, 2B, 2C 16
Mathematics 16A-16B or 18A-18B 9
Statistics 13, 32, 100, or 102 3-4

Depth Subject Matter 45

Six courses in anthropology, including courses 162, 153 and 154A, and the remaining three chosen in consultation with major adviser 22-25

Biological Sciences 101 and Evolution and Ecology 100 8

Additional units from the list below to achieve a minimum of 45 upper division units.

Total units for the Major 100-101

Recommended
Geology 1, 1L, 3, 3L; Physics 5A, 5B, 5C; Psychology 1, 1S.

Bachelor of Science List of Courses

Anthropology 151, 154B, 155, 156, 157, 157L, 158; Anatomy 100; Biological Sciences 102, 103; Evolution and Ecology 101, 102, 105, 106, 133, 136L, 158, 161, 147, 149, 170, 173L, Environmental Studies 100, 125; Geography 117; Geography 140, 107L, 110, 144, 145, 146; Cell Biology and Human Anatomy 101, 101L; Molecular and Cellular Biology 120L, 121, 124, 150, 150L, 151, 152, 153, 154L, 161, 162, 163, 164; Neurobiology, Physiology and Behavior 110, 110L, 143, 148, 155; Physical Education 103, 115; Psychology 106, 112, 150; Statistics 104, 106, 108, 110, 130A, 130B.


Minor Program Requirements:

Anthropology 19-25

General emphasis 22-25

One course from Anthropology 117, 118, 120 4
One course from Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158 8
One course from Anthropology 170, 171, 172, 173, 175 4

One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 148A, 149B, 176 4

One course from Anthropology 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 133, 135, 136, 137, 138 4

One additional course from remaining upper division Anthropology courses 4

Biological emphasis 18-21

Anthropology 152, 153, 154A 13
Two additional upper division Anthropology courses chosen in consultation with B.S. degree undergraduate adviser 5-8

Social–Cultural emphasis 18-21

Anthropology 137 4
One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 149, 176 4
Two courses from Anthropology 101, 117, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 133, 135, 136, 137, 138 8
One additional upper division Anthropology course chosen in consultation with A.B. degree undergraduate adviser 2-5

Teaching Credential Subject Representative. See also the Teacher Education Program.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department Office and at Graduate Studies.

Graduate Adviser C.A. Smith, J.S. Smith.

Courses in Anthropology (ANT)

Lower Division Courses

1. Human Evolutionary Biology (4) I. McHenry, II. Rodman, III. D.G. Smith
Lecture—3 hours; discussion—1 hour. Introduction to human evolution. Processes and course of human evolution; man's place in nature and the study of primates; the biological variability of living man and the genetic background. General Education credit: Nature and Environment.
2. Cultural Anthropology (4) I. Davis, II. Lavio; III. Curley
Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relations, economic activities, politics, gender, and religion in a wide range of societies. Current problems in tribal and peasant societies. General Education credit: Contemporary Societies.

3. Introduction to Archaeology (4) (I). Beaton
Lecture—3 hours; discussion—1 hour. Development of archaeological theory, an anthropological study; objectives and methods of modern archaeology.

4. Introduction to Anthropological Linguistics (4) (I)
I. The Staff; II. Wall
Lecture—3 hours; discussion—1 hour. Exploration of the use of language in social interaction and world view, minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language in socio-cultural issues. General Education credit: Contemporary Societies.

5. Proseminal in Biological Anthropology (4) (III)
Rodman
Seminar—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Prerequisite emphasis on human adaptation to the environment.

Lecture—3 hours; discussion—1 hour; term paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected case studies. General Education credit: Nature and Environment.

20. Comparative Culture (4) (II). Curley
Lecture—3 hours; discussion—1 hour. Introduction to the anthropological study of cultural diversity. Case studies of eight societies will be presented to illustrate and compare the distinctive features of major cultural regions of the world. Concludes with a discussion of modernization.

21. Anthropological Perspectives on the Politics of Culture in the United States (4) (III) Hale
Lecture—3 hours: discussion—1 hour. Primarily for non-majors. Examines what comparative anthropological analysis can contribute to an understanding of the high-profile issues of cultural politics (the so-called "culture wars") in our own: society. Offered in alternate years.

23. Introduction to World Prehistory (4) (II) Beaton
Lecture—3 hours; discussion—1 hour. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. General Education credit: Nature and Environment.

98. Directed Group Study (1-5) (I, II, III) The Staff
Chairperson in charge
Prerequisite: approved for lower division students. (PAP grading only.)

99. Special Study for Undergraduates (1-5) (I, II, III) The Staff
Chairperson in charge
Prerequisite: consent of instructor. (PAP grading only.)

Upper Division Courses

101. Human Ecology (4) II Borgerhoff-Mulder
Lecture—3 hours; discussion—1 hour. Prerequisite: one course from Environmental Studies 29, 30, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Environmental Studies 101.) General Education credit: Contemporary Societies.

(a) Anthropological Linguistics

110. Elementary Linguistic Analysis (4) (II) Macr
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Analytical techniques of articular phonetics, phonemics, morphophonemic, and morphology.

112. Comparative Linguistics (4) (II)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and reconstruction.

113. Indigenous Languages of North America (4) (III) Macr
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, Linguistics 1, or consent of instructor. Survey of indigenous languages of North America, including their classification, linguistic characteristics, areal features, and sociolinguistic patterns.

117. Language and Society (4) (III) J.S. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or Linguistics 1 and course 2. Consideration of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory. General Education credit: Contemporary Societies.

119. World Writing Systems (4) (II) Macr
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or course 2 of Linguistics 1. Survey of major world writing systems, including pictographic, syllabic, and alphabetic scripts used in both the Old and New Worlds in ancient and modern times, examined from linguistic and socio-political perspectives.

120. Language and Culture (4) (I) The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or course 2 and Linguistics 1. Culture, cognition, reasoning, and interpretation: language and the classification of experience and communication and learning in crosscultural perspective.

(b) Social/Cultural Anthropology

121. Folklore (4) (III)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to instructor. Theory and method in the study of folklore, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

122. Economic Anthropology (4) (III) 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.

123A. Anthropology and Political Economy (4) (III)
C. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to the study of political organizations; interrelationships among political institutions, economic systems, and cultural complexity.

123B. Resistance, Rebellion, and Popular Movements (4) (III) Hale
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or the equivalent. Analysis of popular protest in Third World and indigenous societies ranging from covert resistance to national revolt. Comparative case studies and theories of peasant rebellions, militarist movements, social bands, Indian "wars," ethnic and regional conflicts, gender and class conflicts.

124. Religion in Society and Culture (4) (II) Curley
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious belief systems. General Education credit: Contemporary Societies.

125A. Structuralism and Symbolism (4) (I)
Yengovan
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Survival of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Focus on how structural and symbolic interpretations relate to cultural and linguistic universals and to the "higher" or "lower" relativism in the social sciences. (Former course 125B.)

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

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

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

129. Psychological Anthropology (4) (III) Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Consideration of the development of the personality of the individual in foraging, pastoral, agricultural, and industrial societies. Impact of class and state formation, ethnicity, poverty, ruralization, urbanization, economic development on the individual. General Education credit: Contemporary Societies.

130. Gender and Sexuality: Cultural Evolutionary Perspective (4) (II) Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Gender and sexuality in foraging, horticultural and pastoral tribes, agricultural and industrial states. Debates on cultural evolution and discrimination of gender hierarchies. Impact of politics, economics, religion, social practices, women's movements on gender and sexuality. Culture, nature and sexuality. General Education credit: Contemporary Societies.

131. Women and Development (4) (II) Joseph
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or one other course in either history or anthropology. Course focuses on method and interpretation involved in reconstructing the history and cultural experience of those "people without history" who led no documentary record (pre-literate societies, slaves, peasants). Emphasizes cross-cultural comparison and comprehension of methods (archaeology, demography, oral history, travel accounts).

133. Cultural Ecology (4) (III) Crove
Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. General Education credit: Contemporary Societies. (Same course as Environmental Studies 133.)

134. Race and Sex: Race Mixture and Mixed Populations (4) (II.) Forbes
Lecture—3 hours; discussion—1 hour. Phenomena of race mixture (miscegenation), interracial marriage, and mixed (hybrid) human populations. Emphasis on social and cultural effects of race mixture and of the interaction of racism and sexual behavior.

135. Peasant Society and Culture (4) (I) A.C. Smith
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities,

*Course not offered this academic year.
practical considerations in reconstruction of environmental history and their importance in studying human ecology through archaeology. Environmental and human population dynamics and their interactions are considered particularly for non-complex societies. Offered in alternate years.

172. New World Prehistory: The First Arrivals (4) II. Betton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. Offered in alternate years.

173. New World Prehistory: Archaic Adaptations (4) III. Bettger
Lecture—4 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; course 170 recommended. Introduction to and survey of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered in alternate years.

174. New World Prehistory: Formative Life-ways in North and South America (4) III.
Lecture—4 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Transition from hunting and gathering subsistence to sedentary farming in the American Southwest, Mississippi Valley, and Andean South America. Offered in alternate years.

175. New World Prehistory: The High Cultures of Mesoamerica and Andean South America (4). III.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Urban development and the rise of civilization in Mexico and Peru.

176. Prehistory of California and the Great Basin (4) II.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact.

178. Hunter-Gatherers (4) III. Bettger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Study and interpretation of the ancient and modern lifeways in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. Offered in alternate years. General Education credit: Contemporary Societies.

179. Ethnoarchaeology (4) II. Beaton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography by archeologists examines the patterning, site-formation processes, hunting/forging behavior and other artifact creating activities and how these contribute to modern archeological thinking.

181. Field Course in Archeological Method (9) Summer. The Staff
Lecture—6 hours; daily field investigation. Prerequisite: course 3. On-site course in archeological methods and techniques held at a field location in the western United States, generally California or Nevada. Introduces basic methods of archeological survey, mapping, and excavation.

183. Laboratory in Archeological Analysis (4) III. Bettger
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment.

184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4) II.
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or permission of instructor. Analysis of the role of flint, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed.

207. Ethnographic Writing (4) II. Lave
Seminar—3 hours; term paper. Prerequisite: courses 137, 201, or the equivalent. Relationship between conducting participant observations of others and writing it up, emphasizing the processual rift between the reality of fieldwork and its product representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated for credit. Offered in alternate years.

209. Objectives and Methods for College Teaching in Anthropology (2) II. II. The Staff
Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience in the classroom situation.

210. Aspects of Culture Structure (4) III. Boyd
Seminar—3 hours; term paper. Analysis of various phases of culture, such as religion, economics, law, and folklore. May be repeated for credit when topic differs.

211. Advanced Topics in Cultural Ecology (3).
Ortov
Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Studies 153 or the equivalent or consent of instructor. Discussion and evaluation of theories which relate environment, culture, and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, methods, and modes of explanation. Offered in alternate years. (Same course as Ecology 211.)

216. Problems in Archaeological Method (4) II. Beaton
Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

217. Andean Prehistory: Theory and Method (4) III.
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-ceramic and early farming peoples.

218. Topics in North American Prehistory (4)
Bettger
Seminar—3 hours; term paper. Advanced study on current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of instructor.

220. Field Course in Linguistics (4) III. Mack
Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker.

221. Rural Transformation in Postcolonial Societies (4). Ortov
Seminar—3 hours; term paper. Prerequisite: courses 223, 265, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

222. Problems in Urban Anthropology (4) II. Walton
Seminar—3 hours; one paper. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on some of the following topics: class, minorities, pollution, migration, religion, politics, kinship, community, sex-roles, communication, ideology, consciousness in urban context. May be repeated for credit.

223. Economic Anthropology (4) II. Davis
Seminar—3 hours; term paper. Prerequisite: course 122 or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.
Community Studies and Development

**Faculty**

Stephen B. Brush, Ph.D., Professor
Isao Fujimoto, M.A., Senior Lecturer
Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education
James Grieshop, Ph.D., Lecturer/CE Specialist
Luis E. Guzmiano, Ph.D., Assistant Professor
Frank Hirz, Ph.D., Assistant Professor
Martin F. Kennedy, Ph.D., Professor
E. Dean MacCannell, Ph.D., Professor
Michael P. Smith, Ph.D., Professor
Miriam J. Wells, Ph.D., Professor

**Emeriti Faculty**

Marc Pilkus, Ph.D., Professor Emeritus
Oritil E. Thompson, Ph.D., Professor Emeritus

**Human Development and Family Studies**

**Faculty**

Curtis R. Acredolo, Ph.D., Adjunct Associate Professor
Carolyn Aird, Ph.D., Assistant Professor
Keith Barton, Ph.D., Professor
Brenda K. Bryant, Ph.D., Professor
James Chisholm, Ph.D., Associate Professor
Lawrence V. Harper, Ph.D., Professor
Rosemarie K. Mayer, Ph.D., Associate Professor
Beth Ober, Ph.D., Assistant Professor
Emmy E. Wernet, Ph.D., Emeritus

**Emeriti Faculty**

Louise M. Bachtold, Ed.D., Professor Emerita
Glenn R. Hawkes, Ph.D., Professor Emeritus
David B. Lynn, Ph.D., Professor Emeritus

**The Major Program**

The applied behavioral sciences major is concerned with the study of communities and the people in them. The program focuses on community and organizational development, the role of culture and ethnicity in shaping community life, and the ways that knowledge can be used to solve social problems and improve the quality of life.

**The Program**

The principal subjects of study within the major include: community and  organization development, social change processes, the role of culture and ethnicity in shaping community life, community research methodologies, the impacts of innovation and technology on community development, and the effects of social, economic and political systems on communities. In addition, the Applied Behavioral Sciences major includes a student-designed field of concentration to complement students academic and career interests. Examples of recently approved areas of concentration are: organizational planning and management, aging and community development, health care in ethnic communities, community design and planning, socio-environmental planning, and community education.

**Internships and Career Alternatives.** Applied Behavioral Science students are required to have an internship in their field before graduation. Internships have been arranged with such agencies as local, county, and state planning units, health departments, schools, housing offices, and community education programs. Applied Behavioral Sciences graduates are prepared for occupations in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and community health. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences.

**B.S. Major Requirements:**

**Units**

**English Composition Requirement**

See College Requirement: 4-12

**Additional English** (English 103) 4

**Preparatory Subject Matter**

22-25

**Community development (Applied Behavioral Sciences I)** 4
Computer science (Agricultural Science and Management 21, or Computer Science Engineering 15)........................................4
Economic theory (Economics 1A or 1B)......5
Ethnicity and American communities (Applied Behavioral Sciences 2)...........4
Social science theory (Anthropology 2 or Sociology 1).........................................................4-5
Statistics (Statistics 13 or Sociology 468)...........3-4

Breadth/General Education Requirement..............24
Satisfaction of General Education requirement to include:
  Sciences and mathematics..............................8
  Humanities (Proficiency in a second language is specified to gain an understanding of particular aspects of the community Students planning to work in a minority community are encouraged to select an appropriate language.)........8
  Social sciences ........................................8

Depth Subject Matter......................................39
Methods for community research, Applied Behavioral Sciences 151 and 160........8
Social theory and community change, Applied Behavioral Sciences 124 or Sociology 165A........................................4
Institutional and organizational change, Applied Behavioral Sciences 164..............4
Political process or community change, one course from Applied Behavioral Sciences 157, 158, 171.............4
Economics and community change, one course from Applied Behavioral Sciences 140 or 162 or Anthropology 122........4
Ethnicity and social inequality, Applied Behavioral Sciences 172 or 176..............4
Community development and transfer of knowledge, one course from Applied Behavioral Sciences 152, 173, 175 or International Agricultural Development 165A..........................4
Evaluation of human service programs, Applied Behavioral Sciences 166..............4
Applied Behavioral Science seminar: Major Problems in Applied Behavioral Sciences 193..................................................4
Internship: Applied Behavioral Sciences 199..................................................4

Field of concentration......................................37
Advising Center for the major is located in 1333 Hart Hall (916-752-2244).

Other Requirements
In consultation with a faculty and staff adviser, Applied Behavioral Sciences majors must develop a program of study which will comprise an area of specialization. Students must submit a written proposal for the major to be reviewed by a faculty committee.

Major Adviser: M.J. Wells.

Minor in Community Development

Minor Program Requirements:
The Applied Behavioral Sciences faculty offers the following minor program:

Graduate Study. Refer to the Graduate Studies section in this catalog.

Related Courses. See Environmental Studies 10, 101, 133.

Courses In Applied Behavioral Sciences (ABS)

Lower Division Courses

1. The Community (4) I. MacCannell
Lecture—4 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghettos, suburban mainline, and California farm workers.

2. Ethnicity and American Communities (4) I. Guzman
Lecture—2 hours; discussion—1 hour. Historical and cultural survey of the role of various ethnic groups in the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. General Education credit: Contemporary Societies.

17. Population and Community (2) I. The Staff
Lecture—2 hours. Dynamics and challenges offered by demographic changes in California and the world community. Implications for individuals and community change. Special emphasis on the positive contributions each individual can make towards resolving global problems related to human ecology through local community action. (P/NP grading only.)

18. Science, Technology and Society (4) I. Kenney
Lecture—4 hours. Impact of developments in science and technology on the individual in society and how economics, politics, culture and values affect technological development.

47. Orientation to Community Resources (2) II. Thompson; III. Fujimoto
Field trip—4 days; seminar—two 2-hour sessions. (Courses given between quarters). Prerequisite: consent of instructor. Field course in San Francisco. Students interact with agencies and individuals who address the range of human service, educational and social needs in the city. Advance reservations required. (P/NP grading only.)

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

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

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Upper Division Courses

116. Technology and Society (4) I. Kenney
Lecture—3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Impact of technology on labor relations, employment, industrial development and international relations. The internal relations of technology development and deployment.

140. Political Economy of Regional Development (4) II. Kenney
Lecture—4 hours. Prerequisite: one undergraduate economics, agricultural economics or political science course, or consent of instructor. Political economy of domestic regional development. Technology, labor relations and interlinkages. California and other regions as case studies.

151. Community Field Research: Theory and Analysis (3) I. Smith; II. Fujimoto
Lecture—3 hours. Prerequisite: course 151L must be taken concurrently; course 1 and any upper division Applied Behavioral Sciences course are recommended. Design and analysis of research at the community level with a focus on the relationship between practice and theory. Focus will be on conducting community research using statistical analysis, elite interviewing, ethnographic research, and comparative community studies.

151L. Laboratory in Community Research and Analysis: Field Experience (1-3) I. Smith; II. Fujimoto
Fieldwork—3-9 hours. Prerequisite: course 151 concurrently. Field research focused on community or organizational issues and their resolution. Includes assignment with local agencies or community-based organizations. The focus will be conducting community research using such methods as structural analysis, elite interviewing, ethnographic research, and comparative community studies.

152. Community Development (4) I. Fujimoto
Lecture—4 hours. Prerequisite: course 1 Anthropology 2, Anthropology 2, Asian American Studies 100, Chicano Studies 145, Geography 5, or African American Studies 140. Introduction to principles and strategies of community organizing and development. Examination of different citizen participation movements and the role of change agents in the development process. Students work in teams and conduct fieldwork in local communities.

153. International Community Development (4) I, III. Fujimoto
Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of international community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. General Education credit: Contemporary Societies.

154. Semiotics, Structuralism and Sociocultural Change (4) I. MacCannell
Lecture—4 hours. Prerequisite: course 1, Sociology 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of international community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. General Education credit: Contemporary Societies.

157. Politics and Community Development (4) I, III. Smith
Lecture—4 hours. Prerequisite: prior course work in sociology or political science recommended. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Emphasizes theories of the state, the community and social change and case studies of actual community development in comparative historical perspective.

158. Small Community Governance (4) II. Sokolow
Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 151 or 160 or Political Science 100. Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and public issues. Field research on political processes or policy issues in select communities. Offered in alternate years.

159. Field Experience in Community Development (4) I. Fujimoto; II. The Staff; II. Fujimoto
Discussion—2 hours; fieldwork—2 hours. Prerequisite: any one of courses 151, 152, 153, 154, or 157. Field involvement with community or organizational issues or problems and their resolution. May be repeated for credit for a total of 12 units with consent of instructor.

160. Research Design and Method in Community Studies (4) I. The Staff
Lecture—4 hours. Prerequisite: course 1; Statistics 13 or equivalent. Application of behavioral science research methodology to multidisciplinary problems confronting communities and community organizations. Focuses on design, sampling, measurement and analysis.

161. Ethnographic Research in America (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: completion of 8 units of course work in Anthropology, interviewing, ethnographic research, and other such research methods. General Education credit: Contemporary Societies.

151L Laboratory in Community Research and Analysis: Field Experience (1-3) I. Smith; II. Fujimoto
Fieldwork—3-9 hours. Prerequisite: course 151 concurrently. Field research focused on community or organizational issues and their resolution. Includes assignment with local agencies or community-based organizations. The focus will be conducting community research using such methods as structural analysis, elite interviewing, ethnographic research, and comparative community studies.

152. Community Development (4) I. Fujimoto
Lecture—4 hours. Prerequisite: course 1 Anthropology 2, Sociology 2, Anthropology 2, Asian American Studies 100, Chicano Studies 145, Geography 5, or African American Studies 101. Introduction to principles and strategies of community organizing and development. Examination of different citizen participation movements and the role of change agents in the development process. Students work in teams and conduct fieldwork in local communities.

153. International Community Development (4) I, III. Fujimoto
Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of international community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. General Education credit: Contemporary Societies.

154. Semiotics, Structuralism and Sociocultural Change (4) I. MacCannell
Lecture—4 hours. Prerequisite: course 1, Sociology 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of international community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. General Education credit: Contemporary Societies.

157. Politics and Community Development (4) I, III. Smith
Lecture—4 hours. Prerequisite: prior course work in sociology or political science recommended. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Emphasizes theories of the state, the community and social change and case studies of actual community development in comparative historical perspective.

158. Small Community Governance (4) II. Sokolow
Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 151 or 160 or Political Science 100. Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and public issues. Field research on political processes or policy issues in select communities. Offered in alternate years.

159. Field Experience in Community Development (4) I. Fujimoto; II. The Staff; II. Fujimoto
Discussion—2 hours; fieldwork—2 hours. Prerequisite: any one of courses 151, 152, 153, 154, or 157. Field involvement with community or organizational issues or problems and their resolution. May be repeated for credit for a total of 12 units with consent of instructor.

160. Research Design and Method in Community Studies (4) I. The Staff
Lecture—4 hours. Prerequisite: course 1; Statistics 13 or equivalent. Application of behavioral science research methodology to multidisciplinary problems confronting communities and community organizations. Focuses on design, sampling, measurement and analysis.

161. Ethnographic Research in America (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: completion of 8 units of course work in Anthropology,
176. Comparative Ethnicity (4) II. Guarnizo Lecture—4 hours. Prerequisite: upper division standing. A study of the social sciences: course 1 or Sociology or anthropology or equivalent. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches to issues arising from the study of ethnicity, through utilization of data from a range of different societies.

178. Social Networks and Community Health (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Social networks and community health. Exploration of the relationships between social networks and health outcomes, focusing on the impact of social support, social cohesion, and social capital on health outcomes. (P/N grading only.)


192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off- or on-campus, in community and institutional settings. (P/N grading only.)


196. Senior Project in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: major in Applied Behavioral Sciences, and consent of instructor. Guided research leading to completion of senior thesis. May be repeated for credit. (P/N grading only.)

197. Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (P/N grading only.)

197TC Community Tutoring in Applied Behavioral Sciences (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Supervised tutoring in three hours. (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

201. Planning Processes in Applied Behavioral Sciences (4) I. The Staff Lecture—3 hours; supervised practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, including new concepts, theories, and methods for planning with application to educational institutions, agencies and the community at large.

202. Systems Approach for Organizational Change (4) I. Hendrickson Lecture—4 hours. Prerequisite: course 201 or consent of instructor. Organizational structure and processes from systems perspective, organization-environment interaction, microdynamics of resource allocation, impact of power and authority on structure, communication and networks, role of innovation and determinants of change. Emphasis upon applications of theory for organizational learning.

203. Evaluation and Decision Making (4) II. Goldman Lecture—4 hours. Prerequisite: graduate standing; knowledge of social science research methodology. Focuses on theoretical formulations and methodological considerations when designing evaluation research studies for social programs. Includes examination of relationships between organizational planning, decision-making and evaluation research; value conflicts; multiple information requirements; social and political environment influencing evaluation studies.

240. Community Theory (4) I. The Staff Lecture—2.5 hours; seminar—1.5 hours. Prerequisite: two or more upper division courses in sociology, anthropology, philosophy or critical theory. Classic and contemporary theories of community, emphasizing one's own experiences in the comparative community research tradition from Redfield's Yucatan studies to Macro-social Accounting. Readings include Rousseau, Marx, Levi-Strauss, the Cornell School. Postmodernist accounts of community and critical theory.

241. The Economics of Community Development (4) II. Kenney Lecture—4 hours. Prerequisite: course 240. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the global economy.

242. Community Development: Program Management (4) III. The Staff Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or city level.

243. Professional Skills for Human Service and Community Development (4) I. The Staff Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in a social science discipline. Development and application of professional skills as community developer, program administrator and/or consultant.

244. The Political Economy of Domestic Development (4) III. Kenney Lecture—4 hours. Prerequisite: course 241. Examination of the politics and institutions affecting the economic growth of regions. Theories of development and the global context are examined with specific reference to case study material.

245. The Political Economy of Urban and Regional Development (4) III. Smith Seminar—4 hours. Prerequisite: course 157, 244, or the equivalent. How global politics and economic restructuring and national and state policies are mediated by community politics, social prediction of urban forces; role of the state in uneven development; dynamics of urban growth and decline; regional development in California.

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)

297. Practicum in Community Development (2) I, II. The Staff Seminar—2 hours. Prerequisite: course 243 and field placement in community human service agency. Application of theories and approaches of community development through field placement in a community or human service agency. Further development of skills as change agents in community settings. Consideration of the field placement as it relates to relevant research. May be repeated for a maximum of 4 units. (S/U grading only.)

298. Group Study (1-5) I. Guarnizo, II, III. The Staff (Chairperson in charge) (S/U grading only.)

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

Course not offered this academic year.
Applied Biological Systems Technology
(Count of Agricultural and Environmental Sciences)
Faculty. See under Department of Biological and Agricultural Engineering.

Minor Program. The Department of Biological and Agricultural Engineering offers a minor in Applied Biological Systems Technology. This minor is designed for non-engineering students interested in becoming familiar with engineering terminology and procedures. Coursework provides knowledge of material properties, design procedures, fabrication principles, and hardware practices.

Minor Program Requirements:

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<tr>
<th>Materials requirement</th>
<th>2</th>
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<tr>
<td>Choose one from Applied Biological Systems Technology 16, 18, or 17</td>
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<th>Design requirement</th>
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<tr>
<td>Applied Biological Systems Technology 170</td>
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<tr>
<th>Principles and Practices requirement</th>
<th>15</th>
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<td>Select at least nine units from: Applied Biological Systems Technology 101, 103, 105, 110, 112, 121, 141, 141AT, 145, 147, 161, 163, 165; and select the remaining units from: Agronomy 110, Animal Science 118, 119, 143, 146, Environmental Horticulture 126, Food Science and Technology 102, 102L, 110A, 110B, 111, Plant Science 112, 112L, 196, Viticulture and Enology 140, Water Science 110</td>
<td></td>
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<tr>
<td>Total Units for the Minor (minimum)</td>
<td>20</td>
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</table>

Minor Advisor. H.E. Studer.

Courses in Applied Biological Systems Technology (ABT)

These courses are intended primarily for students not majoring in Engineering. Majors in Engineering should refer to courses in Engineering: Biological and Agricultural Engineering (Biological Systems Engineering). Questions pertaining to the following courses should be directed to the instructor or to the Department of Biological and Agricultural Engineering, 2080 Bainer Hall.

Lower Division Courses

15. Wood Properties and Fabrication (2) III.

| Lecture | 1 hour; laboratory—3 hours. Physical properties and properties of woods as related to strength, design procedures, and selection and use of woodworking equipment. Experience in working with wood. Not open for credit to students who have completed Consumer Technology 15. (P/NP grading only.) |

16. Metal Properties and Fabrication (2) I.

| Lecture | 1 hour; laboratory—3 hours. Study of metal properties and techniques for fabricating in metal. Physical principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working with metal. Not open for credit to students who have completed Consumer Technology 16. (P/NP grading only.) |

17. Plastic Properties and Fabrication (2) III. The Staff

| Lecture | 1 hour; laboratory—3 hours. Study of the properties of polymers and the fundamentals of fabrication techniques. Experience in working with common plastics, with applications to biological systems. (P/NP grading only.) |

49. Field Equipment Operation (2) I.

| Lecture | 1 hour; laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of tillage, cultivating, thinning, and planting equipment. Typical sequences in cropning practices. Not open for credit to students who have completed Agricultural Practices 49. (P/NP grading only.) |

52. Field Equipment Maintenance (2) II.

| Lecture | 1 hour; laboratory—3 hours. Prerequisite: course 16. A comprehensive instructor. Trouble-shooting and minor repair of field equipment. Intermediate welding to include hardfacing and inert gas welding. Class projects on maintenance, repair and fabrication. Not open to students who have completed Agricultural Practices 149. (P/NP grading only.) |

90C. Research Conference for Lower Division Students (1) I, II, III. The Staff

| Discussion | 1 hour. Prerequisite: consent of instructor. Research conference for specialized study in applied biological systems technology. May be repeated for credit. (P/NP grading only.) |

98. Directed Group Study (1-5) I, II, III. The Staff

| Prerequisite | consent of instructor. (P/NP grading only.) |

99. Special Study for Lower Division Students (1-6) I, II, III. The Staff

| Prerequisites | consent of instructor. (P/NP grading only.) |

| Upper Division Courses |

101. Engine Technology (3) II.

| Lecture | 2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction and operation. Ideal Otto and Diesel cycles. Engine efficiencies and power measurements. Study of valves, fuel, combustion, lubrication, and fuel injection, conventional and electronic ignition, starting and charging, cooling, lubrication and emission control systems. Not open for credit to students who have completed Consumer Technology 101. (P/NP grading only.) |

103. Electric Power Applications (3) II.

| Lecture | 2 hours; laboratory—3 hours. Prerequisite: Physics 18B or 5B. Principles of electric power involved in common home and light industrial applications; experience in techniques of wiring, motor and appliance selection, energy conservation and safety. Not open for credit to students who have completed Consumer Technology 17. (P/NP grading only.) |

105. Computer Application for Measurement and Control (3) II.

| Lecture | 2 hours; laboratory—3 hours. Prerequisite: upper division standing; introductory course in computer programming. Introduction to computer systems for measurement and control of biological systems. Basic computer hardware and software concepts, programming, and input/output systems. Sensor fundamentals and applications. Computer control of biological processes and environments. |

110L. Experiments in Food Engineering (2) II.

| Lecture | 6 hours. Prerequisite: Food Science and Technology 110B (may be taken concurrently). Use of temperature sensors; measurement of thermal conducitivity and heat transfer in food; refrigeration, freezing, concentration and dehydration of foods. Not open for credit to students who have completed Agricultural Engineering Technology 110L. |

121. Structures and Environmental Control (2) II.

| Lecture | 2 hours. Prerequisite: Plant Science 2 or Animal Science 1 or 2, or Environmental Horticulture 6. Optimal structures and environments for plants and animals; animal production; heat and vapor transmission in buildings; temperature and humidity control; greenhouse design; energy conservation; lighting systems; heating, cooling, ventilating principles and equipment. Not open for credit to students who have completed Agricultural Engineering Technology 112. (P/NP grading only.) |

125. Environmental Considerations in Home Design (3) II.

| Lecture | 1 hour discussion—1 hour. Study of factors to be considered in planning or remodeling homes, including effects of design and choice of materials on safety, energy efficiency and compatibility with the surrounding environment. Not open for credit to students who have completed Consumer Technology 111. |

134. Pest Control Practices (2) II.

| Lecture | 2 hours. Prerequisite: Botany 120 or Entomology 100 or Environmental Toxicology 101 or Plant Pathology 125 or the equivalent. An overview of pest control systems. Mechanical systems for safe and effective application of pest control materials. Biological, legal and environmental considerations of pest control and pesticide application. Not open for credit to students who have completed Agricultural Engineering Technology 134. |

141. Technology for Agriculture in Developing Regions (3) III.

| Lecture | 2 hours; laboratory—discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture; man-animals, and engine-powered devices. Energy requirements, size-cost, costs, support infrastructure development, and productivity potentials. (Same course as International Agricultural Development 141.) |

141AT. Equipment Technology for Agriculture (1) I, II, III.

| Lecture | 1 hour. Prerequisite: course 141 or International Agricultural Development 141 (may be taken concurrently). Autotutorial (slide-tape) presentation of machinery, irrigation, and marine equipment technology applications, operation, and maintenance. (P/NP grading only.) |

145. Field Equipment Technology (2) III.

| Lecture | 1 hour; laboratory—3 hours. Prerequisite: upper division standing and Physics 1A or 5A. Function, construction, and operating principles of field equipment for harvesting fruit, nut, vegetable, and field crops. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling field equipment. |

147. Field Equipment Management (2) I, II, III.

| Lecture | 1 hour. Prerequisite: course 49 (may be taken concurrently) or consent of instructor. Fundamentals of field machinery management to include machinery capacity, selection from common standpoint, scheduling, acquisition options, and trade-in considerations. Estimation of operating costs of farm machinery. Not open for credit to students who have completed Agricultural Engineering Technology 105. |

161. Water Quality Management for Aquaculture (3) II.

| Lecture | 3 hours. Prerequisite: Biological Sciences 1B, Mathematics 16B, Chemistry 2B. Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems. Not open for credit to students who have completed Agricultural Engineering Technology 161. |

163. Aquaculture Systems Engineering (3) II.

| Lecture | 3 hours. Prerequisite: course 161. Design of aquatic systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling. Not open for credit to students who have completed Agricultural Engineering Technology 161. |

165. Irrigation Practices for an Urban Environment (2) (III) Hills

| Lecture | 2 hours. Prerequisite: Physics 1A or 5A. Basic design, installation, and operation principles of irrigation systems for turf and landscape golf courses, parks, highways, public buildings, etc. Emphasis on hardware association with sprinkler and drip-irrigation systems. Not open for credit to students who have completed Agricultural Engineering Technology 165. |

170. Design in Biological Systems Technology (3) III.

| Lecture | 2 hours; laboratory—3 hours. Prerequisite: Physics 1A or 5A and course 15, 16, or 17. Introduces the application of design methods and tools. Techniques are presented for solving design problems and selecting appropriate material. Catalog and
Graduate Study. Students prepare for careers relating to the application of mathematics to problems in the physical and life sciences, engineering, and management. The degree requirements consist of rigorous training in applied mathematics, including coursework and a research dissertation under the direction of a member of the Applied Mathematics Graduate Group. The M.S. degree provides preparation (1) for further study in applied mathematics or an application area, or (2) for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching. Areas of research in the program include differential equations, fluid mechanics, numerical analysis, operations research, systems theory, probability and stochastic processes, mathematical biology, and mathematical physics. Detailed information may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

New applicants are admitted to the fall quarter only. Preparation. The program encourages application from students who have prior training in engineering, physical and life sciences, mathematics, economics, and related fields. Applicants must have completed two years of undergraduate mathematics including linear algebra, differential equations, and vector calculus. A rigorous course in advanced calculus is strongly encouraged. Graduate Advisers. A. Cheer (Mathematics); T. Nathan (Land, Air, and Water Resources).

Applied Physics
See Physics

Aquaculture
See Animal Science; Applied Biological Systems Technology; and Wildlife and Fisheries Biology

Art History
(College of Letters and Science)
Mary H. Fong, Ph.D., Director, Program in Art History Department Office, 111A Art Building (916-752-0105)

Faculty
Mary H. Fong, Ph.D., Professor
Robert J. Grigg, Ph.D., Associate Professor
Dianne Sachko MacLeod, Ph.D., Associate Professor
Jeffrey Ruda, Ph.D., Associate Professor
Emeritus Faculty
Daniel J. Crowley, Ph.D., Professor Emeritus
Seymour Howard, Ph.D., Professor Emeritus

The Major Program
Art History is the study of the visual arts in civilization. It examines changing aesthetic and cultural values and significant material and ideological developments as seen in works of art and architecture. It emphasis visual as well as verbal intelligence, providing more than the standard advantages of liberal arts training.

The Program. The student majoring in art history begins with courses which survey the arts of Asia, Europe, and America. More specialized courses follow in ancient, Byzantine, medieval, Renaissance, baroque, modern, non-Western, Oriental, and American art and architecture. At the same time students are encouraged to take classes in related disciplines such as religion, history, philosophy, literature, and foreign languages.

Career Alternatives. The major prepares students for advanced study either in graduate school, or in professional programs. It can also serve as the foundation for careers in teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment.

A.B. Major Requirements:

Preparatory Subject Matter
Three courses selected from Art History at 1A, 1B, 1C, 1D, 1E
One art studio course in drawing, painting, or photography.

Depth Subject Matter
Nine upper division art history courses, which must be taken in at least four of the following five areas:
(A) Ancient/Medieval/Northern Renaissance
(B) Southern Renaissance/Baroque
(C) Modern
(D) China/Japan
(E) Non-Literate

Total Units for the Major

Minor Program Requirements:

Art History
Five upper division courses (one lower division substitute course permitted)
Courses must be chosen from at least three of the following subject areas with no more than two courses in any single area:
(A) Ancient/Medieval/Northern Renaissance
(B) Southern Renaissance/Baroque
(C) Modern
(D) China/Japan
(E) Non-Literate

Honors Program. An Honors Program is available to Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade-point average of 3.7 in the major. In addition to meeting the standard major requirements, the honors student completes onequarter of language in German or Chinese, one seminar (courses 190 or 198), and writes an honors thesis (course 194H). Students participating in this program are candidates for Departmental recommendation for graduation with High or Highest Honors. See the Letters and Science section of this catalog and consult the department chairman for further information.

Teaching Credential Subject Representative. Department Chairperson. See also the Teacher Education Program.

Graduate Study. The Program in Art History offers studies leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. Further information may be obtained by writing to the Graduate Adviser or consulting the Graduate Announcement.

Courses in Art History (AHI)

Lower Division Courses
1A. Ancient Art (4)
1B. Modern Art (4)
Lecture—3 hours discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric
151. *Arts of the Indians of the Americas* (4) II. The Staff
Lecture—3 hours; term paper or gallery studies and review. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile.

152A. *Arts of Oceania and Prehistoric Europe* (4) III. Crowley
Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in the cultural contexts. Prehistoric art of Europe and Near East.

154A. *Early Greek Art and Architecture* (4) III. The Staff
Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of history and significance of major monuments in Greek art and architecture from the Homeric, Geometric Age to the Golden Age and the death of Socrates.

154B. *Later Greek Art and Architecture* (4) III. The Staff
Lecture—3 hours; gallery studies and term paper. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander and the end of the Hellenistic Age and the death of Cleopatra.

155. *Roman Art* (4) III. The Staff
Lecture—3 hours; term paper or gallery studies and review. The art of Republican and Imperial Rome.

163A. *Chinese Art* (4) III. Lecture—3 hours; term paper or gallery studies and review. A survey from the beginning to the twelfth century focusing on the major art forms that are traditioned as newly discovered through archeology in China.

163B. *Chinese Painting* (4) III. Fong
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers, birds, and landscapes. The favorite and enduring theme of the Chinese scholar-painter.

163C. *Painting in the People's Republic of China* (4) III. Fong
Lecture—3 hours; term paper. Prerequisite: course 1D or upper division standing. Analysis of the interaction between art and politics in the emergence of China into the modern world. Integration of Western influence, implementation of Mao Zedong's thoughts on art, and the formation of contemporary Chinese painting.

164. *The Arts of Japan* (4) III. The Staff
Lecture—3 hours; term paper and/or gallery studies and review (determined by instructor) each quarter concerning Japanese art. Emphasis on the development of architecture, sculpture, painting, and decorative arts from prehistoric age to the nineteenth century.

168. *Great Cities* (4). The Staff
Lecture—3 hours; term paper. Transformation in architecture and urban form in Paris, London, and Vienna in the context of varying social, political, and economic systems as well as very different cultural traditions, concentrating on the years 1890-1930. Offered in alternate years.

176A. *Art of the Middle Ages: Early Christian and Byzantine Art* (4) I. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture, and architecture of the early Christian era and Byzantine Empire through the latter Roman Empire in the West and to the final capture of Constantinople in the East.

176B. *Art of the Middle Ages: Early Medieval and Romanesque Art* (4) I. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture, and architecture of early Europe in the early medieval era from the rise of the barbarian kingdoms through the twelfth century.

176C. *Art of the Middle Ages: Gothic* (4) II. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture, and architecture in northern Europe from the twelfth through the fifteenth centuries.

*Course not offered this academic year.*

**177A. Northern European Art (4)** I. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France, and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel.

**177B. Northern European Art (4)** I. Grigg
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Germany, France, and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel.

**178A. Italian Renaissance Art (4)** I. Ruda
Lecture—3 hours; term paper or gallery studies and review. Giottto and the origins of the Renaissance. Painting and sculpture in Italy from Nicola Pisano through Lorenzo Monaco, with emphasis on Duccio, Giotto, and other leading artists of the early fourteenth century.

**178B. Italian Renaissance Art (4)** II. Ruda
Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence; fifteenth-century artists from Donatello and Masaccio through Botticelli, their artistic and cultural setting.

**178C. Italian Renaissance Art (4)** III. Ruda

**179B. Baroque Art (4)** III. Ruda
Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez. Offered in alternate years.

**182. British Art (1750-1914) (4)** III. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C. Analysis of the place of art in British culture 1750 to 1914. Topics include influence of class and gender on art education, patronage, and exhibition societies. Artists: Hogarth, Turner, Pre-Raphaelites, and futurists. Prostitution and women as advocates of military, social realism, and colonial themes.

**183A. Art in the Age of Revolution (4)** I. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Analytic and stylistic implications of European painting from 1750 to 1860. Artists studied include Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet.

**183B. Impressionism and Post-Impressionism (4)** II. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Social and cultural study of major European art movements between 1860 and 1900, including an examination of the paintings of Manet, Monet, Renoir, Whistler, Gauguin, van Gogh, Cézanne, and Pissaro.

**183C. Modern Art: 1900-1945 (4)** I. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Examination of modern movement in European art from Cubism and Cubism to Surrealism and Abstract Expressionism (1900-1945). Artists studied include Picasso, Matisse, Kandinsky, Malevich, and Pollock.

**183D. Modern Sculpture (4)** III. The Staff
Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present.

**183E. Contemporary Art: 1945 to the Present (4)** I. Macleod
Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Painting and sculpture in Europe and America from 1945 to the present, with emphasis on the New York school, Pop art, Op art, Earthworks, and Feminist art.

**184. Twentieth Century Architecture (4)** III. The Staff
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged.
188B. Architecture of the United States (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. American architecture from the first European settlers to Postmodernism. Technological and formal developments will be examined within the social, political, and economic context in which they emerged. Issues include ideals of domesticity and the development of the architectural profession.

188C. Painting of the United States (4) II. McLeod
Lecture—3 hours; discussion—1 hour; term paper or gallery studies and review. American pictorial development from 1850 to the present, with emphasis on twentieth-century developments.

190. Undergraduate Seminar (4) II. The Staff (Program Director in charge)
Lecture—3 hours; term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substantial paper in a particular area of art history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrollment.

192. Internship (2-12) I, II, III. The Staff (Program Director in charge)
Internship—term paper or catalogue. Supervised program of one term at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/N grading only.)

194H. Special Study for Honor Students (4) I, II, III. The Staff
Independent study—12 hours. Prerequisite: course 190 or the equivalent, as determined by the major adviser. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee.

198. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge)
(P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Program Director in charge)
(P/N grading only.)

Graduate Courses

200. Introduction to Art Historical Research (4) I. The Staff
Seminar—4 hours. Introductory sampling of major writers, methods, and sources used for research in the discipline of art history.

250. Problems in Art Historical Research (4) III. The Staff
Seminar—3 hours; term paper. Major topics in art historical research, emphasizing special methods of investigation, and of historical and critical analysis. May be repeated for credit.

251. Seminar in Tribal Arts (4) II. The Staff
Seminar—3 hours; term paper. Selected topics in the art and aesthetics of small scale societies. May be repeated for credit when topic differs and with consent of instructor.

254. Seminar in Classical Art (4) III. The Staff
Seminar—3 hours; term paper. Selected areas of special study in classical art. Course may be repeated for credit with consent of instructor.

255. Seminar in Chinese Art (4) II. Ford
Seminar—3 hours; term paper. Selected areas of special study in Chinese art. May be repeated for credit with consent of instructor.

256. Seminar in Medieval Art (4) III. Grigg
Seminar—3 hours; term paper. Selected areas of special study in medieval art from early Christian to late Gothic. May be repeated for credit with consent of instructor.

276. Seminar in Italian Renaissance Art (4) II. Huda
Seminar—3 hours; term paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor.

283. Seminar in Modern European Art (4) III. Macleod
Seminar—3 hours; term paper. Selected areas of special study in art since 1800 in Europe. May be repeated for credit with consent of instructor.

288. Seminar in European and American Architecture (4) II. The Staff
Seminar—3 hours; term paper. Exploration of selected topics in European and American architectural history with concentration on the Modern Period. May be repeated for credit with consent of instructor.

299. Individual Study (1-6) I, II, III. The Staff (Program Director in charge)
(P/N grading only.)

Professional Course

280. Introduction to Teaching Art History for Teaching Assistants (1) I, II, III. The Staff
Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (P/N grading only.)

Professional Courses

401. Museum Training: Curatorial Principles (4) II. Ameron

402. Museum Training: Exhibition Methods (4) II. Ameron
Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms.

Note: Various of the above courses are not offered each year; please check the quarterly Class Schedule and Room Directory.

The Major Program

The studio art major provides the knowledge and experience necessary for a broad understanding of the visual arts.

The Program. For the beginning student, the major offers an introduction to drawing, composition, sculpture, and art history. Students may then advance to more specialization (painting, sculpture, printmaking, ceramics, photography, film making, as well as theory and criticism) in upper division work.

Portfolios. Students at Davis should keep a continuing portfolio of their art work which is subject to faculty appraisal at such times as the student is declaring the major, trying to choose the first day of class (the department gives preference to students who have preenrolled), requesting independent study courses, and scheduling an exhibition in the student gallery.

Career Alternatives. The studio art graduate is prepared for graduate work or continuing development as a professional artist or art teacher. Students who have career aspirations in the commercial aspects of the visual arts can acquire a broad general education and a creative foundation in the art studio major, establishing a basis for further specialization in commercial art.

A.B. Major Requirements:

Preparatory Subject Matter: ........................................... 20
Three courses from Art Studio 2, 3, 4, 5, 6, 26
see prerequisites required for upper division courses

Two courses from Art History 1A, 1B, 1C, 1D

Depth Subject Matter: ...................................................... 8
Six courses, under three different instructors from Group A, B, or C

Recommended

(a) Students interested in drawing and painting should take Art Studio 2, 3, 4 (course 5 is recommended);

(b) Students interested in sculpture should take Art Studio 2, 3, 4 (course 5 is recommended); and

(c) Students preparing for graduate work in any of the environmental design professions should take Art Studio 2, 5, 6

Major Advisers. See the Class Schedule and Room Directory.

Minor Program Requirements:

Minors

Art Studio

(15 credits)

Bachelor of Arts in Art Studio

Preparatory Subject Matter: ........................................... 20
Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permissible)

Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

Teaching Credential Subject Representative. Department Chairperson. See also the Teacher Education Program.

Graduate Study. The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. Detailed information regarding graduate study may be obtained from the Graduate Admissions Office or the Art Office.

Courses in Art Studio (ART)

Lower Division Courses

2. Drawing I (4) I, II, III. Hetherington, Carnwath and staff
Laboratory—8 hours; to be arranged—4 hours. Form and composition in black and white.

[Note: *Course not offered this academic year.*]
3. Drawing II (4) I, II, III. Cannwath, Schulz, Thiebaud Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2. Form and composition in color.

4. Life Drawing (4) I, II. Hollowell, Schulz 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. Puls, Zhang Laboratory—8 hours; to be arranged—4 hours. Form in space using plaster and other media.

*105. Introduction to Art Appreciation (4) I. The Staff Lecture—3 hours; term paper or gallery studies and review. Understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. (P/NP grading only.)

16. Descriptive Drawing (4) I. Hollowell Laboratory—8 hours; to be arranged—4 hours. Objective drawing and rendering; representation of space.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Restricted to lower division art students. (P/NP grading only.)

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

Upper Division Courses

Note: Upper division courses are listed under these groups:
(A) Practice of Art; (B) Theory and Criticism; (C) Special Study Courses.

- Preenrollment in upper division courses is restricted to art majors. Art minors may obtain permission to preenroll by filling out a "Waiver of Restriction" form in the Art office.

Group A: Practice of Art

101. Painting: Materials and Carriers (4) I, III. Cannwath Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Experimentation in media and their supports.

102. Painting (4) I, II, III. Schulz, Atkinson Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 101 or consent of instructor. Advanced painting in various media including oil and polymer prints. May be repeated once for credit with consent of instructor.

103. Advanced Drawing (4) I. Henderson Laboratory—8 hours; to be arranged—4 hours. Prerequisite: course 2, 3, 4, 16, or consent of instructor. Advanced drawing in composition and form in black and white and color. May be repeated once for credit with consent of instructor.

104. Figure Drawing and Painting (4) II, III. Schulz, Zhang Laboratory—12 hours. Prerequisite: courses 4 and 101, or consent of instructor. Advanced figure drawing and painting using the human figure as subject. May be repeated once for credit with consent of instructor.

110. Photography I (4) I, II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with camera and light sensitive materials.

111. Photography II (4) II, III. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 110 or consent of instructor. Art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated once for credit with consent of instructor.

113. Interdisciplinarity (4) II. Hershman Studio—8 hours. Prerequisite: one course in Art History or Art Studio. Focus on the uses of two or more art forms to make a unique work: also, ideas of collaboration and reconfigured and integrated forms as new methods of expression that do not solely depend on unique authorship.

114. Identity and Technology (4) II. Hershman Studio—8 hours; independent study—1 hour. Prerequisite: one course in Art History or Art Studio. The notion of "self," "portraiture" and "identity" as it is defined in an electronic world in which media alters perceptions of belief as individuals and society. Hands-on projects plus theoretical analysis of media.

115. Film-making I (4) I, II. Hershman Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, or consent of instructor. Film-making as an art form; 8 and 16 mm. cameras and sound track. May be repeated once for credit with consent of instructor.

116. Video Practice and Theory (4) I. Hershman Studio—8 hours; independent study—1 hour. Prerequisite: 12 units of lower division art studio classes. Production techniques of video, including shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques.

117. Experimental Documentary (4) III. Hershman Studio—8 hours; independent study—1 hour. Prerequisite: upper division standing. Study of the documentary form with particular attention to hybrid forms of film, video and computer genres. May be repeated once for credit with consent of instructor when topic differs.

120. Intermedia Art (4) III. Zhang Studio—8 hours; independent study—1 hour. Prerequisite: three courses chosen from the following: courses 2, 3, 4, 5, and 16. Use of multiple media in art making. Human body as artistic medium. Non-traditional visual media. Problem solving on conceptual and technical levels. Visual metaphors, narrative, intuition, meaning and expression in art. May be repeated once for credit when topic differs and with consent of instructor.

125. Printmaking: Relief (4) II. Cannwath Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other techniques.

126. Printmaking: Intaglio (4) I. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate etching, aquatint, hard- and soft-ground, burin engraving and related methods. May be repeated once for credit when topic differs and with consent of instructor.

127. Printmaking: Lithography (4) III. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal lithography and other planographic methods. May be repeated once for credit with consent of instructor.

128. Printmaking: Serigraphy (4) III. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal lithography and other planographic methods. May be repeated once for credit with consent of instructor. Silk screen and related stenciling methods. May be repeated once for credit with consent of instructor.

141. Sculpture: Material Experiments (4) I. Puls Studio—8 hours; independent study—1 hour. Prerequisite: course 5. Primary application and exploration of a single sculptural material. Examination of its properties, qualities and characteristics for three dimensional expression. May be repeated twice for credit in different subject areas with consent of instructor.

142. Sculpture: Ceramics I (4) I. Zhang Laboratory—8 hours; 1 hour to be arranged. Prerequisite: course 2, 3, 4 and 5, or consent of instructor. Introduction to ceramic forms and processes.

143. Sculpture: Ceramics II (4) II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 142 or consent of instructor. Introduction to color, as well as glazing and use of kiln. May be repeated once for credit with consent of instructor.

*144. Sculpture: Figure Modeling (4) II. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

145. Sculpture: Concepts (4) II. Puls Studio—8 hours; independent study—1 hour. Prerequisite: course 5 or consent of instructor. Investigation through the creation of sculpture of the relationship of idea to form and material. May be repeated once for credit in different subject area with consent of instructor.

146. Sculpture: Ceramics III (4) III. The Staff Laboratory—8 hours; to be arranged—1 hour. Prerequisite: course 141, 143, 144, or 145. Advanced form and color. Clay sculpture in relief and round. May be repeated once for credit with consent of instructor.

Group B: Theory and Criticism

147. Theory and Criticism of Photography (4) I. Hilmann Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present.

148. Theory and Criticism: Painting and Sculpture (4) II. Thiebaud Lecture—3 hours; term paper. Prerequisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces.

149. Introduction to Critical Theory (4) I. Rogoff Lecture—3 hours; discussion—1 hour. Prerequisite: two of Art History 1B, 1C, or 183F. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture.

150. Theory and Criticism of Electronic Media (4) III. Hershman Lecture—3 hours; term paper. Prerequisite: course 116 or 117. The history of electronic media, stressing both aesthetics, applied research and relation to art practice. Analysis of the conceptual biases of electronic media as an artistic mode of expression.

Group C: Special Study Courses

192. Internship (2-12) I, II, III. The Staff (Chairperson in charge) Internship—term paper or catalog. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/NP grading only.)

*193. Seminar in Art Practice (4) I, I, III. The Staff (Chairperson in charge) Discussion-laboratory—8 hours; variable—4 hours. Prerequisite: courses 2 and 3; upper division standing. May be taken for having taken more than one section of drawing, painting, and sculpture. Work (painting, sculpture, drawing, etc.) done for group discussion and criticism, as well as group discussion of contemporary topics in the visual arts. May be repeated once for credit.

196. Directed Group Study (1-5) I, I, III. The Staff (Chairperson in charge) (P/NP grading only.)

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

Graduate Courses

201. Experiments in Art and Visual Communication (4) I, II, III. The Staff Lecture—3 hours. Original work produced for class discussion and criticism. Discussion of work and credit. (P/NP grading only.)

200. Seminar (4) I, II, III. Puls, Rogoff. Hershman and 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. The Staff (Graduate Adviser in charge) Seminar—1 hour. May be repeated for credit. (S/U grading only.)

292. Seminar: Comprehensive Qualifying (1) I, II. The Staff (Graduate Adviser in charge) Seminar—1 hour. Further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.)
Courses in Asian American Studies (ASA)

Direct questions pertaining to the following courses to the instructor or to Asian American Studies Program, 3102 Hart Hall (916-752-3655).

Lower Division Courses

1. Historical Experience of Asian Americans (ASA 4) II. The Staff Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asian Americans from the 1840s to the present within the context of the development of the United States.

2. Contemporary Experience of Asian Americans (ASA 4) I, III. The Staff Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through analysis of relationships between ethnicity, race, and identity, development of Asian American communities and the contemporary American institutional contexts.

20. Calligraphic Expression in Chinese American Culture (ASA 5) II. Leung Lecture—2 hours, studio—3 hours. Survey the legacy of calligraphy in Chinese American families, festivals, temples, and schools. Understanding and appreciating of calligraphic works, critical thinking and analysis of calligraphies, cultural and historical context of Chinese American calligraphy. Offered in alternate years.

98. Directed Group Study (ASA 5) II, III. The Staff (Director in charge)

99. Special Study for Undergraduates (ASA 5) II, III. The Staff (Director in charge)

Upper Division Courses

100. Asian American Communities (ASA 5) II. The Staff Lecture/discussion—4 hours. Prerequisite: course 110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

101. Language and Educational Issues of Asian Immigrants (ASA 5) Osajima Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity issues in American society, especially in public schools. Overview of public policies on language and programs, primarily for Asian language minority students. Offered in alternate years.

110. Theoretical Perspectives in Asian American Studies (ASA 5) II. The Staff Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Theories of race and ethnic relations as tools for understanding the Asian American experience with the society as the unit of analysis.

116. Ethnic Self and Identity (ASA 5) Osajima Lecture/discussion—4 hours. Prerequisite: course 101. Study of cultural and social psychological influences on Asian Americans, with the individual as the unit of analysis.

112. Asian/Pacific American Women (ASA 5) II, III. Leung Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of the cultural, social, and political situations of Asian and Pacific American women using theoretical perspectives from social science disciplines: socialization, family dynamics, domestic and political power, economic production, and division of labor.

130. Asian American Literature (ASA 5) II, III. Leung Lecture/discussion—4 hours. Prerequisite: course 1 or 2, or consent of instructor. Analysis of Asian American writings as expressions of various cultural themes, psychological issues, interpersonal relationships and sociopolitical influences on the Asian American experience.

136. Asian American Drama (ASA 5) II, III. Leung Lecture/discussion—4 hours. Prerequisite: courses 1, 2, or 130; or consent of instructor. Comparative introduction to the dramatic literature of Asian American playwrights such as Frank Chin, Philip Kan Gotanda, Velina Hasu Houston, David Henry Hwang, Wakako Yamauchi, and others from diverse socio-historical, artistic, and theoretical contexts.

150. Filipino American Experience (ASA 5) I. The Staff Lecture—4 hours. Prerequisite: course 1 or 2. Examination of the relationship between the Filipino American community and the larger American society through a critical evaluation of the historical and contemporary conditions, problems and prospects of Filipinos in the U.S.

155. Legal History and the Asian American (ASA 5) I. The Staff Lecture/discussion—4 hours. Prerequisite: course 1 or 2; consent of instructor. Legal history of Asian Americans beginning with the experience of Chinese Americans in the mid-19th century. Includes an examination of laws affecting Asian American communities in immigration, economic activities, and World War II internment.

192. Internship (ASA 5) I, III. The Staff (Director in charge)

Internship—3-15 hours. Prerequisite: enrollment dependent on availability of intern position with priority to Asian American Studies minors. Supervised internship in community and institutional settings related to Asian American concerns. (P/N only.)

197. Tutoring in Asian American Studies (ASA 5) I, III. The Staff (Director in charge)

Tutoring—1-5 hours. Prerequisite: upper division standing and completion of appropriate course with distinction; consent of instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated for credit once for a given course and also for a different course. (P/N only.)

198. Directed Group Study (ASA 5) I, III. The Staff (Director in charge)

Prerequisite: consent of instructor. Primarily intended for upper division students. (P/N only.)

199. Special Study for Advanced Undergraduates (ASA 5) I, III. The Staff (Director in charge)

Prerequisite: consent of instructor. (P/N only.)

Courses in Cantonese (CANT

Lower Division Courses

1-23. Elementary Cantonese (CANT 5-5) I-II. Leung Lecture—3 hours; recitation—3 hours. Introduction to Cantonese grammar and development of conversational skills in a cultural context. Approximately 250 Chinese characters will be introduced during Cantonese 2 and 3. (Not open to native speakers.)

4-56. Intermediate Cantonese (CANT 5-5) I-II. Leung Lecture—2 hours; recitation—2 hours. Prerequisite: course 1-2. Development of conversational skills in a cultural context. Community-oriented language materials in health care, social service, and bilingual education will be introduced.

Asian American Studies

See Asian American Studies; and East Asian Studies
Astronomy

See Physics

Atmospheric Science

(College of Agricultural and Environmental Sciences)

Faculty. See Under Department of Land, Air and Water Resources.

The Major Program

Atmospheric science is the study of the layer of air that surrounds the planet. It includes all weather phenomena, such as frontal systems and clouds, as well as severe weather events such as hurricanes and tornadoes. Concerns regarding the effects of human activity on the quality of the air we breathe, and on possible global warming are also central to this field of study.

The Program. Modern meteorology is a quantitative science that is becoming increasingly computer oriented. In addition to the study of daily weather events, the program deals with fundamental physical processes that involve the general circulation of the atmosphere; mass and energy transfers at the planetary surface and within the atmosphere; and the terrestrial radiation; atmospheric interaction with the biosphere; climate variations; air pollution; meteorology, and developments in modern meteorological instrumentation. As well as providing a broad background in meteorology, the major includes an informal minor area to be chosen from mathematics, computer science, environmental studies, resource management, or a physical or biological science.

Internships and Career Alternatives. Atmospheric science students have participated in internships with the California Air Resources Board, various county Air Pollution Control Districts, and the National Weather Service. Numerous career opportunities exist in the federal and state governments, research and development in the private sector, and education. Examples of career areas are weather forecasting, agricultural meteorology, air pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, environmental consulting, and weather research. Guidance of our graduates continue their education by seeking the M.S. or Ph.D. degree in 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.)

| ENGLISH COMPOSITION REQUIREMENT | 0-8 |
| PREPARATORY SUBJECT MATTER | 62 |
| BIOLOGICAL SCIENCES | 1A |
| CHEMISTRY | 2A, 2B |
| COMPUTER SCIENCE | (Engineering 5 or the equivalent in FORTRAN programming) |
| MATHEMATICS | 21A, 21B, 21C, 21D, 22A, 22B |
| METEOROLOGY | (Atmospheric Science 60) |
| PHYSICS | 9A, 9B, 9C |
| STATISTICS | (Statistics 32) |
| BREADTH/GENERAL EDUCATION | 28 |

Course in Atmospheric Science.

Upper Division Courses

100. Severe and Unusual Weather (3) I, III. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10, high school physics. Extreme or unusual weather events, e.g., floods, blizzards, hurricanes, tornadoes, and deserts. Emphasis placed on scientific perspective and human context. Not intended for students majoring in the physical sciences. Not open to students who have received credit for Atmospheric Science 10. General Education credit: Nature and Environment.

110. Weather Observation and Analysis (4) III, Soong

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 60. Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stationarity, indices, probability of local severe weather, weather map analysis. Use of National Weather Service advisories and forecast products. Laboratory makes use of computer-generated analyses.

111. Weather Analysis and Prediction (5) I, Grojahn

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110, 121B, knowledge of FORTRAN (Engineering 5). Introduction to the use of analysis and predicting mid-latitude weather systems. Quasi-geostrophic theory related to weather prediction and weather forecast model design and verification. Laboratory develops computer methods to illustrate topics in lecture.

120. Atmospheric Thermodynamics and Cloud Physics (3) I, Iwee

Lecture-discussion—3 hours. Prerequisite: Mathematics 21C, Physics 9B, course 60 (may be taken concurrently). Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud formation, cloud growth by condensation and colligations, cloud models.

121A. Atmospheric Dynamics (3) Ii, Nathan

Lecture—3 hours. Prerequisite: course 120, Mathematics 21D, Physics 9B. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulation; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology.

121B. Atmospheric Dynamics (3) III, Nathan

Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems. Rosby waves; Heelitz-Rossby waves; the effect of turbulence; boundary layers; the Planetary wave. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes, cumulus models.

124. Meteorological Instruments and Observations (3) I, Paw U

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 60, Physics 9C. Modern meteorological instruments and their use in meteorological observations and measurements. Both hand-held and micrometeorological instruments are included.

128. Radiation and Satellite Meteorology (4) II, Weare

Lecture-discussion—3 hours; laboratory—1 hour. Prerequisite: course 60, Physics 9B, Mathematics 22B, 21D. Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness.

133. Biometeorology (4) II, Paw U

Lecture—3 hours; discussion—1 hour. Prerequisite: two courses in a biological discipline: Mathematics 15B, Atmospheric and biological interactions. Physical basis for plant, animal and human response and adaptation to short-term and long-term meteorological events. Students who have completed course 165 may receive only two units of credit.

*Course not offered this academic year.

Units:

- 8
- 10
- 3
- 4
- 12
- 3
- 28
- 8-16

Additional units in social sciences and humanities to total 28 units.
149. Introduction to Air Pollution (3) I. Carroll, Chairperson (in charge) Lecture—3 hours. Prerequisite: Mathematics 229, 21D; Chemistry 1B; course 121A or Engineering 103A. Examination of physical and technical aspects of atmospheric pollution. Emphasis on airflow processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Civil Engineering 149.)

*150. Computer Methods in Meteorology (4) II. Grotjahn Lecture—3 hours; laboratory-discussion—2 hours. Prerequisite: Engineering 5, Mathematics 229, and a course in fluid dynamics (course 121A, Physics 104A or Engineering 103A), or consent of instructor. Numerical techniques and applications to meteorological problems. Finite differenting and spectral (Fourier transform) methods. Advection equation, simple forecast models, eigenvalue matrices, time series. Students will write and run FORTRAN programs to illustrate these topics.

150a. Boundary-Layer Meteorology (4) III. Paw U Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development and structure of the atmospheric boundary layer. Observations and theory of the boundary layer and energy transfer from the underlying surface and extending to a maximum of about two kilometers under convective conditions. Turbulent diffusion in the boundary layer. The microclimate at the near ground surface.

192. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—36 hours. Prerequisite: completion of 64 units and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the staff. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.)

Graduate Courses

200. Atmospheric Processes (3) I. Grotjahn Lecture—3 hours. Prerequisite: Mathematics 229-22C; Physics 96. Advanced phenomenological and physical study of atmospheric structure and processes including radiation, statics, thermal structures, weather systems. Accelerated computer presentation of the major topics covered in courses 60, 110A-110B, 120, and 128. Credit not allowed to students having completed any two of these courses.

221A. Advanced Atmospheric Dynamics I (3) II. Nathan Lecture—3 hours. Prerequisite: course 121B. Shallow wave theory and potential vorticity conservation. Mathematical and physical properties of geophysical waves. Wave-wave interactions. Barotropic instability of geophysical flows. Offered in alternate years.

221B. Advanced Atmospheric Dynamics II (3) III. Nathan Lecture—3 hours. Prerequisite: course 221A. Quasi-geostrophic potential vorticity equation for a rotating stratified atmosphere on a sphere. Conditions for instability in stratified atmospheres; baroclinic instability. Wave-zonal flow interaction theory. Forced waves in the atmosphere. Nonlinear theory of baroclinic instability. Offered in alternate years.


230. Atmospheric Turbulence (3) III. Shaw Lecture—3 hours. Prerequisite: course 121B or 158. Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence: Eulerian and Lagrangian scales, spectra, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Offered in alternate years.

231. Advanced Air Pollution Meteorology (3) III. Carroll Lecture—3 hours. Prerequisite: course 149, and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of turbulence, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems are examined. Offered in alternate years.

233. Advanced Biometeorology (3) III. Paw U Lecture/discussion—3 hours. Prerequisite: course 133 or consent of instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, aerosols, and aerobiology. Offered in alternate years.

240. General Circulation of the Atmosphere (3) III. Grotjahn Lecture—3 hours. Prerequisite: course 121B. Large-scale, observed atmospheric circulations. Energy and momentum balances derived and compared with observations. Theoretical frameworks developed to synthesize observed features. Offered in alternate years.

241. Climate Dynamics (3) I. Weyre Lecture—3 hours. Prerequisite: courses 120, 121A, 121B or equivalent; Applied Science Engineering 115 or equivalent computer programming experience; course 122 or equivalent. Dynamics of climatic variations. Global and zonal average energy balance models. Parameterizations of radiative transfer, convection, and ocean circulation. Introduction to primitive equation climate models. Offered in alternate years.

250. Mesoscale Meteorology (3) I. Soong Lecture—3 hours. Prerequisite: graduate standing, course 150, a course in partial differential equations; or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Offered in alternate years.

255. Numerical Modeling of the Atmosphere (4) III. Grotjahn and Soong Lecture—2 hours; laboratory—6 hours. Prerequisite: course 121B and Engineering 5; course 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model development using the shallow water equations and the primitive equations. Operational forecast models. Offered in alternate years.

270-A. Topics in Atmospheric Science (1-3) I, II, III, The Staff (Chairperson in charge) Discussion—1-3 hours. Applications and concepts in (A) Meteorological Statistics; (B) Computer Modeling of the Atmosphere; (C) Design of Experiments and Field Studies in Meteorology; (D) Solar and Infrared Radiation in the Atmosphere; (E) Aerosol and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.

290. Seminar (1) I, 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.)

291-A. Research Conference in Atmospheric Science (1-3) I, II, III. The Staff Lecture/discussion—1-3 hours. Research and discussion of current literature in: (A) Air Quality Meteorology; (B) Biometeorology; (C) Boundary Layer Meteorology; (D) Convective Processes; (E) General Meteorology. May be repeated up to a total of 6 units per semester. (Su grading only.)

*Course not offered this academic year.

298. Group Study (1-9) 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.)

Atmospheric Science
(A Graduate Group)

John J. Carroll, Ph.D., Chairperson of the Group (916-752-3245)
Group Office, 151 Hoagland Hall (916-752-1406)

Faculty. Includes eighteen faculty members from the Departments of Land, Air and Water Resources, Mechanical Engineering, Civil and Environmental Engineering, Geography, Physics, the Institute of Toxicology and Environmental Health, and the Division of Environmental Studies.

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. The student can place major emphasis on graduate work in one or more of the following fields: air quality meteorology, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large scale dynamics, and mesoscale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Considerable flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

Graduate Adviser. K. T. Paw U (Land, Air and Water Resources, 752-1510)
Graduate Admissions Officer. T. H. Nathan (Land, Air and Water Resources, 752-1609)

Avian Medicine
See Medicine and Epidemiology

Avian Sciences
(College of Agricultural and Environmental Sciences)
Barry W. Wilson, Ph.D., Chairperson of the Department
Department Office, 3202A Meyer Hall (916-752-1300)

Faculty
Francine A. Bradley, Ph.D., Lecturer
Ann T. Brice, Ph.D., Lecturer
Ralph A. Ernst, Ph.D., Lecturer
Anna J. King, Ph.D., Associate Professor
Kirk C. Klass, Ph.D., Professor
James R. Millam, Ph.D., Associate Professor
Aida Morozeti, M.S., Lecturer
Kathryn Radeke, Ph.D., Associate Professor
Wesley W. Weathers, Ph.D., Professor
Barry W. Wilson, Ph.D., Professor
The Major Program
Avian sciences is the study of birds and the ways in which they relate to and are useful to humans. The major combines 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 with a broad introduction to biological science.

The Program. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field give students a large role in selecting and designing their own course work. Students may specialize in a bachelor's program that qualifies them for a particular career or they may choose a program to meet other broader intellectual and cultural interests.

Interships and Other Alternatives. Independent study, undergraduate research, and internships are features emphasized in the avian sciences program. There are birds available for laboratory or special studies housed within the main building as well as the research farm and the experimental avairy. A student in the avian sciences major has a variety of career options: health-oriented research, teaching biology, gamebird production, domestic and foreign agricultural extension and advisory services, governmental agencies, or the domestic or exotic bird industries. A recent survey has shown that the majority of avian sciences graduates enter graduate school or are employed by the domestic bird industry. The remainder of the graduates were evenly distributed in the categories of professional schools, avian biology agencies, educational fields, and individual jobs directly associated with birds.

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.)

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Courses</th>
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<tbody>
<tr>
<td>18</td>
<td>Avian Sciences (101, 102, 115, 121, 123, 149, 150, 150l, 151)</td>
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<tr>
<td>12</td>
<td>Food Science and Technology 121, Animal Science 143, Food Science and Technology 120, 121, 121, International Agricultural Development 102, Molecular and Cellular Biology 150, 150l, Nutrition 123</td>
</tr>
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</table>

Courses in Avian Sciences (AVS)

Lower Division Courses

11. Introduction to Poultry Science (3) II. Bradley
Lecture—3 hours; one field trip required. The meeting of birds that have an interest in avian science.

13. Birds, Humans, and the Environment (3) III. Wilson
Lecture—2 hours; discussion—1 hour; half-day field trip. Introductions of the worlds of birds and humans. Lectures, discussions, field trips and topics focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecology, and conservation. Current environment issues are emphasized. General Education credit: Nature and Environment.

15. Captive Raptor Management (2) I, II, III. Morzenti
Laboratory—3 hours; independent study—3 hours; one field trip. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including their husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements.

16L-18L-16LC. Raptor Migration and Population Fluctuations (2-2-3) I-III. Morzenti
Fieldwork—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: consent of instructor. Identifying raptors; study effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; study survey sites; collect, computerize, analyze data; compare with previous years. Species, observations, emphasis are different each quarter.

Upper Division Courses

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Problems in avian biology, nutrition, breeding, and physiology of poultry and wild birds and their products. (P/NP grading only.)

99. Upper Division Courses

100. Principles of Avian Sciences (5) II. King
Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A. Aspects of biology (anatomy, physiology, behavior, nutrition, reproduction, and genetics) that govern the life of birds. Emphasis on those features of birds, domestic, wild and experimental, which are pertinent to poultry. (P/NP grading only.)

101. Patterns in Avian Biology (3) I. Weathers
Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Patterns of reproduction, locomotion, aging, growth and development, energetics, and temperature regulation exhibited by birds. Ecological and evolutionary adaptations and allometric analysis of life history traits. Offered in alternate years.

115. Avian Reproduction and Behavior (3) I. Morzenti
Lecture—4 hours; two Saturday field trips. Prerequisite: Biological Sciences 1A or the equivalent. Study of birds of prey: classification, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry.

123. Management of Companion Birds (3) III. Milham
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species covered include wild and companion birds. Course has a physiological orientation.

130. Poultry Breeding and Genetics (3) I. Alperenan
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Applications of genetic principles in poultry. Action of major genes in the control of morphology, reproduction and disease resistance. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance.

149. Egg Production Management (2) II. Ernst
Lecture—2 hours; one Saturday field trip required. Prerequisite: course 11 or the equivalent, consent of instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg pro-
Avian Sciences (A Graduate Group)

J.R. Millam, Ph.D., Chairperson of the Group
Group Office, 3202 Meyer Hall (916-752-1300)

Faculty. Consists of members from several departments in the College of Agricultural and Environmental Sciences, the Graduate School, and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Avian Sciences, offers the M.S. degree program to students who wish to pursue specialized advanced work on avian sciences. The areas of specialization that may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food chemistry, management, ecology, genetics, comparative nutrition, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis or comprehensive examination, are available.

Preparation. It is expected that the student will have had undergraduate preparation in a field appropriate to the course of study selected. The student will be expected to have had courses in most of the following subjects: general biology, molecular and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

Graduate Adviser. K.C. Klausing (Avian Sciences).

Biochemistry and Molecular Biology (A Graduate Group)

John W. Hershey, Ph.D., Chairperson of the Group
Office, 188 Briggs Hall (916-752-9301)

Faculty. Consists of members from the Colleges of Letters and Science, and Agricultural and Environmental Sciences, and the School of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Biochemistry and Molecular Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. Graduate work in biochemistry involves a broad overview plus specialization in one or more of the following: protein chemistry, control of gene expression, plasmids, gene rearrangements, chromosome structure and function, immunohistochemistry, molecular virology, reproductive biochemistry, structure and function of surfaces, protein synthesis, biochemistry of neoplasms, biochemistry of chloroplasts, lipid biosynthesis, hormonal control of metabolism, photobiology, enzymology, and membrane transport. This information is available from the chairperson of the group.

Graduate Advisers. E. Bandman (Food Science and Technology), D.J. Klonosky (Microbiology), J.C. Lagarias (Molecular and Cellular Biology), T. Wilkins (Agronomy and Range Science).

Courses in Biochemistry and Molecular Biology (BBM)

Graduate Courses

290. Seminar (1, 1, 1, 1). The Staff
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12). The Staff
Research—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

Biological Chemistry

See Medicine, School of

Biological and Agricultural Engineering (College of Agricultural and Environmental Sciences)

David J. Hills, Ph.D., Chairperson of the Department
Department Office, 2030 Bainer Hall (916-752-0102)

Faculty

William J. Chancellor, Ph.D., Professor
Pctawska (Paul) Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Professor
Robert B. Hartsough, Ph.D., Associate Professor
Bruce R. Hartsough, Ph.D., Associate Professor
David J. Hills, Ph.D., Professor
Rian M. Jenkins, Ph.D., Professor
John M. Kocha, Ph.D., Professor
Miguel A. Martinez, Ph.D., Professor
Kathryn McCarthy, Ph.D., Assistant Professor
Michael J. McCarthy, Ph.D., Associate Professor

Biochemistry and Biophysics

See Biological Sciences: Section of Molecular and Cellular Biology

*Course not offered this academic year.
new organizational structure these changes are listed in a concordance table at the back of this catalog. Students who elect a given major are entitled to complete that major according to the degree requirements listed in the catalog at the time the major is declared.

Faculty
All faculty are primary members of one section and some faculty are secondary members of a section as well. See "Sections of the Division" below for a list of faculty in each section.

Programs of Study
Seven majors are offered leading to a B.S. degree in:
- Biochemistry
- Biological Sciences
- Genetics
- Evolution and Ecology (Zoology)
- Microbiology
- Physiology
- Plant Biology (Botany)

Four majors leading to an A.B. degree are offered in:
- Biological Sciences
- Evolution and Ecology (Zoology)
- Microbiology
- Plant Biology (Botany)

Choice of College. The Bachelor of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered by the College of Letters and Science and the College of Agricultural and Environmental Sciences. The major requirements are the same in each college, but there are differences in the college requirements and policies. See the appropriate college sections in the front of this catalog for more information.

Courses. See "Division-wide Programs and Courses" (following "The Major Programs") for descriptions of biological sciences courses offered by the divisions of the division. "Sections of the Division" below for descriptions of courses offered by the individual sections.

Note: Most courses have been reordered or relocated to new sections as a result of the reorganization. A concordance table identifying the previous course number and the new course number or section location appears at the back of this catalog following the last department/course descriptions.

Student Services. Student affairs officers at the division's Undergraduate Academic Programs Office, 66 Briggs Hall, and advising staff in section offices provide information and counseling on the major programs and courses offered by the sections of the division.

The Major Programs
The division offers two categories of majors. One is the Biological Sciences major, which is offered by the entire division. The major is broad in concept, designed to span the numerous core disciplines of biology. The Biological Sciences major covers most dimensions of the study of life, ranging from the molecular to the population level. While emphasizing breadth, the Biological Sciences major also features an area of emphasis requirement which provides concentrated attention to one facet of biology at the upper division level. Each area of emphasis coincides with one of the sections of the division. More specialized majors that focus on one of the core disciplines are offered through individual sections of the division and listed under "Majors in the Core Disciplines of Biology."

Division-wide Biological Sciences Major
(Sections of Evolution and Ecology, Microbiology, Molecular and Cellular Biology, Neurobiology, Physiology, and Behavior, and Plant Biology)

The Program. Students select either a Bachelor of Arts or Bachelor of Science program in Biological Sciences. The Bachelor of Science program includes mathematics, general and organic chemistry, and courses in biology that emphasize breadth as well as depth. This program can be used to satisfy requirements for admission to graduate schools, leading to either a variety of professional health careers, or further study in basic and applied areas of biology. The Bachelor of Arts program prepares students for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. It is an excellent background for students interested in entering a graduate program in biology, a teacher-training program, a health professional school, or other professional schools.

Career Alternatives. The biological sciences degree provides suitable 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. It is an excellent background for students interested in entering a graduate program in biology, a teacher-training program, a health professional school, or other professional schools.

B.S. Major Requirements:

Preparatory Subject Matter ............................................. 60-67
Math 16A-B-16C ............................................................. 9
Chemistry 2A-2B-2C ....................................................... 15
Chemistry 8A-B or 118A ................................................. 118B-118C ......................................................... 6-12
Biological Sciences 1A-1B .............................................. 15
Statistics 32, 100, or 102 ................................................. 3-4
Physics 5A-5B-5C ........................................................... 12

Depth Subject Matter ...................................................... 45 units
Biological Sciences 101, 102, 103, 104, 107, 122, 124, 130, 131 ......................................................... 3-5
Restricted Electives.......................................................... 32

Breadth in the major is obtained by a requirement for at least one course from each of the five field requirements listed.

Field Requirement Course List

(a) Evolution: Anthropology 151, 154A; Evolution and Ecology 100; Geology 107; Plant Science 103 ......................................................... 3-5
(b) Ecology: Anthropology 154A; Biological Sciences 122; Entomology 104, 156, Environmental Studies 100, 121; Evolution and Ecology 101; Geology 145; Microbiology 120; Wildlife and Fisheries Biology 151 ......................................................... 3-4
(c) Microbiology: Food Science 104; Microbiology 102, 132, 162, Soil Science 111; Veterinary Microbiology 127, 128 ......................................................... 3-5
(d) Neurobiology and Behavior: Anthropology 154A, 154B; Entomology 102, 104, Environmental Studies 122; Neurobiology, Physiology and Behavior 101, 102, 141, 160 ......................................................... 3-5
(e) Plant biology: Agronomy 120; Environmental Horticulture 102; Evolution and Ecology 121, 140; Plant Biology 102, 105, 108, 111, 112, 116, 117, 118, 119, 120, 121; Plant Pathology 120, 130; Plant Science 103, Range Science 100 ......................................................... 3-5

Areas of Emphasis:

Evolution and Ecology emphasis ................................13-18

Field requirement: take Evolution and Ecology 100 to satisfy Field requirement (a), and Evolution and Ecology 101 to satisfy Field requirement (b).
Diversity Lists
(a) Animal diversity: Avian Sciences 101; Entomology 100, 107, 109; Evolution and Ecology 105, 115, 133, 134, 136, 137; Nematology 110; Wildlife and Fisheries Biology 110, 111, 120.
(b) Microbial diversity: Microbiology 105, 162; Plant Biology 118, 119, Soil Science 111; Veterinary Microbiology and Immunology 127, 128, 132.
(c) Plant diversity: Evolution and Ecology 121, 140; Plant Biology 102, 108, 116, 121.

Approved Biology Electives
Anatomy 100
Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157
Avian Sciences 100, 102, 130, 150
Biological Sciences—All upper division courses
Cell Biology and Human Anatomy 101, 101L
Clinical Pathology 101, 101L, 102
Entomology and upper division courses
Environmental Horticulture 105, 107
Environnmental Studies 100, 110, 121, 123, 124, 125, 129, 129L, 150C, 150C1, 151L
Evolution and Ecology and upper division courses
Geology 106, 107L, 110L, 111B, 115, 145, 146
150C
Medical Microbiology 107, 115
Microbiology—All upper division courses
Molecular and Cellular Biology—All upper division courses
Nematology 100, 110
Neurobiology, Physiology and Behavior—All upper division courses
Nutrition 101, 110, 111
Philosophy 108
Physical Education 101, 102, 110, 111, 113
Plant Biology—All upper division courses
Plant Pathology 120, 130
Plant Science 101, 102, 103, 109
Psychology 108, 150
Range Science 100, 133, 135
Vegetable Crops 105, 150
Veterinary Microbiology and Immunology 126, 126L, 127, 128, 132
Wildlife and Fisheries Biology 110, 111, 120, 120L, 122, 123, 136, 140, 151

Other Upper Division Courses
There is a limitation on variable-unit courses that may be counted toward the major. Of these courses, up to 4 units of 199 courses may be counted, and no units of 192 or 197 courses may be counted.

Honors and Honors Programs. Students who have met the minimum grade-point average and the units-completion criteria, and who have obtained a sponsoring faculty supervisor may elect to participate in the Biological Sciences Honors Program. The program entails completion of a research project and honors thesis through enrollment in course 194H. Complete details must be obtained from the Undergraduate Academic Programs Office, 66 Briggs Hall, before starting in the Honors Program.

The Division of Biological Sciences also confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade-point average and participate in an appropriate research project.

The division additionally recommends students in the Biological Sciences major to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation. For further details on the above programs and awards, contact the Undergraduate Academic Programs Office, 66 Briggs Hall.

The Minor Program
The minor in Biological Sciences is designed to acquaint students with the range and variety of modern biology, including work in two or three areas: animal biology, plant biology, and microbiology; and in four of the following five subdisciplines: organismal...
**B.S. Major Requirements:**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B-1C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 2A-2B-2C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 9A-8B or 118A-118B-118C</td>
<td>6-12</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C</td>
<td>12</td>
</tr>
<tr>
<td>Physics 5A-5B-5C</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 13, 32, 100, or 102</td>
<td>3-4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 101, 103, 104</td>
<td>13</td>
</tr>
<tr>
<td>Molecular and Cellular Biology 160L, 162L, 163, 178</td>
<td>11</td>
</tr>
<tr>
<td>Evolution and Ecology 100</td>
<td>4</td>
</tr>
<tr>
<td>Course from the following: Microbiology 102-102L; Molecular and Cellular Biology 120L, 170L</td>
<td>6</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>3-13</td>
</tr>
<tr>
<td>Upper division courses in genetics or other fields relevant to the student's interest chosen in consultation with the adviser. No more than 4 units of 198, 199, or 299 can be used for credit in this category</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Units for the Major</th>
<th>110-121</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Adviser. Contact R.S. Hawley (Molecular and Cellular Biology), 345 Briggs Hall.</td>
<td></td>
</tr>
<tr>
<td>Advising Center for the major is located in 156 Briggs Hall (916-752-0202).</td>
<td></td>
</tr>
</tbody>
</table>

**Microbiology Major Program**

The microbiology major is designed to provide a broad background in the biological, medical, and physical sciences basic to the study of modern biology. The major is sufficiently flexible to accommodate students interested in the subject and wish to pursue a career in the basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Microbiology Major Program

(Guidelines for Undergraduate Academic Programs Office, 66 Briggs Hall)

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*COURSE NOT OFFERED THIS ACADEMIC YEAR*
The Program. Both undergraduate major programs provide a balance of studies in microbiology, with appropriate courses in mathematics and physical sciences. The A.B. degree program emphasizes the biological aspects of the field, while the B.S. degree program includes more biochemistry and related coursework. Either program, with judicious course selection, is appropriate for students contemplating a career in medicine or various allied health professions including medical technology, or teaching. The B.S. program is especially well suited for students who want a professional career in microbiology, or who wish to pursue graduate education in a biological science discipline. The choice of a major program and its suitability for particular career options should be discussed with a major adviser.

Career Alternatives. A bachelor's degree in microbiology is excellent preparation for a career in biotechnology, pharmacology, agriculture, and the food industry. It also provides a strong background for students wishing to continue on to professional studies in medicine and the other health sciences.

A.B. Major Requirements:

UNITs
Preparatory Subject Matter

Biology Sciences 1A-1B-1C...........................................15
Chemistry 2A-2B..........................................................10
Chemistry 9A-9B or 11A-11B-11C.....................................12
Mathematics 16A-16B or 21A-21B.....................................6-8
Physics 1A-1B or 5A-5B-5C.............................................6-12
Statistics 13.................................................................4

Depth Subject Matter

Biology Development 1..................................................3
Microbiology 102, 102L, 105, 130A........................................14
Microbiology 162 or Veterinary Microbiology and Immunology 128..........................3-4
Two of the following: Microbiology 120-121, 120L-121L, 130L-130L, 177-177L........................................10-11
Additional units from Microbiology 110, 120L, 120L, 130B, 130L, 177, 177L, Molecular Cell Biology 120L, Plant Biology 114, 118, 119; Veterinary Microbiology and Immunology 126, 127........................................7

Total Units for the Major.............................................85-101

B.S. Major Requirements:

UNITs
Preparatory Subject Matter

Biology Sciences 1A-1B-1C.............................................15
Chemistry 2A-2B-2C........................................................15
Chemistry 9A-9B or 11A-11B-11C........................................6-12
Mathematics 16A-16B-16C.............................................9
Physics 1A-1B or 5A-5B-5C.............................................12
Statistics 13, 32, 100 or 102.............................................3-4

Depth Subject Matter

Biology Sciences 101, 102, 103, 104..................................13
Molecular and Cellular Biology 120L..................................6
Microbiology 102, 102L, 105, 130A, 130B, 130L, 177-177L; Molecular and Cellular Biology 161-170L, Soil Science 111; Veterinary Microbiology and Immunology 127..................................................3-4
Three additional units from Food Science and Technology 104L, 104L; Medical Microbiology 107; Microbiology 110, 120, 120L, 130L, 177, 177L, 199; Molecular and Cellular Biology 119, 119; Soil Science 111; Veterinary Microbiology and Immunology 126, 127, 132, 132........................................3-4

Total Units for the Major.............................................105-119

Master Adviser. M. L. Wheelis (Section of Microbiology), 2202 Storer Hall.

Honors and Honors Program. M. L. Wheelis.

Teaching Credential Subject Representative. M. L. Wheelis. See also the Teacher Education Program.

Graduate Study. The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees in microbiology. The offerings of the Section of Microbiology are augmented by programs of the Department and Sections of Evolution and Ecology; Food Science and Technology; Land, Air, and Water Resources; Molecular and Cellular Biology; Plant Pathology; Plant Biology; Veterinary and Biomedical Sciences; and the Schools of Medicine and of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Section of Microbiology.

Related Courses. For other courses related to Microbiology, see course offerings in the Division of Biological Sciences and departments of Medicine and Epidemiology; Food Science and Technology; Land, Air, and Water Resources; Medical Microbiology; Plant Pathology; Plant Science; and Pathology, Microbiology and Immunology.

Faculty of the Section of Microbiology also teach or participate in the following courses: Biological Sciences 10, 14, and 19.

The Physiology Major Program

(Section of Neurobiology, Physiology, and Behavior)
The study of physiology is concerned with understanding the mechanisms that control and carry out the vital functions of living organisms. The single cell and its contents and the multicellular organism, its systems, to the whole animal and its relationship to its environment—the entire range of function of living matter is investigated.

The Program. An understanding of physiology must be built on a broad scientific background. In the freshman and sophomore years, physiology majors take courses in chemistry, biology, physics, and mathematics. As juniors or seniors, majors can enroll in a variety of physiology courses along with upper division courses in related sciences. With this background, students can participate in a number of advanced laboratory courses or may design an individual, independent project guided by a member of the faculty.

Career Alternatives. Completion of the physiology major provides the foundations for a challenging career in physiology and also serves 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.

B.S. Major Requirements:

UNITs
Preparatory Subject Matter

Biology Sciences 1A-1B-1C.............................................15
Chemistry 2A-2B-2C........................................................15
Chemistry 9A-9B or 11A-11B-11C........................................6-12
Mathematics 16A-16B-16C.............................................9
Physics 1A-1B or 5A-5B-5C.............................................12
Statistics 13, 32, 100 or 102.............................................3-4

Depth Subject Matter

Biology Sciences 101, 102, 103, 104..................................13
Molecular and Cellular Biology 120L..................................6
Microbiology 102, 102L, 105, 130A, 130B, 130L, 177-177L; Molecular and Cellular Biology 161-170L, Soil Science 111; Veterinary Microbiology and Immunology 127..................................................3-4
Three additional units from Food Science and Technology 104L, 104L; Medical Microbiology 107; Microbiology 110, 120, 120L, 130L, 177, 177L, 199; Molecular and Cellular Biology 119, 119; Soil Science 111; Veterinary Microbiology and Immunology 126, 127, 132, 132........................................3-4

Total Units for the Major.............................................105-119

*Course not offered this academic year.

Total Units for Major.............................................107-118

Master Adviser. J. Goldberg (Section of Neurobiology, Physiology, and Behavior), 191 Briggs Hall.

Advising Center. 196 Briggs Hall (916-752-9696)

Graduate Study. The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information on graduate study may be obtained by writing to the Graduate Advisor, Graduate Group Complex. See also the Graduate course offerings in Physiology Graduate Group and Neuroscience Graduate Group. See also the Graduate Studies section in this catalog.

The Plant Biology Major Program

Plant biology is the study of plants as organisms. It includes disciplines of cellular and molecular plant biology and the traditional areas of botany, such as anatomy, morphology, systematics, physiology, mycology, phycology, ecology, and evolution, along with the newer disciplines of cellular and molecular plant biology.

The Program. The plant biology major consists of core courses in applied plant biology, plant anatomy, plant physiology, and plant ecology, as well as biochemistry, cell biology, and genetics. In addition, students complete a set of courses in one of the following areas: 1) applied plant biology, 2) plant evolution and ecology, 3) general plant biology, and 4) plant physiology, development, and molecular biology. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization. Independent research opportunities in plant biology are available. Consult with an adviser.

Career Alternatives. A Plant Biology degree is an excellent credential for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. Plant biologists work in the field, in the forest, in the laboratory, in botanical gardens or nurseries, in food or seed companies, or in pharmaceutical, energy or chemical industries, and pursue rewarding careers in the areas of biotechnology, environmental protection, or agribusiness. The program is also an excellent background for students wishing to enter graduate or other professional schools, including medicine, law or journalism.

Plant Biology (Botany)

A.B. Major Requirements:

UNITs
Preparatory Subject Matter

Biology Sciences 1A-1B-1C.............................................15
Chemistry 2A-2B-2C........................................................15
Agricultural Systems and Environment 120 or Statistics 13 or 100 or 102.............................................4

Depth Subject Matter

Biology Sciences 101.....................................................4
Ecology and Evolution 140 or Plant Biology 116.....................................................4
Plant Biology 105, 111, 112, 117.....................................15
Additional upper division units in Plant Biology or related natural science courses..................................13-14

Total Units for the Major.............................................76-77

Recommended

Biology 102; Evolution and Ecology 100; Plant Biology 118, 119.

For students with interests in specialized areas of plant biology (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions in other sections or departments, may be allowed on prior consultation with a Plant Biology major adviser.
B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>60-61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B-1C</td>
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</tr>
<tr>
<td>Chemistry 2A-2B-2C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 8A-8B</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C</td>
<td>9</td>
</tr>
<tr>
<td>Physics 2A-5B-SC</td>
<td>12</td>
</tr>
<tr>
<td>Agricultural Systems and Environment 120</td>
<td>12</td>
</tr>
<tr>
<td>Statistics 13, 32, 100, or 102</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Depth Subject Matter: 45

Biological Sciences 101 or Plant Science 105 (Students completing the Applied Plant Biology option should take Plant Science 105) 8

Biological Sciences 102, 103, 104 8

Plant Biology 105, 111 8

Completion of one Option listed below 24

Applied Plant Biology Option

- Plant Biology 112 3
- Plant Science 101 or 103 3.4
- Plant Science 140, 145 8
- Molecular and Cellular Biology 120L
- Plant Biology 111L, Plant Science 107L 112L, 140L or Vegetable Crops 191L 3.6
- Additional upper division coursework from the Applied Plant Biology course list to achieve a total of 24 or more units 3.7

Plant Evolution and Ecology Option

- Evolution and Ecology 100 4
- Plant Biology 117 or Plant Science 101 4

One course from the Applied Plant Biology course list (Plant Science 145 recommended) 3.5
- Additional upper division coursework from the Ecology and/or Evolution and Diversity course list to achieve a total of 24 or more units 11.3

General Plant Biology Option

- Evolution and Ecology 100, Plant Biology 112 7
- Plant Biology 117 or Plant Science 101 4

One course from the Applied Plant Biology course list (Plant Science 145 recommended) 3.5
- One course from the Evolution and Diversity course list 3.5
- Additional upper division coursework from any of the above courses, chosen in consultation with an advisor, to achieve a total of 24 or more units 3.7

Plant Physiology, Development, and Molecular Biology Option

- Plant Biology 112 3
- Molecular and Cellular Biology 120L 170L
- Plant Biology 111L or Plant Science 107L 3.4
- One course from the Applied Plant Biology course list (Plant Science 145 recommended) 3.5
- One course from the Ecology course list 3.4
- One course from the Evolution and Diversity course list 3.5
- Additional upper division coursework from the Plant Physiology, Development, and Molecular Biology course list to achieve a total of 24 or more units 3.9

Option Course Lists

Applied Plant Biology Option:
- Agricultural Systems and Environment 100, 107, 110, 110L, 111, 112, 113, 118, 150, 170A, 170B, 175
- Atmospheric Science 333
- Entomology 100, 103, 110, 115, 119, 191L, 135
- Environmental Horticulture

Ecology Option:
- Agronomy 112
- Entomology 102
- Environmental and Resource Sciences 100
- Environmental Studies 101
- Environmental Studies 103
- Evolution and Ecology 121
- Evolution and Ecology 123
- Plant Biology 117
- Plant Science 101
- Range Science 133
- Water Science 100, 104, 122, 122L

Evolution and Diversity Option:
- Evolution and Ecology 102, 104, 144, 149
- Plant Biology 102, 106, 118, 119, 120
- Vegetable Crops 103

Plant Physiology, Development, and Molecular Biology Option:
- Agronomy 130
- Environmental Horticulture 133
- Molecular and Cellular Biology 126
- Plant Biology 125, 135
- Plant Pathology 130
- Plant Science 102, 105, 122, 122L, 140

Total Units for the Major 105-106

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Minor Program</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Biology</td>
<td>23</td>
</tr>
</tbody>
</table>

To satisfy the requirements for a Plant Biology minor, a student must complete Biological Sciences 1A-1B-1C (or equivalent) and 8 additional upper division units including one course from each of the four groups below.

- (b) Physiology and development: Plant Biology 111, 125, 127, Plant Pathology 130.
- (c) Evolution and ecology: Evolution and Ecology 100, Plant Biology 102, 117, Plant Science 103.
- (d) Applied plant biology: Agronomy 100, Plant Science 109, 112, 113, 140, 145

Minor Advisor: Contact the Plant Biology Section Office, 143 Robbins Hall.

Total Units for the Major 77-81

Recommended:
- Biological Sciences 102-103, Geology 3, Physics 5B.

Areas of Study:
- 3. Developmental biology: Molecular and Cellular Biology 150, 150L.

Note: A maximum of 5 units of variable-unit courses (numbered 192, 195, 198) may be applied to upper division elective requirements. Evolution and ecology majors may not substitute course 195 for the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>57-66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A-1B-1C</td>
<td>15</td>
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<tr>
<td>Chemistry 2A-2B-2C</td>
<td>15</td>
</tr>
<tr>
<td>Chemistry 8A-8B or 118A-118B-118C</td>
<td>15-21</td>
</tr>
</tbody>
</table>
- Mathematics 16A-16B-16C or 21A-21B-21C 9-12
- Physics 5A-5B-5C 6-8

Depth Subject Matter:
- Biological Sciences 101, 102, 103, 104 13
- Evolution and Ecology 100, 101, 102 12
- Statistics 100 or 102 or 130A-130B 4-8

*Course not offered this academic year.*
Additional upper division course work in biological sciences to achieve a total of 49 or more units: 16-20 units. Include at least:
(a) 2 units (6 hours/week) of laboratory, and (b) one course from each of the areas of study shown below.

Area of Study:
2. Physiology and functional morphology: Entomology 102; Environmental Studies 120, 126; Evolution and Ecology 105, 133, 170, 170L; Neurobiology, Physiology and Behavior 101; Plant Biology 111, 112, 116.

Note: A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective requirements. Evolution and ecology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered 1977 are not applicable to the upper division elective unit requirement.

Biological Sciences Electives. The following courses are acceptable toward the fulfillment of the upper division biological sciences requirement in the A.B. and B.S. major programs and may be selected without adviser approval. Other elective courses are approved on an individual basis by petition through an adviser.

Anatomy 100
Anthropology 151, 152, 153, 154A, 154B, 155, 156
Botany 101, all upper division courses
Chemistry 107A, 107B
Clinical Pathology 101, 101L
Entomology, all upper division courses except 110
Environmental Studies 110, 116, 121, 123, 150C, 151L
Geology 106, 107, 107L, 111A, 111B, 145, 146, 150C
Microbiology, all upper division courses
Molecular and Cellular Biology, all upper division courses
Neurobiology 110
Nuclear Medicine 110, 111
Philosophy 108
Plant Biology, all upper division courses
Psychology 108, 134, 130
Veterinary Microbiology and Immunology 126, 126L, 128, 132
Wildlife and Fisheries Biology 120, 120L, 121

Total Units for the Major: 105-115

Major Advisers. Students transferring to Davis from another institution and majoring in evolution and ecology must consult an adviser immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Section of Evolution and Ecology Office for adviser assignment. Substitutions of courses not on the above list for major requirements are arranged through the adviser.

Advising Center for the major is located in 2320 Storer Hall (916-752-8223).

Pre-professional students should establish contact with the Health Sciences Advising Office, South Hall, to learn what specific courses are required on their transcripts.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the Department of Education in regard to preparation for certification. See also the section on the Teacher Education Program.

Divisionwide Programs and Courses

Bodega Marine Laboratory Program
A full quarter of undergraduate course work in marine biology is available at the Spring Quarter at the Bodega Marine Laboratory (BML) located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology of marine invertebrates, physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of the laboratory faculty (Biological Sciences courses 120, 120P, 120P, 129, 129F, 129G, 129H, 141L, 141P). The program is residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees.

Application required. Forms can be obtained from the Division of Biological Sciences. Applications are due on or before the pre-registration deadline for spring quarter. Additional information on the Bodega Marine Laboratory Program is available from the Undergraduate Academic Programs—Division of Biological Sciences Office, 66 Briggs, or BML directly, (707) 875-2211, P.O. Box 247, Bodega Bay, CA 94923.

Courses in Biological Sciences (BIS)

Lower Division Courses
1A. Introductory Biology (5) I, II, III, The Staff Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 2B (may be taken concurrently). Introduction to biological molecules, bioenergetics, cell structure and function, elements of molecular biology and viruses. Interdisciplinary course for majors in the biological sciences.
1B. Introductory Biology (5) I, II, III, The Staff Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 1A. Continuation of course 1A. Topics covered include transmission genetics, systems, evolution, survey of the animal kingdom, comparative anatomy, physiology, and adaptation in animals.
1C. Introductory Biology (5) I. Thornton; II. Murphy; III. Bloom/Yoder and O'Neill Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1B. Continuation of course 1B. Topics covered include a survey of invertebrates, protists and algae, and plants, structure and function of plant tissues, adaptive development and evolution of plants, population ecology, ecosystem analysis and human evolution.
10. General Biology (4) I. Marr; II. Keizer; III. Fallk Lecture—3 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 1A. General Education credit: Nature and Environment.
11A-11B. Issues in the Life Sciences (2-2) II. Goldberg Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students; consent of instructor required. Designed to broaden the students' understanding of biology by demonstrating the range of subjects and approaches included in the field of biology. Both basic biological research topics and applied biology will be studied.
19B. Biology of Cancer (3) II. The Staff Lecture—3 hours. Prerequisite: course 1A or 1B, or Molecular and Cellular Biology 108, or Microbiology, Physiology and Behavior 101. Interdisciplinary course offers an introduction to the biological, clinical and psycho-social aspects of cancer, and emphasizes basic understanding of the biological principles of pathology and facies, and the disease process. Designed for students with little scientific background. Offered in alternate years.

98. Directed Group Study (1-5) I, II, III, The Staff (Associate Dean in charge) Prerequisite: consent of instructor. Primarily for lower division students. (FNP grading only.)

Upper Division Courses
101. Genes and Gene Expression (4) I. Gottlieb, Rodriguez; II. Dvorak, Sanders; III. Shen and staff Lecture—4 hours. Prerequisite: course 15B, Chemistry 8B, or 118B or 128B (may be taken concurrently). Nucleic acid structure and function; gene expression and its regulation; replication, transcription and translation; transmission genetics; molecular evolution. Not open for credit to students who have completed Genetics 100. (Former course Genetics 100.)
102. Structure and Function of Biomolecules (3) I. Gasser, Schloëy; II. Hilt, Hjelmeland; III. Thøeg and staff Lecture—3 hours. Prerequisite: Chemistry 6B or 118B or 128B. Structure and function of macromolecules with emphasis on proteins; enzyme kinetics; supramolecular assemblies; membranes; cytoskeleton; cell motility and cell division. Not open for credit to students who have completed Biochemistry and Biophysics 101A. (Former course Biochemistry and Biophysics 101A.)
103. Bioenergetics and Metabolism (3) I. Oci, Schramm; II. Callis, Segel; III. Carlson, Segel Lecture—3 hours. Prerequisite: course 102. Fundamentals of metabolism including glycolysis and oxidative pathways; photosynthesis, biosynthesis of amino acids, nucleotides. Not open for credit to students who have completed Biochemistry and Biophysics 101B. (Former course Biochemistry and Biophysics 101B.)
104. Regulation of Cell Function (3) I. Nuccitelli; II. The Staff; III. Ezzel Lecture—3 hours. Prerequisite: course 101 and 102; course 103 recommended. Membrane receptors and signal transduction; cell trafficking; cell cycle; cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system. Not open for credit to students who have completed Botany 220 and Zoology 120A. (Former courses Botany 220 and Zoology 120.)
120. Developmental Biology of Marine Invertebrates (4) I. Jeffery (Molecular and Cellular Biology)
Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Molecular and Cellular Biology 150-150L, Biological Sciences 102 and 103; course 123 concurrently. Phylogentic patterns of reproduction and development of the marine invertebrates. Emphasis on both modern and classical approaches to understanding gametogenesis, gamete interaction and fertilization, cleavage, cell differentiation, morphogenesis, and larval development and metamorphosis. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)
120P. Developmental Biology of Marine Invertebrates (Advanced Laboratory Topics) (4) I. Jeffery (Molecular and Cellular Biology)
Lecture—30 hours total; discussion—10 hours total. Prerequisite: course 120 concurrently. Students pick a research topic for study. Research will be related to a topic covered in course 120 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)
Lecture—3 hours total; laboratory—30 hours total. Prerequisite: lower division core in biological sciences; course 123 concurrently. Population and community processes. Emphasis on biological and physical processes affecting plant and animal populations in the array of habitats at the ecological reserve. Modelling as a basis for designing experiments. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)
122P. Population Biology and Ecology/Advanced Laboratory Topics (6) III. Strong (Evolution and Ecology) Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 122 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 122 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

123. Undergraduate Colloquium in Marine Science (1) III. The Staff Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker. Course will be held at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)

194H. Research Honors (2) I, II, III. The Staff (Associate Dean in charge)

Independent study—6 hours. Prerequisite: senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisors. (P/NP grading only.)

197T. Tutoring in Biological Sciences (1-2) I, II, III. The Staff (Associate Dean in charge) Prerequisite: upper division standing; appropriate background in biological sciences. Assistance in courses in Biological Sciences under the direction of the faculty. (P/NP grading only.)

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

Graduate Courses

298. Group Study (1-6) I, II, III. The Staff (Associate Dean in charge) Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.

Professional Course

310. Effective Teaching of College Biology (2) II. Thornton (Plant Biology) Informal lecture/discussion—2 hours. Teaching function of an academic career; objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussions; examinations and grading; evaluation; counseling; innovation. (SU grading only.)

Sections of the Division of Biological Sciences

Biological Sciences: Evolution and Ecology

Thomas W. Schoener, Ph.D., Chairperson of the Section
Section Office, 2320 Storer Hall (916-752-1272)

Faculty

Primary Section Members
James A. Doyle, Ph.D., Professor
Olaf W. J. Ellers, Ph.D., Assistant Professor
John H. Gilliss, Ph.D., Professor
Lester D. Gillrie, Ph.D., Professor
Richard K. Grogger, Ph.D., Associate Professor
Charles H. Langley, Ph.D., Professor
Marc M. Marzec, Ph.D., Associate Professor
Marcel Riemann, Ph.D., Associate Professor
Thomas W. Schoener, Ph.D., Professor
H. Bradley Shaffer, Ph.D., Associate Professor
Arthur M. Shapiro, Ph.D., Associate Professor
Academic Senate Distinguished Teaching Award
Judy A. Stamps, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Donald R. Strong, Ph.D., Professor
Catherine A. Toft, Ph.D., Professor
Michael Turelli, Ph.D., Professor

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Emeriti Faculty
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Milton Hildebrand, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Everett W. Jamerson, Ph.D., Professor Emeritus
Jack Major, Ph.D., Professor Emeritus
Milton A. Miller, Ph.D., Professor Emeritus
Timothy Prout, Ph.D., Professor Emeritus
Robert L. Rudd, Ph.D., Professor Emeritus
George W. Salt, Ph.D., Professor Emeritus
G. Ledyard Stebbins, Jr., Professor Emeritus
Kenneth E. F. Watt, Ph.D., LL.D., Professor Emeritus
Grady L. Webster, Ph.D., Professor Emeritus
Stephen L. Wolfe, Ph.D., Lecturer Emeritus

Courses in Evolution and Ecology (EVE)

Lower Division Courses

92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas of the Section of Evolution and Ecology. Internships supervised by a member of the faculty. (Former course Biology 92.) (P/NP grading only.)

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

Upper Division Courses

100. Introduction to Evolution (4) I. Langley, II. Turelli, III. Stanton Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, and 101, and Mathematics 16A, 16B, or equivalent. A general survey of the principles of biological diversity and evolutionary mechanisms. Not open for credit to students who have completed Botany 100, Genetics 100, and Zoology 146. (Former courses Botany 100, Genetics 100, Zoology 146.)

101. Introduction to Ecology (4) I. Mangel, II. Toft, III. Shapiro Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, Mathematics 16A, 16B, or equivalent. A general survey of the principles of ecology. Not open for credit to students who have completed Zoology 125. (Former course Zoology 125.)

102. Advanced Evolution (4) I. Doyle, Gillespie Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Advanced topics and current issues in microevolution and macroevolution, including population genetics, speciation, paleontology, and systematics. Not open to students who have completed Zoology 105 or 106. (Former courses Genetics 105, 106.)

105. Phylogenetic Analysis of Vertebrate Structure (4) I. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B. Structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny. Not open to students who have completed Zoology 105. (Former course Zoology 105.)

112. Invertebrate Zoology (4) II. Ellers, Grogger Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B, course 112L (concurrently); courses in systematics, ecology, and evolution recommended. Survey of the invertebrate phyla, emphasizing basic forms and understanding of morphology, development, natural history, and phylogenetic relationships. Not open to students who have completed Zoology 112. (Former course Zoology 112.)

112L. Laboratory for Invertebrate Zoology (3) II. Ellers, Grogger Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, course 112L concurrently. Field and laboratory experience with representative members of the invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates. Not open to students who have completed Zoology 112L. (Former course Zoology 112L.)

117. Plant Ecology (4) I. Stanton, Pearcy Lecture—3 hours; fieldwork—1 hour; term paper—1 hour. Prerequisite: Biological Sciences 1C recommended; consent of instructor required. Structure of selected plant communities and the relationship of their component species to the environment. Especially recommended for non-majors. General Education credit: Nature and Environment. Not open to students who have completed Plant Biology 101 or Botany 101. (Former courses Plant Biology 101, Botany 101.)

121. Survey of Plant Communities of California (4) II. Barbour Lecture—2 hours; fieldwork—1 hour; term paper—1 hour. Prerequisite: Biological Sciences 1C recommended; consent of instructor required. Structure of selected plant communities and the relationship of their component species to the environment. Especially recommended for non-majors. General Education credit: Nature and Environment. Not open to students who have completed Plant Biology 101 or Botany 101. (Former courses Plant Biology 101, Botany 101.)

133. Patterns in Vertebrate Biology (3) II. The Staff Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, Vertebrate thermoregulation and water balance, circadian and circannual activity, communication, breathing, movements and feeding patterns. Not open to students who have completed Zoology 133. (Former course Zoology 133.)

134. Herpetology (3) III. Shaffer Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B; Evolution and Ecology 104 recommended. The world-wide diversity of amphibians and reptiles with emphasis on behavior, ecology, functional morphology, and evolutionary history. Offered in alternate years. Not open to students who have completed Zoology 134. (Former course Zoology 134.)

134L. Herpetology Laboratory (2) II. Shaffer Laboratory—6 hours; two weekend field trips. Prerequisite: Biological Sciences 1A, 1B; course 104 concurrent. Diagnostic characters and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographic and phylogenetic patterns. Field trips will acquaint students with techniques for studying amphibians and reptiles under natural conditions. Offered in alternate years. Not open to students who have completed Zoology 134L. (Former course Zoology 134L.)

135. Mammalogy (1) I. The Staff Lecture—2 hours. Prerequisite: course 101 or equivalent general course in ecology. Systematics, life history, reproduction, distribution, and physiology of wild mammals. Not open to students who have completed Zoology 136. (Former course Zoology 135.)

136. Mammalogy Laboratory (1) I. The Staff Laboratory—6 hours; extensive weekend field-trips. Prerequisite: course 101 or 136, and consent of instructor. Systematics of California mammals; techniques of study in professional mammalogy. May be
taken concurrently with course 138. Not open to students who have completed Zoology 138L. (Former course Zoology 138L.)

137. Ornithology (2) II. Western (Avian Sciences) Lecture—2 hours. Prerequisite: course 101 or the equivalent course in ecology. Systematics, distribution, physiology, and population dynamics of birds. Students who have had Wildlife and Fisheries Biology 111 may not receive credit for this course. Not open to students who have completed Zoology 137. (Former course Zoology 137.)

137L. Ornithology Laboratory (3) II. The Staff Laboratory—6 hours. Prerequisite: course 101 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. Not open to students who have completed Zoology 137L. (Former course Zoology 137L.)

138. Ecology of Tropical Latitudes (3) II. Shapiro Lecture—3 hours; biweekly research projects. Prerequisite: Biological Sciences 1A, 1B, or 1C. Introduction to plant fossil record, beginning with invasion of land in the Silurian, emphasizing origin and evolution of major groups and adaptations and changing composition and distribution of flora in relation to plate tectonics and climatic change. Not open to students who have completed Botany 140. (Former course Botany 140.)

141. Principles of Systematic Zoology (3) II. Shapiro Lecture—2 hours; biweekly research projects. Prerequisite: Biological Sciences 1B or 1C; course 100 recommended. Historical background, philosophical, rational, contemporary approaches, and working rules of animal biologists, including International Code of Zoological Nomenclature. Offered in alternate years. Not open to students who have completed Zoology 141. (Former course Zoology 141.)

144. Plant Geography (4) II. Elliott-Fisk (Geography) Lecture—3 hours. Prerequisite: course 100 or the equivalent course in plant ecology or taxonomy. i.e., one of courses Evolution and Ecology 117, Geography 102, or Plant Biology 101, 102, 108, 121. The worldwide distribution of the major plant communities and taxa is used to relate to the historical and the theoretical principles of biogeography. Laboratory studies introduce students to the interpretation of data and testing of biogeographical hypotheses. Offered in alternate years. Not open to students who have completed Botany 144. (Former course Botany 144.)

147. Zoogeography (4) I. Shapiro Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial animals. The role of geologic, climatic, and biological changes in the geographic distribution of animals. Offered in alternate years. Not open to students who have completed Zoology 147. (Former course Zoology 147.)

148. Evolution of Ecological Systems (4) I. Shapiro Lecture—3 hours; term paper. Prerequisite: course 101 or Environmental Studies 130 (or the equivalent) and course 100 (or the equivalent). Evolution as an organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation. Offered in alternate years. Not open to students who have completed Zoology 148. (Former course Zoology 148.)

170. Comparative Biomechanics (3) II. Eilers Lecture—3 hours. Prerequisite: Physics 5A and 5B, Mathematics 16A, 16B, and 16C. Biological Sciences 1B, Biomechanics and functional morphology of vertebrates and invertebrates. Emphasis on physical laws that provide design principles for a wide range of organisms. Principles from fluid and solid mechanics, acoustics and vibration, locomotion, skeletal morphology, behavior, and waves. Offered in alternate years. Not open to students who have completed Zoology 170. (Former course Zoology 170.)

170L. Comparative Biomechanics Laboratory (3) I. Eilers Laboratory—6 hours; term paper. Prerequisite: Physics 5A and 5B, Mathematics 16A, 16B, and 16C, Biological Sciences 1B; course 170 recommended to be taken concurrently. Experimental techniques for measuring physical quantities relevant to organisms. Descriptions of principles in fluid, solid, and acoustical mechanics. Emphasis on use of electronic transducers and computerized data collection. Includes a capstone design and research project. Offered in alternate years. Not open to students who have completed Zoology 170L. (Former course Zoology 170L.)

189. Introduction to Biological Research (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: upper division standing in Zoology or related biological science; consent of instructor. Introduction to research methods in biology: presentation and discussion of research by faculty, graduate, and undergraduate students. May be repeated for credit up to a total of 3 units. (Former course Zoology 199B.) (PINP grading only)

190. Undergraduate Seminar (2) I, II, III. The Staff Seminar—2 hours; division standing in the biological sciences or a related discipline. Student reports on current topics with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (Former course Zoology 190.) (PINP grading only)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3.68 hours. Prerequisite: completion of 48 units and consent of instructor. Work experience off and on campus in all subject areas offered in the Section of Evolution and Ecology. Internships supervised by a member of the faculty. Former course Zoology 192. (PINP grading only)

194HA-194HB-194HC. Research Honors (2, 3) I, II, III. The Staff Laboratory—6 hours. Prerequisite: Students who have completed zoology 138 units and qualify for the honors program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full-three-quarter sequence culminating in the writing of an honors thesis. Not open to students who have completed Zoology 194HA-194HB-194HC. (Former course Zoology 194HA/194HB-B/194HC-D) (PINP grading only, pending completion of sequence.)

197T. Tutoring (1-5) I, II, III. The Staff Tutoring—1-5 hours. Prerequisite: upper division standing. Experience in teaching under guidance of the staff. Former course Zoology 197T. (PINP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Former course Zoology 198. (PINP grading only)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Former course Zoology 199. (PINP grading only)

Graduate Courses

221. Behavioral Ecology (3) III. Mangel, Stamps Lecture—3 hours. Prerequisite: course 101 or Neurobiology, Physiology and Behavior 155 or the equivalent, and graduate standing. Introduction to the main topics in modern behavioral ecology, the main experimental techniques used to treat these issues and the major theoretical methods used to develop predictive models. Offered in alternate years. Not open to students who have completed Zoology 221. (Former course Zoology 221.)
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) I. Ignacio
Lecture—3 hours. Prerequisite: course 102; Biological Sciences 103 (may be taken concurrently); Mathematics 16A, Physiology and regulation of bacterial growth including the effect of the environment. Mapping techniques and use of mutants in problem solving.

130B. Bacterial Physiology and Genetics (3) III. Artz, Kowalczewski
Lecture—3 hours. Prerequisite: course 130A. Gene regulation, Proteolytic digestion, and function of the bacterial cell envelope; synthesis of peptidoglycan and lipopolysaccharide; active transport of nutrients; chemotaxis.

130L. Bacterial Physiology Laboratory (3) III. Arzt Laboratory—9 hours. Prerequisite: course 130A and course 102L. Physiology and genetics of bacteria and bacterial viruses. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction. Studies on control of enzyme synthesis by induction, repression and catabolic repression.

162. General Virology (4) I. Manning
Lecture—4 hours. Prerequisite: Biological Sciences 1A, 102. Introduction to the nature of animal, bacterial, and plant viruses, including their structure, replication, and genetics.

177. Metabolism of Anaerobic Bacteria (3) II. Macy (Animal Science)
Lecture—3 hours. Prerequisite: course 102; Biological Sciences 103 (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) II. Macy (Animal Science)
Laboratory—6 hours. Prerequisite: course 102L; course 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experiments dealing with certain characteristics of physiological and metabolic aspects of anaerobic bacteria. Offered in alternate years.

190C. Undergraduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion/conference—1 hour. Prerequisite: upper division standing; consent of instructor. Presentation and critical discussion of staff research activities; designed for advanced undergraduate students. May be repeated for a maximum of 3 units of credit when subject matter differs. (P/N grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/N grading only.)

194H. Microbiology Honors Research (2) I, II, III. The Staff
Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six units of 194H in microbiology; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/N grading only.)

197T. Tutoring in Microbiology (1-5) I, II, III. The Staff (Chairperson in charge)
Tutoring—1-5 hours. Prerequisite: course 102L and 18 upper division units in Microbiology; consent of chairperson. Assist in undergraduate laboratory courses supervised by teaching assistants or faculty; in discussion sections supervised by faculty; and staffing "drop-in" offices for individual help. (P/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.)

*Course not offered this academic year.
283. Principles of Protein–Nucleic Acid Interactions (3) III. Kowalczykowski
Lecture—3 hours. Prerequisite: advanced graduate standing and completion of one year of basic graduate coursework in biochemistry, biophysics, genetics, microbiology, or molecular biology. Physical basis of protein–nucleic acid interaction. Topics include nucleic acid recognition by proteins, thermodynamics of protein–nucleic acid stability, and kinetics of binding processes for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein–nucleic acid interactions. Offered in alternate years.

270. Advanced Animal Virology (3) III. Manning, Privatky
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 alternate years.

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff-research activities. Designed for advanced graduate students. May be repeated for credit. (SU/G grading only.)

291. Selected Topics in Microbiology (1) I, II, III. The Staff
Seminar—1 hour. Current progress in microbiology and molecular biology. (SU/G grading only.)

292. Seminar in Bacterial Physiology, Genetics and Virology (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in bacterial physiology, genetics, and virology with presentations by individual students. (SU/G grading only.)

293. Seminar in Protein Sorting (1) I, II. Klickis
Seminar—1 hour. Prerequisite: consent of instructor. Reading, presentation and discussion of current research papers on the topics of organelle biogenesis, protein sorting and secretion. (SU/G grading only.)

296. Seminar in Animal Virology (1) I. Manning
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (Same course as Pathology, Microbiology and Immunology 292A.) (SU/G grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU/G grading only.)

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

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Biological Sciences: Molecular and Cellular Biology

Carl W. Schmid, Ph.D., Chairperson of the Section Section Office, 149 Briggs Hall (916-752-3611)

Faculty

Primary Section Members
Peter B. Armstrong, Ph.D., Professor
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Judy Callis, Ph.D., Associate Professor
Don M. Carlson, Ph.D., Professor
Wallis H. Clark, Jr., Ph.D., Professor (Animal Science)
James S. Clegg, Ph.D., Professor
Richard S. Criddle, Ph.D., Professor
John H. Crowe, Ph.D., Professor
Michael E. Dahmus, Ph.D., Professor
David W. Deamer, Ph.D., Professor
Roy H. Doo, Ph.D., Professor
Carol A. Erickson, Ph.D., Professor
Marlyn E. Ezler, Ph.D., Professor
Charles S. Gasser, Ph.D., Associate Professor
Robert D. Gray, Ph.D., Professor, Academic Senate Distinguished Teaching Award
R. Scott Hair, Ph.D., Professor
Jerry L. Hedrick, Ph.D., Professor
Leonard H. Hjelmeland, Ph.D., Professor (Biological Chemistry)
William R. Jeffery, Ph.D., Professor
John A. Kiger, Ph.D., Professor
J. Clark Langan, Ph.D., Professor
R. Marc Learned, Professor
Mark G. McNamee, Ph.D., Professor
Gregg B. Morin, Ph.D., Assistant Professor
Jeanette E. Natzel, Ph.D., Associate Professor
Richard L. Nuccitelli, Ph.D., Professor
Raymond L. Rojas, Ph.D., Professor
Mark F. Sanders, Ph.D., Lecturer
Carl W. Schmidt, Ph.D., Professor (Chemistry)
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Che-Kun J. Shen, Ph.D., Professor
Larry R. Sprecher, Ph.D., Lecturer

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Daniel J. Klickis, Ph.D., Assistant Professor
Stephen C. Kowalczykowski, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Brian Mulloney, Ph.D., Professor
Sharon O'Neil, Ph.D., Assistant Professor
Pamela A. Pappone, Ph.D., Associate Professor
Martin J. Privatky, Ph.D., Professor
Steven M. Thog, Ph.D., Assistant Professor
Robert M. Thornton, Ph.D., Senior Lecturer,
Academic Senate Distinguished Teaching Award
LARRY N. Vanderhoef, Ph.D., Professor
Merna R. Villarejo, Ph.D., Professor
Martin Wilson, Ph.D., Professor

Emeriti Faculty
Paul A. Castellano, Ph.D., Professor Emeritus
Sterling Chaykin, Ph.D., Professor Emeritus
Eric E. Conn, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement
Gordon J. Erle, Ph.D., Professor Emeritus
Melvin M. Green, Ph.D., Professor Emeritus
Lloyd L. Ingraham, Ph.D., Professor Emeritus
Paul K. Stumpf, Ph.D., Professor Emeritus

Courses in Molecular and Cellular Biology (MCB)

Lower Division Courses
10. Introduction to Human Heredity (4) I. Sanders; III. Hawley
Lecture—3 hours; discussion—1 hour. Topics in human heredity and human genetics and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development and behavior. Not open to students who have received credit for Genetics 10. (Former course Genetics 10.) General education credit: Nature and Environment.

99. Special Study (1-5) I, II, III. The Staff
Independent study—3-15 hours. Prerequisite: consent of instructor. Not open to graduate students. (Former course Genetics 99.) (BNP grading only.)

Upper Division Courses
120L. Biochemistry Laboratory (6) I. Hedrick, Hill, Sprecher, II. Loughlin (Neurology), Lagarias, Segel, III. Doi, Hill, Criddle, Sprecher
Laboratory—1-2 hours; lecture—1-2 hours; laboratory/ discussion—1 hour. Prerequisite: Biological Sciences 103 (may be taken concurrently). Introduction to labo-

*Course not offered this academic year.
ogy with emphasis on molecular, biophysical, and cellular properties of contractile and motile systems. Not open to students who have received credit for Zoology 121C. (Former course Zoology 121C.)

114. Histology (4) I, II. The Staff
Lecture—4 hours; laboratory—2 hours. Prerequisite: Biological Science 104. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes. Not open to students who have received credit for Zoology 122. (Former course Zoology 122.)

114D. Undergraduate Seminar in Cell Biology (2) I, II. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Students report on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only)

150. Embryology (4) I. Armstrong, Edwards; II. Grey and staff; III. Erickson
Lecture—4 hours. Prerequisite: Biological Sciences 1A-1B, and concurrent enrollment in course 150L. The events and mechanisms of embryonic development, including cell migration, determination, cell differentiation and organogenesis, with emphasis on vertebrates. Not open to students who have received credit for Zoology 100. (Former course Zoology 100.)

150L. Laboratory in Vertebrate Embryology (1) I, II. Armstrong and staff; III. Erickson
Lecture—3 hours. Prerequisite: concurrent enrollment in course 150. The comparative analysis of the embryonic development of vertebrates. Not open to students who have received credit for Zoology 100L. (Former course Zoology 100L.) (P/NP grading only)

151. Senior Colloquium in Developmental Biology (4) II.
Erickson, Nattey, Jaffee, Nuccitelli
Lecture—2 hours; laboratory—6 hours; written report. Prerequisite: Biological Sciences 100L, 200L, 300L. Advanced electives in developmental biology will be followed by sophisticated laboratory exercises that demonstrate lecture topics. Students conduct their own independent studies during last four weeks of quarter; written report due at end of the quarter. Not open to students who have received credit for Zoology 101. (Former course Zoology 101.)

153. Undergraduate Seminar in Developmental Biology (2) I, II. The Staff
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Students report on current topics in developmental biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only)

154. Advanced Developmental Biology (3) II.
Kiger
Lecture—4 hours; discussion—1 hour. Prerequisite: Biological Sciences 100L, 200L, 310L, or consent of instructor. Presentation of detailed aspects of developmental genetics, including gene function and the regulation of gene expression. Not open to students who have received credit for Genetics 144, 146. (Former course Genetics 144.) (P/NP grading only)

170L. Advanced Molecular Genetics Laboratory (4) I.
Learned; III. Morin
Lecture—4 hours; laboratory—4 hours; writing assignment. Prerequisite: Biological Sciences 101; course 120, 120L, or consent of instructor. Microbiology 102L recommended. Molecular techniques in gene transfer, manipulation, and characterizations of DNA, RNA, and proteins using recombinant DNA technology. Limited enrollment. Not open for credit to students who have completed Genetics 102L. (Former course Genetics 102L.)

178. Undergraduate Seminar in Molecular Genetics (1) I. Hawley, II. Hawley, Schrmid, III. Hawley
Seminar—1 hour. Prerequisite: upper division standing in the biological sciences. Not open to students who have received credit for Genetics 120L. (Former course Genetics 120L.)

190C. Undergraduate Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing and consent of instructor. Students present papers related to current research activities. Limited enrollment. Not open to students who have received credit for Genetics 190, 191. (P/NP grading only)

190-D. Undergraduate Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing and consent of instructor. Students present papers related to current research activities. Limited enrollment. Not open to students who have received credit for Genetics 190, 191. (P/NP grading only)

190-internship (1-12) I, II, III. The Staff
Internships—1 to 12 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Department of Molecular and Cellular Biology faculty. (Former course Molecular Biology and Biochemistry 190.) (P/NP grading only)

192. Internship (1-12) I, II, III. The Staff
Internship—1 to 12 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Department of Molecular and Cellular Biology faculty. (Former course Molecular Biology and Biochemistry 190.) (P/NP grading only)

Advanced Research (3) I, II, III. The Staff
Laboratory—6 hours; discussion—1 hour. Prerequisites: upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course and consent of instructor. Research project carried out under the supervision of a faculty sponsor. Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of research to a research group. May be repeated for credit. (Former course Genetics 193.) (P/NP grading only)

194H. Research Honors (3) I, II, III. The Staff
Independent study—9 hours. Prerequisite: 6 units of course 193 and/or 199 with faculty director; senior standing; grade point average of at least 3.25; and consent of Section. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (Former course Biochemistry and Biophysics 194H.) (P/NP grading only)

197T. Tutoring (1-5) I, II, III. The Staff
Tutoring—1 to 5 hours. Prerequisites: upper division standing, completion of course to be tutored, and consent of instructor. To assist the instructor by tutoring students in one of the Department's regular courses. (Former course Biochemistry and Biophysics 197T.) (P/NP grading only)

198. Directed Group Study (1-5) I, II, III. The Staff
Variable—1 to 5 hours. Prerequisite: consent of instructor. (Former course Biochemistry and Biophysics 198.) (P/NP grading only)

199D. Study for Advanced Undergraduates (1-10) I, II, III. The Staff
Independent study—1 to 10 hours. Prerequisite: consent of instructor. (Former course Biochemistry and Biophysics 199.) (P/NP grading only)

Graduate Courses

200A. Current Techniques in Cell Biology (3) I.
Hedrick
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 104 and course 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunocytochemistry, histology, organellar isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with an emphasis on practical avoidance of using the technique. (Same course as Cell and Developmental Biology 200.) Not open to students who have received credit for Zoology 200. (Former course Zoology 200.) (SU grading only)

200B. Current Techniques in Biochemistry (3) II.
Hedrick
Lecture—2 hours. Prerequisite: Biological Sciences 103 and course 120L or the equivalent courses. Current techniques used in biochemical research including protein and carbohydrate analyses, immunocytochemistry, recombinant DNA methods, electrophoretic and chromatographic methods. Not open to students who have received credit for Biochemistry and Biophysics 200. (Former course Biochemistry and Biophysics 200.) (SU grading only)

200C. Current Techniques in Biophysics (3) III.
Hedrick
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffusion, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Biophysics Graduate Course 200.) (SU grading only)

220L. Advanced Biochemistry Laboratory Rotations (5) I, II, III. Hedrick
Laboratory—15 hours. Prerequisite: course 221A (may be taken concurrently), and 120L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodological/procedural exper- iments and experiments of independent design. May be repeated for credit. (Former course Biochemistry and Bio- physics 220L.)
221A. Physical and Chemical Biochemistry (4) I. Baronik (Biological Chemistry), Schmid, Segel
Lecture—4 hours. Prerequisite: Biological Sciences 103; Chemistry 102 or 102C; 107 or 129C, 118C, or the equivalent courses. Biochemical thermodynamics and chemical and physical properties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules. Students who have received credit for Biochemistry and Biophysics 201A. (Former course Biochemistry and Biophysics 201A.)

221B. Integration of Metabolism and Regulatory Phenomena (3) I. Learned, Segel
Lecture—3 hours. Prerequisite: course 221A or consent of instructor. Regulatory phenomena that occur in the control of metabolism; e.g., regulation at enzyme level; integration of metabolic pathways including homeostasis, hormonal influences, turnover of enzymes, comparative aspects of metabolism, regulation of amino acids and lipid metabolism in living systems. Not open to students who have received credit for Biochemistry and Biophysics 201B. (Former course Biochemistry and Biophysics 201B.)

221C. Molecular Biology (4) III. The Staff
Lecture—4 hours. Prerequisite: course 221A. Structure and regulation of DNA and chromatin; transcription and replication; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells. Not open to students who have received credit for Zoology 225. (Former course Zoology 225.)

221D. Cellular Biochemistry (3) II. Eizirik, Hanley (Biological Chemistry), Niemance, Scholz
Lecture—3 hours. Prerequisite: course 221A. Structure and function of cell membranes and cell surface components with emphasis on biochemical principles involved in cell growth, development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system. Not open to students who have received credit for Biochemistry and Biophysics 201D. (Former course Biochemistry and Biophysics 201D.)

231. Membrane Biochemistry (2) III. Niemance
Lecture—2 hours. Prerequisite: course 221D. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Not open to students who have received credit for Biochemistry and Biophysics 206. (Former course Biochemistry and Biophysics 206.)

232. Chemical Modification of Proteins (3) III. Benkoik (Biological Chemistry)
Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 128C or 118C or the equivalent course. 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 function. Not open to students who have received credit for Biochemistry and Biophysics 212. (Former course Biochemistry and Biophysics 212.)

241. Muscle Biochemistry (3) I. Deamer
Lecture—3 hours. Prerequisite: Biological Sciences 102 or 102C, or Biological Sciences 104 or 129C or course 141, or consent of instructor. This course will emphasize biological aspects of muscle function and structure. The general approach will be to discuss cell biology from the viewpoint of membrane components of cells. Offered in alternate years. Not open to students who have received credit for Zoology 241. (Former course Zoology 241.)

242. Muscle Biophysics (4) I. Basinski
Lecture—2 hours discussion—1 hour; term paper. Prerequisite: Biological Sciences 102, 103 and Mathematics 16B or 21B, or consent of instructor. The physical and chemical aspects of muscle function. Not open to students who have received credit for Zoology 236. (Former course Zoology 236.)

248. Seminar in Cell Biology (2) III. Scholz
Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physical and chemical properties of biological membranes and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit. (Former course Zoology 226.)

249. Literature in Cell Biology (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of recent journal articles in cell biology. General topic area will change each quarter. May be repeated for credit. (Former course Zoology 242.) (SU grading only.)

250. Special Topics in Cell Biology (3) I. Deamer
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in cell biology. May be repeated for credit. (Former course Zoology 240.)

251. Biology of Fertilization (3) I. Nuccitelli, Mezzal, Clark, Hendrick
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 104 or the equivalent, and consent of instructor. The morphology, physiology, and biochemistry of gametes, and the mechanism and consequences of fertilization in animals and plants. Offered in alternate years. Not open to students who have received credit for Zoology 225. (Former course Zoology 225.)

252. Cellular Basis of Morphogenesis (4) III. Armstrong
Lecture/discussion—3 hours; term paper. Prerequisite: course 150. Development of form and structure; morphogenetic movement, mechanisms of cellular motility, cell adhesion, intercellular invasion, interaction of cells and tissues in development. Offered in alternate years. Not open to students who have received credit for Zoology 304. (Former course Zoology 304.)

253. Pattern Formation (4) I. Nuccitelli
Lecture—3 hours; term paper. Prerequisite: course 150, Biological Sciences 104 or the equivalent, and consent of instructor. Morphology and mechanism of pattern formation beginning with epiblastic segregation and progression on cell polarity, and the possible systems that will be covered. Offered in alternate years. Not open to students who have received credit for Zoology 205. (Former course Zoology 205.)

254. Mechanisms of Organogenesis (4) II. The Staff
Lecture—3 hours; term paper. Prerequisite: course 150. This course will demonstrate the various means by which the body develops from the organized embryo and differentiate form a functional unit, using five selected organ systems. Offered in alternate years. Not open to students who have received credit for Zoology 206. (Former course Zoology 206.)

255. Molecular Mechanisms in Animal Development (3) I. Natsume, Jeffrey
Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: graduate standing or consent of instructor. Introduction to the molecular mechanisms that control animal development, with a special focus on multiple levels of gene regulation. Expanded systems including Drosophila, amphibians, C. elegans, and mice will be discussed. Readings will be taken from current literature. Offered in alternate years. Not open to students who have received credit for Zoology 208. (Former course Zoology 208.)

265. Cell and Molecular Biology of Cancer (1) Armstrong
Lecture—1 hour. Prerequisite: course 150 or 141 or Biological Sciences 104. Analysis of the cellular and molecular levels of the regulation of normal and neoplastic growth, tumor dissemination, identification and characterization of oncogenic agents, characterization of onco genes and anti-oncogenes. Not open to students who have received credit for Zoology 226. (Former course Zoology 226.)

258. Seminar in Development (2) II. Armstrong, Erickson
Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. (Former course Zoology 258.)

259. Literature in Developmental Biology (1) I, II, III. Erickson
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. (Former course Zoology 259.) (SU grading only.)

262. Recombinant DNA and Genetic Engineering (3) II. Rodriguez
Lecture—3 hours. Prerequisite: course 161 or Microbiology 130A-130B or consent of instructor. This course will explore the biology of necessary elements such as plasmids, transposons insertion sequences, prophages, etc. Both prokaryotic and eukaryotic moveable genetic elements will be discussed. The molecular biology of plasmid replication, illegitimate recombination, etc., will be considered. Offered in alternate years. Not open to students who have received credit for Genetics 202. (Former course Genetics 202.) (SU grading only.)

290C. Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology, biochemistry, genetics, and cell biology. May be repeated for credit. (Former courses Biochemistry and Biophysics 290C.) (SU grading only.)

291. Current Progress in Molecular and Cellular Biology (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. (Former course Biochemistry and Biophysics 291.) (SU grading only.)

295. Literature in Molecular and Cellular Biology (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. (SU grading only.)

296. Research Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: course 221C or consent of instructor. Presentation and critical discussions of research activities of various members of the local molecular and cellular biology community, primarily designed for graduate students. May be repeated for credit. (Former course Biochemistry and Biophysics 296.) (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff
Variable—1.5 hours. Prerequisite: consent of instructor. (Former courses Biochemistry and Biophysics 298, Genetics 298.) (SU grading only.)

299. Research (1-12) I, II, III. The Staff
Independent study—3-36 hours. (Former courses Biochemistry and Biophysics 299, Genetics 299.) (SU grading only.)

Professional Course

300. Methods of Teaching (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems in teaching biochemistry/genetic cell biology. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion and laboratory sections, formulating examinations under supervision of instructor. Participating in the teaching program required for Ph.D. May be repeated for credit. (Former courses Biochemistry and Biophysics 300, Genetics 300.) (SU grading only.)

*Course not offered this academic year.
Biological Sciences: Neurobiology, Physiology, and Behavior

Barbara A. Horwitz, Ph.D., Chairperson of the Department
Section Office, 196 Briggs Hall (916-752-2020)

Faculty

Primary Section Members

Mary Ann S. Barr, Ph.D., Associate Professor
Kenneth H. Britten, Ph.D., Assistant Professor
Earl F. Carstens, Ph.D., Professor
Leo M. Chalupa, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor (Animal Science)
Charles A. Fuller, Ph.D., Professor
Jack M. Goldberg, Ph.D., Lecturer
Charles M. Gray, Ph.D., Assistant Professor
John M. Horwitz, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Barbara A. Horwitz, Ph.D., Professor, Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement
Andrew T. Ishaia, Ph.D., Associate Professor
Patricia Johnson, Ph.D., Adjunct Professor (Nutrition)
Joel E. Keesler, Ph.D., Professor
Peter R. Marler, Ph.D., Professor
Gary P. Moberg, Ph.D., Professor (Animal Science)
Brian Mulloney, Ph.D., Professor
Pamela A. Papone, Ph.D., Associate Professor
Gregg H. Racarabone, Ph.D., Assistant Professor
Grace L. Rosenviit, Ph.D., Assistant Adjunct Professor
Arnold J. Stillman, Ph.D., Professor
Martin W. West, Ph.D., Professor
Martin Wilson, Ph.D., Professor
Charles M. Winget, Ph.D., Lecturer
Donald C. Wood, Ph.D., Professor

Secondary Section Members

Ronald J. Baskin, Ph.D., Professor
John H. Crowe, Ph.D., Professor
Marc Mangel, Ph.D., Professor
Mark G. Mchale, Ph.D., Assistant Professor
Judy A. Stamps, Ph.D., Professor

Emeriti Faculty

James M. Boda, Ph.D., Professor Emeritus
Harry W. Colvin, Ph.D., Professor Emeritus
Frederick W. Lorenz, Ph.D., Professor Emeritus
Verna E. Mendel, Ph.D., Professor Emeritus
Arthur H. Smith, Ph.D., Professor Emeritus

Courses in Neurobiology, Physiology, and Behavior (NPB)

Lower Division Course

10. Elementary Physiology (4) I II. The Staff
Lecture—3 hours; discussion—1 hour. Introduction course in physiology for nonmajors. Not open for credit to students who have had Biological Sciences 1B.

Upper Division Courses

Lecture—5 hours. Prerequisite: Biological Sciences 1B. Physics 1B or SC strongly recommended. Systemic physiology with emphasis on functions of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Not open for credit to students who have completed Physiology 110 or Neurobiology, Physiology and Behavior 110. (Former course 110, Physiology 110.)

101L. Systemic Physiology Laboratory (2)

101. Systemic Physiology Laboratory—4 hours; discussion—1 hour. Prerequisite: course 101 prior to taking 101L recommended, but 101 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 101. Not open for credit to students who have completed Physiology 110 or Neurobiology, Physiology and Behavior 110. (Former course 110L, Physiology 110.)

102. Animal Behavior (3) I Harrier, Stamps
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open to students who have received credit for Neurobiology, Physiology and Behavior 155 or Zoology 155. (Former courses Neurobiology, Physiology and Behavior 155, Zoology 155.)

103. Cellular Physiology/Neurobiology (3) II Papone
Lecture—3 hours. Prerequisite: Biological Sciences 103 and 104 recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to cytoplasmic communication between cells, and the cellular mechanisms of sensory and motor transduction. Not open to students who have received credit for Neurobiology, Physiology and Behavior 100B or Physiology 100B. (Former courses for Neurobiology, Physiology and Behavior 100B, Physiology 100B.)

104L. Cellular Physiology/Neurobiology Laboratory (3)

104L. Cellular Physiology/Neurobiology Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: Biological Sciences 104 or the equivalent; and course 103 may be taken concurrently. Experiments in the physical and chemical processes of cells and tissues. Not open to students who have received credit for Neurobiology, Physiology and Behavior 100L or Physiology 100L. (Former course 100L, Physiology 100L.)

106. Experiments in Physiology: Design and Execution (3) I, II, III. The Staff
Laboratory—7.5 hours; discussion—0.5 hours. Prerequisite: course 101 and consent of instructor. Experiments in current physiological problems. Discussion of experimental design and decision to choose a project; and independently or in groups of 2-3, design an protocol, do the project, and report their findings. May be repeated for credit with consent of instructor. (Former course Physiology 106.) (P/NP grading only.)

111A. Advanced Systemic Physiology Laboratory (3)

111A. Advanced Systemic Physiology Laboratory—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: courses 101, 101L, courses 113, 114 recommended. Selected comprehensive experiments on the cardiovascular, respiratory, digestive, and endocrine systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems. Not open for credit to students who have completed Physiology 111A. (Former course Physiology 111A.)

111B. Advanced Systemic Physiology Laboratory (3)

111B. Advanced Systemic Physiology Laboratory—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: courses 101, 101L; course 112 recommended. Course 111A is not a prerequisite for course 111B. Selected comprehensive experiments on the nervous and muscular systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems. Not open for credit to students who have completed Physiology 111B. (Former course Physiology 111B.)

111C. Advanced Systemic Physiology Laboratory (3)

111C. Advanced Systemic Physiology Laboratory—1 hour; laboratory—6 hours. Prerequisite: courses 101, 101L, Statistics 13; course 112, 113, or 114 recommended. Interfacing physiological recording equipment with microcomputers; data acquisition and analysis using the microcomputer; data interpretation within the framework of physiological concepts. Not open for credit to students who have completed Physiology 111C. (Former course Physiology 111C.)

112. Neuroscience (3) I, II. Caretens Gray, Britten
Lecture—3 hours. Prerequisites: course 101. Presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration. Emphasis on mammalian nervous system. Not open for credit to students who have completed Physiology 112. (Former course Physiology 112.)

113. Cardiovascular, Respiratory, and Renal Physiology (4) I Goldberg, Weidner
Lecture—4 hours. Prerequisite: course 101; Chemistry 85, Physics 55 recommended. An intensive and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiology students and graduate students with related interests. Not open for credit to students who have completed Physiology 113. (Former course Physiology 113.)

114. Gastrointestinal Physiology (3) I Johnson
Lecture—3 hours; term paper; individual conferences. Prerequisite: Evolution and Ecology 12; Chemistry 2A, 2B, Physics 55C; Biological Sciences 102 and 103 recommended. Comparative physiology of the gastrointestinal tract: some pathology and nutritional items will be covered. Not open for credit to students who have completed Physiology 114. (Former course Physiology 114.)

115. Avian Physiology (3) I, III. The Staff
Lecture—3 hours. Prerequisite: course 101 or Biological Sciences 1B. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and reproductive systems. Not open for credit to students who have completed Physiology 115. (Former course Physiology 117.)

119. Invertebrate Physiology (4) I, II. Crowe
Lecture—3 hours; term paper; individual conferences. Prerequisite: Evolution and Ecology 12, Physiology 2A, 2B, Chemistry 55C; Biological Sciences 102 and 103 recommended. Comparative physiology of invertebrate organ systems. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 142 or Zoology 142. (Former courses 142L, Zoology 142L.)

119L. Invertebrate Physiology Laboratory (3) I, II.

Laboratory—6 hours (includes research project). Prerequisite: course 119 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Design and execution of a research project. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 142L or Zoology 142L. (Former courses 142L, Zoology 142L.)

121. Physiology of Reproduction (3) I, II. Anderson
Lecture—3 hours. Prerequisite: course 101. Physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals. Not open for credit to students who have completed Physiology 121. (Former course Physiology 121.)

121L. Physiology of Reproduction Laboratory (1)

121L. Physiology of Reproduction Laboratory—1 hour. Prerequisite: course 101 recommended and may be taken concurrently. Experiments on the reproductive systems of domestic animals including male and female gametes. Not open for credit to students who have completed Physiology 121L. (Former course Physiology 121L.) (P/NP grading only.)

125. Comparative Physiology: Neurointegrative Mechanisms (3) III. Wooley
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal king-
126. Comparative Physiology of Sensory Systems (3) II. Silman
Lecture—3 hours. Prerequisite: course 101. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste), photoreceptors, and electric organs. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 120F or Physiology 128F. (Former courses 120F, Physiology 120F.)

127. Comparative Physiology: Circulation (3) III. Goldberg
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 120B or Physiology 120B. (Former courses 120B, Physiology 120B.)

128. Comparative Physiology: Endocrinology (3) II. Barkley
Lecture—3 hours. Prerequisite: course 101. Comparison of physiological functions in the animal kingdom: endocrinology. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 120B or Physiology 120B. (Former courses 120B, Physiology 120B.)

129. Comparative Physiology: Respiration (3) II. Cech
Lecture—3 hours. Prerequisite: course 101. Comparison of physiological functions in the animal kingdom: respiration. Offered in alternate years. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 120B or Physiology 120B. (Former courses 120B, Physiology 120B.)

130. Physiology of the Endocrine Glan dis (4). Adams
Lecture—4 hours. Prerequisite: course 101. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. Not open for credit to students who have completed Physiology 130. (Former course Physiology 130.)

140. Principles of Environmental Physiology (3) II. Fuller
Lecture—3 hours. Prerequisite: course 101 and Biological Sciences 104, or Biological Sciences 102 or the equivalent. Aspects of interactions of organisms and environment at cellular, system, and organismal levels. Emphasis on regulatory responses/ mechanisms to thermal, pressure and cosmic environmental variables. Not open for credit to students who have completed Neurobiology, Physiology and Behavior 145 or Physiology 145. (Former courses 145, Physiology 145.)

141. Physiological Adaptation of Marine Organisms (3) II. Clegg (Molecular and Cellular Biology), Chang
Lecture—3 hours total; laboratory—30 hours total. Prerequisite: Biological Sciences 102 and 103, Biological Sciences 123 (concurrently), Physics 5A-5B or 5C. Physiological adaptation to the environment among organisms in marine and estuarine habitats. Course offered at Bodega Marine Laboratory. (See "Division-wide Programs" for Bodega Marine Laboratory.) Not open for credit to students who have completed Biological Sciences 121. (Former course Biological Sciences 121.)

141P. Physiological Adaptation of Marine Organisms: Advanced Laboratory Topics (1) II. Clegg (Molecular and Cellular Biology), Chang on request
Laboratory—150 hours total; discussion—10 hours total. Prerequisite: course 141 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 141 and will be conducted in the Bodega Marine Laboratory with the close supervision of resident faculty. (See "Division-wide Programs" for Bodega Marine Laboratory Program.) Not open for credit to students who have completed Biological Sciences 121P. (Former course Biological Sciences 121P.)

150. Hormones and Behavior (3) III. Mendoza
Lecture—3 hours. Prerequisite: courses 101, 102. Endocrine physiology with emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in the individual during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. Advanced Cellular Neurobiology (4) I. Muloney and Wilson
Lecture—3 hours; independent study—1 hour, extensive outside reading; writing of take-home essays. Prerequisite: course 103, Biological Sciences 101, 102, 104, or permission of instructor. Students to be enrolled in SC recommended. A consideration of neuronal structure; ion channels; synapses, transmitters and transmitter pharmacology; receptors; neuroendocrine modulation and circuit dynamics. Not open to students who have received credit for Neurobiology, Physiology and Behavior 143 or Zoology 143. (Former courses 143, Zoology 143.)

160L. Advanced Cellular Neurobiology Laboratory (4) II. Mulliken
Laboratory—12 hours. Prerequisite: course 160, Physics 5C recommended. Students will learn to record neural activity, to interpret their recordings, and to label neurons with antibodies against neurotransmitters. Not open to students who have received credit for course Neurobiology, Physiology & Behavior 143L, or Zoology 143L. (Former courses 143L and Zoology 143L.)

161. Developmental Neurobiology (3) W. Chalupa
Lecture—3 hours. Prerequisite: courses 101 and 103. Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include neural, and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives.

162. Neural Basis of Behavior: Neuroethology (3) III. Muloney
Lecture—3 hours. Prerequisite: courses 102, 103. Analysis of the mechanisms by which cellular properties of neurons determine the characteristics of neural circuits and behaviors, including locomotion, visually and acoustically guided foraging, startle-response, communication, and learning.

190. Proseminar in Physiology (3) I, II, III. The Staff (Chairperson in charge)
Seminar—3 hours. Prerequisite: course 101 and Biological Sciences 104 (or Physiology 100A), one additional upper division course in physiology or a related course in science, and consent of instructor. Student presentations, discussion and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

190C. Introduction to Physiological Research (1) I, II, III. The Staff (Chairperson in charge)
Discussion—3 hours. Prerequisite: upper division standing in physiology or related biological science; consent of instructor. Introduction to research findings and methods in physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (Former course Physiological Research 190.) (P/N grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: completion of 94 units and consent of instructor. Work experience offered and on campus in all subject areas offered in physiology. (Former course Physiology 192.) (P/N grading only.)

*Course not offered this academic year.

194A/194B/194C. Physiology—Honors (1-4) I, II, III. The Staff (Chairperson in charge) Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.5 GPA; approval by the section's Honors Committee. Honors project in physiology. Laboratory research in physiology on a specific question. Project developed with a sponsoring faculty member (Physiology Gradu ate Group member) and approved by the section's Honors Committee. Honors thesis submitted upon completion of the project. Not open for credit to students who have completed Physiology 194A/194B/194C. (Former course Physiology 194A/194B/194C.) (P/N grading only.)

*196A. Voluntary Control of Physiological Processes (2) I, II, III. Lorenz Laboratory—3 hours. Prerequisite: course 196A. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. (Former course Physiology 196A.) (P/N grading only.)

*196B. Voluntary Control of Physiological Processes (1-4) I, II, III. Lorenz Laboratory—3-12 hours. Prerequisite: course 196A. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit with a maximum of 6 units for 196A/196B course sequence. (Former course Physiology 196B.) (P/N grading only.)

1977. Tuning in Neurobiology, Physiology and Behavior (1-5) I, II, III. The Staff (Chairperson in charge)
Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assistance in courses in neurobiology, physiology and behavior under the direction of the ion. (Former course Physiology 1977.) (P/N grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(Former course Physiology 198.) (P/N grading only.)

198. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(Former course Physiology 199.) (P/N grading only.)

Biological Sciences: Plant Biology

Robert W. Pearcy, Ph.D., Chairperson of the Section
Section Office, 113 Robbins Hall (916-752-0617)

Committee in Charge
Karl J. Bradford, Ph.D. (Vegetable Crops)
John J. Herada, Ph.D. (Plant Biology), Chairperson
Teresa M. Murphy, Ph.D. (Plant Biology)
Caroly Napoli, Ph.D. (Environmental Horticulture)
Robert M. Thor, Ph.D. (Plant Biology)
John Yoder, Ph.D. (Vegetable Crops)

Faculty
Faculty includes members of the Departments of Agronomy and Range Science; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; Viticulture and Enology; and the Sections of the Division of Biological Sciences.

Primary Section Members

David E. Bayer, Ph.D., Professor
Richard H. Fisk, Ph.D., Professor
John J. Herada, Ph.D., Associate Professor
William J. Lucas, Ph.D., Professor
Teresa M. Murphy, Ph.D., Professor
Robert F. Norris, Ph.D., Associate Professor
Shannon O'Neil, Ph.D., Assistant Professor
Robert W. Pearcy, Ph.D., Professor
Thomas L. Rost, Ph.D., Professor
Alan J. Sterner, Ph.D., Professor

*Course not offered this academic year.
COURSES IN PLANT BIOLOGY (PLB)

Lower Division Courses

10. Plants, People and the Biosphere (3) I, II, Fall Lecture—3 hours; laboratory—3 hours; field trip (half-day); term paper. Ethnobotanical and ecological themes are emphasized in our dependence on plants, the ecological roles of plants, and the development of botany as a contemporary science. Non-science majors are encouraged to enroll. General Education credit: Nature and Environment. Not open for credit to students who have completed Botany 10. (Former course Botany 10.)

18. Introduction to Plant Biology (3) I, II, Spring Lecture—3 hours; laboratory—3 hours. Prerequisites: General Education B 6, 9. Students are introduced to the general content, methodology, and experimental techniques of modern botany. Special emphasis is on the roles of plants in the biosphere. Not open for credit to students who have completed Botany 10.

110. Plant Physiology (3) I, II, Lucas Discussion—3 hours; laboratory—6 hours. Prerequisites: General Education B 6, 9B, Biochemistry 1B, 1C, Cellular and Molecular Biology 161 or course 111. Focus will be on the physiological and morphological aspects of plants, as well as the functional and evolutionary aspects of plant growth and development. Not open for credit to students who have completed Botany 110.

111. Problems in Plant Physiology (1) I, Lucas Discussion—1 hour; laboratory—6 hours. Prerequisite: course 110. Students will be assigned problems each week that will require the integration of knowledge from course 110 and the ability to critically evaluate the results of experiments. Not open for credit to students who have completed Botany 111.

112. Plant Growth and Development (3) I, II, Thornton Lecture—3 hours; laboratory—3 hours. Prerequisites: General Education B 6, 9B, Biochemistry 1B, 1C, Cellular and Molecular Biology 161 or course 111. Students will be assigned problems each week that will require the integration of knowledge from course 112 and the ability to critically evaluate the results of experiments. Not open for credit to students who have completed Botany 112.

113. Plant Growth and Development (1) I, Thornton Discussion—1 hour; laboratory—6 hours. Prerequisite: course 112. Students will be assigned problems each week that will require the integration of knowledge from course 113 and the ability to critically evaluate the results of experiments. Not open for credit to students who have completed Botany 113.

114. Plant Development and Evolution (4) I, II, Jenkins Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory plant biology (i.e., Biological Sciences 1C). Introduction to form, function, and evolution of vascular plants. Emphasis is given to the development of reproductive strategies in plants and the evolutionary processes that have led to the diverse array of plant forms. Not open for credit to students who have completed Botany 114.

115. Plant Ecology (4) I, Pearcy Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, 1E, course 110, course 112, or course 113. Description of the ecological relationships between plants and their environment, especially as they relate to the processes of plant evolution. Not open for credit to students who have completed Botany 115.

116. Plant Ecology (4) I, Pearcy Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, course 110, course 112, or course 113. Description of the ecological relationships between plants and their environment, especially as they relate to the processes of plant evolution. Not open for credit to students who have completed Botany 116.

117. Plant Ecology (4) I, Pearcy Lecture—3 hours; three to five field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, course 110, course 112, or course 113. Description of the ecological relationships between plants and their environment, especially as they relate to the processes of plant evolution. Not open for credit to students who have completed Botany 117.

118. Introduction to Botany (4) I, II. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisites: Biological Sciences 1A, 1B, 1C, Comparative morphology, physiology, development, and reproduction of the major groups of non-vascular plants. Focus is on anatomy of plant life. Study of the anatomy of plant life. Not open for credit to students who have completed Botany 118. (Former course Botany 118.)

119. Introductory Mycology (5) I, MacDonald (Plant Pathology) Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisites: Biological Sciences 1A, 1B, 1C. Introduction to the classification, ecology, and taxonomy of selected species of the major divisions of the fungi. Not open for credit to students who have completed Botany 119. (Former course Botany 119.)

120. Introduction to Weed Science (3) I, II, Beyer Lecture—2 hours; discussion—3 hours. Prerequisites: Biological Sciences 1A, 1B, 1C, Chemistry 68, 88. Principls and weed-killer mechanisms, biological, chemical and control methods. Weed control in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Identification of weeds and their control principles. Not open for credit to students who have completed Botany 120. (Former course Botany 120.)

121. Biology of Weeds (3) I, II, Rejmanek Lecture—2 hours; laboratory—3 hours. Prerequisites: Biological Sciences 1A, 1B, 1C, Organs and evolution, beneficial and harmful aspects, reproduction and dispersal, seed germination and dormancy, growth, development, ecology, interaction of weeds and crops, natural succession, and herbicide-induced succession. Laboratories will emphasize taxonomy of weeds and their control principles. Not open for credit to students who have completed Botany 121. (Former course Botany 121.)

122. Action of Herbicides (3) I, II, Beyer Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120, Soil Science 100; courses 111, 111D recommended. Influence of plants and soils on the actions of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils. Not open for credit to students who have completed Botany 122. (Former course Botany 122.)

123. Molecular Biology of Plant Development (3) I, II, A. K. Y. Ng Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, Molecular and Cellular Biology 161 or course 111. Gene expression and its control in plant development and its influence on growth and differentiation of plant tissues. Not open for credit to students who have completed Botany 123. (Former course Botany 123.)

135. Mineral Nutrition of Plants (4) I, II, Richards (Land, Air and Water Resources) and Brown (Pomology) Lecture—3 hours; laboratory—3 hours. Prerequisites: course 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. Not open for credit to students who have completed Botany 135. (Former course Botany 135.)

150. Biology and Management of Freshwater Macrophytes (3) I, Anderson Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C, Chemistry 68; course 111 or Water Quality 122 recommended. Brief survey of common freshwater macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology and management. Offered in alternate years.

*Course not offered this academic year.
Biomedical Engineering (A Graduate Group)

David F. Katz, Ph.D., Chairperson of the Group

Group Office, 3078 Bailer Hall (Chemical Engineering), (916)-752-2504

Faculty. Includes faculty members from the three colleges, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study are intended to prepare students for professional work in the effective integration of engineering with biology and medical sciences, including modeling of biological systems and the design of devices and procedures useful for human and veterinary medicine. It is a broadly interdepartmental program which is best suited for students who are capable of working comfortably with collaborative independence. Each student together with an advisor defines a specific course of study suited to individual goals.

Preparation. The program regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some such training can be acquired after admission to the program. A general science course in biology and chemistry is expected, including biological systems and the design of devices and procedures useful for human and veterinary medicine. It is a broadly interdepartmental program which is best suited for students who are capable of working comfortably with collaborative independence. Each student together with an advisor defines a specific course of study suited to individual goals.

Courses in Biomedical Engineering (BIM)

Graduate Courses

200. Introduction to Biomedical Engineering (2) I. Katz Lecture—2 hours. Prerequisite: Biological Sciences 1A and 1B, Engineering 17, 38, and 45, and consent of instructor. Introduction to several primary fields of specialization in biomedical engineering. Fields include the following: 1) sensors, instrumentation, and signal processing; 2) orthopaedic biomechanics; 3) whole body biomechanics; 4) imaging; and 5) transport.

210. Introduction to Biomechanics (4) J. Shackelford Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood coagulation; properties of bones, joints, and blood vessels; biocompatibility of orthopaedic and cardiovascular materials.

225. Spatial Kinematics and Robotics (3) II. Yang Lecture—3 hours. Prerequisite: Mechanical Engineering 222. Spatial kinematics: point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: Solving for kinematics equations and differential equations; motion trajectories and dynamic analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videometrics, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Mechanical Engineering 227/Physical Education 227.)

226. Skeletal Muscle Mechanics: Form, Function, and Adaptability (3) III. Hull Lecture—3 hours. Prerequisite: graduate standing, consent of instructor, and basic background in biology, physiology, and engineering. Engineering 3 and 45, Mathematics 22B, and Neurobiology and Behavior 110 recommended. Basic structure and function of skeletal muscle is examined at the microscopic and macrosopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Special emphasis on the relation between muscle structure and muscle mechanics (e.g., force, work, power). (Same course as Physical Education 226.)

231. Musculo-Skeletal System Biomechanics (3) III. Hull Lecture—3 hours. Prerequisite: Engineering 102, Mechanical Engineering 176. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years. (Same course as Mechanical Engineering 231.)

252. Advanced Information Systems (3) II. Waters Lecture—2 hours. Prerequisite: consent of instructor. Experience in initial stages of data preparation, editing, and sorting. Computer Science Engineering 185 or 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 personnel needs, and to prepare students to apply this understanding in the solution of specific problems in the creation, design and implementation of information systems.

290. Seminar (1-12) I, II, III, IV. The Staff Seminar—1 hour. Seminar in biomedical engineering. (SU grading only.)

296. Group Study (1-5) I, II, III, IV. The Staff Study—1 hour. Seminar in biomedical engineering. (SU grading only.)

Concordance Table for Biological Sciences appears at the back of this catalog

*Course not offered this academic year.

Biophysics

Richard Nuccitelli, Ph.D., Chairperson of the Group

Group Office, 154 Briggs Hall (919-752-3091)

Faculty. Includes faculty members from the Departments of Molecular and Cellular Biology, Chemistry, Physics, and the School of Medicine.

Graduate Study. The Graduate Group in Biophysics offers programs of study leading to the Ph.D. degree. Biophysics is a broad interdisciplinary program that is ideal for students who are comfortable with considerate interdependence. The emphasis is on molecular biophysics. The curriculum consists of certain core courses in biology, chemistry, and physics, followed by specially courses related to research interests.
Specific program requirements are decided upon by a curriculum committee consisting of a research supervisor, the graduate adviser, and a group member. The Committee meets to consider individual educational needs with the student.

Graduate Adviser: R.J. Baskin (Molecular and Cellular Biology).

Courses in Biophysics (BPH)

Graduate Courses

200. Current Techniques in Biophysics (2) III. The Staff
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including microscopy, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Molecular and Cellular Biology 200C.) (S/U grading only.)

200A. Biophysics Laboratory (3) I, II, III. The Staff (Chairperson in charge)
Laboratory—18 hours (5 weeks). Prerequisite: course 200 (may be taken concurrently). Laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design.

200B. Biophysics Laboratory (6) I, II, III. The Staff (Chairperson in charge)
Laboratory—two 18-hour rotations (5 weeks each). Prerequisite: course 200 (may be taken concurrently). Two five-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design.

200C. Research Conference in Biophysics (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Biophysics and/or consent of instructor; course 200B concurrently. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

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

Cell and Developmental Biology

(A Graduate Group)

Carol A. Erickson, Ph.D., Chairperson of the Group
(916-752-8316)
Group Office, 188 Briggs Hall (916-752-9091)

Faculty. The group includes 40 faculty members from 17 departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Cell and Developmental Biology offers programs of study leading to the Ph.D. degree. Cell and Developmental Biology is a broad interdisciplinary program. The curriculum consists of core courses in cell biology or developmental biology. Specific programs of study are decided upon by an advisory committee chaired by the student's research adviser, and the choice of major core courses will reflect the student's primary research interest.

Preparation. Appropriate preparation is an undergraduate degree in a biological or physical science. Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and introductory courses in statistics, biochemistry, genetics and biology.

Graduate Adviser: J. Natzie (Molecular and Cellular Biology), S. Meisel (Cell Biology and Human Anatomy).

Courses in Cell and Developmental Biology (CDB)

Graduate Courses

200. Current Techniques in Cell Biology (2) I. Nuciferi
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 104 and Molecular and Cellular Biology 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with an emphasis on pitfalls to avoid when using the techniques. (Same course as Molecular and Cellular Biology 200A.) (S/U grading only.)

200A. Cell and Developmental Biology Laboratory (3) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week assignment in the research laboratory of a Cell and Developmental Biology Graduate Group member. Individual research problems with emphasis on methodological/procedural experience and experimental design.

200B. Cell and Developmental Biology Laboratory (6) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). Two five-week assignments in research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on methodological/procedural experience and experimental design.

200C. Cell Biology of the Cytoskeleton (2) III. Tablin
Lecture—1 hour and discussion 1/2 hour (course hours entered to run sequentially); student presents critical analysis of current journal article and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduction to cytoskeletal proteins; actin, tubulin, intermediate filaments, myosin, and other associated proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (S/U grading only.) Offered in alternate years.

Botany

See Biological Sciences: Section of Plant Biology; Plant Science; and Plant Biology (A Graduate Group) for graduate study.

Cantonese

See Asian American Studies.

*Course not offered this academic year.

Cell Biology and Human Anatomy

See Medicine, School of

Chemistry

(College of Letters and Science)

Chairperson of the Department

Vice-Chairperson of the Department

Department Office, 108 Chemistry Building (916-752-0503/9093, FAX 916-752-8995)

Faculty

Alan L. Balch, Ph.D., Professor
R. David Brit, Ph.D., Assistant Professor
Timothy C. Donnelly, Ph.D., Lecturer
Ronald Fawcett, Ph.D., Professor
William H. Fink, Ph.D., Professor
Edwin C. Friedrich, Ph.D., Professor
William M. Jackson, Ph.D., Professor
Susan M. Kautzlar, Ph.D., Associate Professor
Elie Kiefer, Ph.D., Professor
Peter E. Kelly, Ph.D., Associate Professor
Mark J. Kirsch, Ph.D., Professor
Gary D. Knaier, Ph.D., Professor
Donald A. Land, Ph.D., Assistant Professor
Carlo L. Lebrilla, Ph.D., Assistant Professor
August H. Mahr, Ph.D., Professor
Edward M. McDougal, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Claus E. Mears, Ph.D., Professor
R. Bryan Miller, Ph.D., Professor
Taddeus F. Molinski, Ph.D., Assistant Professor
W. Kenneth Musker, Ph.D., Professor
Kristinam P. Nambrant, Ph.D., Assistant Professor
Michael H. Nantz, Ph.D., Assistant Professor
Philip P. Nave, Ph.D., Professor
Peter A. Rock, Ph.D., Professor
Carl W. Schmidt, Ph.D., Professor
Neil E. Schore, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Kevin M. Smith, Ph.D., Professor
James H. Swinehart, Ph.D., Professor
Dino S. Tinti, Ph.D., Professor
Nancy S. True, Ph.D., Professor
Susan C. Tucker, Ph.D., Assistant Professor
Fred E. Wood, Ph.D., Lecturer

290. Current Topics in Cell and Developmental Biology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (S/U grading only.)

290C. Research Conference in Cell and Developmental Biology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing in Cell and Developmental Biology and/or consent of instructor; course 290 concurrently. Presentation and discussion of faculty and graduate-student research in cell and developmental biology. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)
Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry. See also the Graduate Division section in this catalog.

Courses in Chemistry (CHE)

Lower Division Courses

1A, 1B, 1C, General Chemistry

These courses have been cancelled and replaced by courses 2A, 2B, 2C.

2A. General Chemistry (5) I. Wood, Donnelly, Tintel, Il. La Mar, Rock, Wood

 Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics strongly recommended; satisfactory score on diagnostic examination or course 9 with grade of C or better. Periodic table, stoichiometry, chemical equations, physical properties and kinetic; theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties of gases, atomic spectroscopy, and introductory quantitative analysis. General Education credit for non-GE course sequence (2A-2B) which will satisfy one GE course: Nature and Environment.

2AH, Honors General Chemistry (5) I. Maki

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics; satisfactory score on diagnostic examination; Mathematics 21A (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH orystem.

2B. General Chemistry (5) I. Donnelly, Donnelly, Lebrilla, III. Donnelly, Rock, True

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A or 2AH. Continuation of course 2A. Condensed phases and intermolecular forces, chemical Thermodynamics, chemical equilibria; acids and bases; solubility; laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. General Education credit for non-GE course sequence (2A-2B) which will satisfy one GE course: Nature and Environment.

2BH, Honors General Chemistry (5) II. True

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A with consent of instructor or course 2AH with a grade of C or better; and Mathematics 21B (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C.

2C. General Chemistry (5) I. Tucker, Jackson; III. Jackson and staff

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B or 2BH. Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in kinetics, electrochemistry, quantitative analysis using instrumental methods, qualitative analysis, and inorganic and organic synthesis.

2CH, Honors General Chemistry (5) III. Brit

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B with consent of instructor or course 2BH with a grade of C or better; and Mathematics 21C (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2C.

4A, 4B, AC. General Chemistry

These courses have been cancelled and replaced by courses 2AH, 2BH, 2CH.

8A. Organic Chemistry: Brief Course (3) I. II. The Staff

Lecture—3 hours. Prerequisite: course 1B with a grade of C or better. With course 8B an introduction to the nomenclature, structure, chemistry, and reac-
tional mechanisms of organic compounds. Intended for students majoring in areas other than chemistry.

9. Introduction to General Chemistry (2) I. Donnelly

Lecture/discussion—3 hours. Prerequisite: chemistry diagnostic examination; open to credit for students who have passed the exam or completed course 2A or 2AH. Introduction to chemistry. Students who complete course 9 will receive only 3 units credit for course 2A. Course 9 must be taken for a letter grade and may not be repeated. The offerings of this course, instruction may be video.

10. Concepts of Chemistry (4) I.

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 ful credit. General Education credit: Nature and Environment.

18. 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.)

Special Study for Undergraduates (1-5) I, II, III. The Staff

Chairperson in charge

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

107A. Physical Chemistry for the Life Sciences (3) I. Fink

Lecture—3 hours. Prerequisite: course 4C or 5 or consent of instructor. Mathematics 16C or 21C; one year of college level physics. A basic course in physical chemistry for students of 107A. Development and application of the principles of chemical thermodynamics. Rate processes. Introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and colloidal systems. Considerations on bio-irreversible processes.

108. Physical Chemistry of Macromolecules (3) I. Schmid

Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural thermodynamic and transport properties of polymers in bulk and in solution. Physical characterization of biological polymers. Special topics on the properties of polyelectrolyte systems.

110A. Physical Chemistry: Thermodynamics (3) I. Lebrilla, III. Fink

Lecture—3 hours. Prerequisite: course 5 or 4C; Mathematics 16C or 21C; one year of college physics. Development and application of the principles of chemical thermodynamics.

110B. Physical Chemistry: Quantum Mechanics (3) I. McQuarrie, II. The Staff

Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

110C. Physical Chemistry: Kinetics (3) II. Fink; III. Fauci

Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.
117. Physical Chemistry: Methods and Applications (4) I. Land, III. Tinti
Lecture—4 hours; laboratory—6 hours. Prerequisite: courses 110C (may be taken concurrently) and 115. Introduction to the chemical literature, methods of data analysis, techniques of physical measurements, vacuum techniques, and spectroscopic experiments from the areas of thermodynamics, spectroscopy, and kinetics.

115. Instrumental Analysis (4) I. Fawcett
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Theory and practice of modern instrumental analysis with emphasis on electroanalytical and spectroscopic methods and separation science. Introduction to instrumentation electronics. Laboratory focuses on trace analyses of samples by high-sensitivity techniques.

118A. Organic Chemistry for Health and Life Sciences (4) I. Schoen, II. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1C Cor 4C with a grade of C or higher. The 119A, 119B, 118C series is designed to fulfill the requirements of students planning professional schools in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and on preparation and reactions of aromatic hydrocarbons, alkenes, aldehydes, and alcohols.

118B. Organic Chemistry for Health and Life Sciences (4) I. Nambiar, II. The Staff
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 1C 1B 4A course 114A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic compounds, aldehydes and ketones.

118C. Organic Chemistry for Health and Life Sciences (4) I. Kurth, III. Nambiar
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118B. Continuation of course 118B, with emphasis on separation and purification of organic compounds.

120. Physical Chemistry Laboratory: Advanced Methods (5) I. Miller, II. The Staff
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110C and 111. Design of experiments; experimental control and data acquisition using microcomputers. Laboratory emphasizes the use of microcomputers in advanced physical-chemical experiments.

121. Introduction to Molecular Structure and Spectra (4) I. Miller, II. The Staff
Lecture—4 hours. Prerequisite: course 110B. Modern theoretical methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.

124A. Inorganic Chemistry: Fundamentals (3) I. Kauzlarich
Lecture—3 hours. Prerequisite: course 1C 4C. Symmetry, molecular geometry and structure, molecular orbital theory of bonding, vibrations and transitions, solid state chemistry, energetics and spectroscopy of inorganic compounds.

124B. Inorganic Chemistry: Main Group Elements (3) II. The Staff
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and organometallic compounds containing main group elements.

124C. Inorganic Chemistry: d and f Block Elements (3) III. Balch
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

128A. Organic Chemistry (3) I. The Staff, II. Schoen
Lecture—3 hours. Prerequisite: course 1C 4C with a grade of C or higher. Organic chemistry majors should enroll in course 128A. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry.

128B. Organic Chemistry (3) II. Nantz
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 functional groups and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.

129C. Organic Chemistry Laboratory (3) I. Nantz, III. The Staff
Lecture—3 hours. Prerequisite: course 128B. Chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on condensation reactions and the chemistry of amine, ethers, alcohols, and sugars. Selected biologically important compounds.

129D. Organic Chemistry Laboratory (2) I. Miller, II. The Staff
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 129B or consent of instructor. Course 129B may be taken concurrently.

129E. Organic Chemistry Laboratory (2) I. Miller, III. The Staff
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 129B. Application of chemical techniques to the qualitative identification of organic compounds.

130. Qualitative Organic Chemistry (4) I. Miller
Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 5, 128C, 129C. Application of physical and chemical techniques to the qualitative identification of organic compounds.

131. Modern Methods of Organic Synthesis (3) I. Miller
Lecture—3 hours. Prerequisite: course 128C. Introduction to modern synthesis methodology in organic chemistry with emphasis on stereochemistry. Additional reactions and application to multistep syntheses of organic molecules containing multifunctionality.

140. Synthetic Methods (4) I. Power
Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 128A, 128B. Synthesis of organic compounds using modern methods and utilizing the knowledge and experience gained in the laboratory. Course 140 is offered in the fall, spring, and summer quarters.

159. Chemistry of Natural Products (3) I. Miller
Lecture—3 hours. Prerequisite: course 128C. Chemistry of terpenes, steroids, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.

192. Internship in Chemistry (1-6) I. Miller, II. Miller, III. The Staff (Chairperson in charge)
Internship—3-18 hours. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised experience in a chemical area requires a final written report. May be repeated for a total of 6 units. (P/NP grading only.)

194HA-194HB-194HC. Undergraduate Honors Research (2-2-2) I-II-III. The Staff (Chairperson in charge)
Independent study—2 hours. Prerequisite: open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty member culminating in the writing of an extensive report. (Deferred grading only, pending completion of sequence.)

195. Industrial Chemistry (1) I. Kurth
Seminar—3 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (P/NP grading only.)

197. Projects in Chemical Education (1-4) I, II, III.
The Staff (Chairperson in charge)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
The Staff (Chairperson in charge)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

201. Basic Chemical Uses of Symmetry and Group Theory (2) I. Power
Lecture—2 hours. Prerequisite: graduate standing in chemistry. Symmetry elements, operations and point group, molecular symmetry. Representations of groups. Applications to molecular orbitals and molecular vibrations.

205. Symmetry, Spectroscopy, and Structure (3) I, II, Balch
Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectroscopy: electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.

210A, 210B. Quantum Chemistry: Introduction and Stationary-State Properties (3) I. Tinti
Lecture—3 hours. Prerequisite: courses 110B and 110C or consent of instructor. Stationary-state quantum chemistry: postulates of quantum mechanics, simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules.

210B. Quantum Chemistry: Time-Dependent Systems (3) I, II, Tucke
Lecture—3 hours. Prerequisite: course 210A. Molecular spectroscopy. Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics.

211A. Advanced Physical Chemistry: Statistical Thermodynamics (3) I. Rock
Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, liquids, and solutions. (P/NP grading only.)

211B. Statistical Mechanics (3) I, II, McQuarrie
Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, transport in random fields, Brownian motion and linear response theory. Offered in alternate years.

212. Chemical Dynamics (3) I, II, Jackson
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Offered in alternate years.
215. Theoretical and Computational Chemistry (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 211A and 210B or consent of instructor. Mathematics of molecular quantum mechanics, computational quantum chemistry, and computational methods for quantification of molecular structures. Emphasis may vary in successive years. May be repeated for credit when topics differ. Offered in alternate years.

216. Magnetic Resonance Spectroscopy (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 210A, 210B may be taken concurrently. Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, electron spin resonance, theory of g-tensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Offered in alternate years.

217. X-Ray Structure Determination (3) II. The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, intensities of x-ray diffraction patterns, presentation of results, text, tables and graphics, crystallographic literature.

218. Physical Principles of Macromolecular Structure (3) III. Meares
Lecture—2 hours. Prerequisite: course 211A or the equivalent. Relationship of higher order macromolecular substructure to conformation and temperature dependence of macromolecular structure. Chemical and physical techniques of macromolecular structure. Offered in alternate years.

219. Spectroscopy of Organic Compounds (3) I. Molinski
Lecture—2 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of chemical reaction mechanisms. Spectroscopic methods in organic chemistry. Biopolymers and organic reactions. Offered in alternate years.

*22A-H. Special Topics in Organic Chemistry (3) I, II, III. The Staff
Lecture—2 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course.

226. Principles of Transition Metal Chemistry (3) I. Belch
Lecture—2 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metals. Offered in alternate years.

228A. Bio-Inorganic Chemistry (3) III. Swenerton
Lecture—2 hours. Prerequisite: course 226 or consent of instructor. Emphasis on biological properties of transition metals and their coordination chemistry. Offered every third year.

*228B. Main Group Chemistry (3) III.
Lecture—2 hours. Prerequisite: course 226 or consent of instructor. Emphasis on electronic properties, reactions and bonding of main group compounds. Concepts of bonding and chemisorption of main group compounds. Offered every third year. (Next offering: Spring 1996.)

*229C. Solid-State Chemistry (3) III. Kuzwilanski
Lecture—3 hours. Prerequisites: courses 124A, 110B, 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year (next offering Spring 1995).

231. Organic Synthesis: Methods and Strategies (3) II. Kurth
Lecture—5 hours. Prerequisite: course 131 or the equivalent. Provides a broadly based discussion of current strategies in synthetic organic chemistry. Focus on methods for constructing carbon frameworks, controlling stereochemistry, and controlling unsaturated systems. Retrosynthetic strategies will be emphasized throughout the course.

232. Bio-Medical Organic Chemistry (3) II. The Staff
Lecture—3 hours. Prerequisites: courses 128B-128C and 110A-110B-110C or the equivalent. Introduction to elementary principles in physical-organic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions.

233. Organometallic Chemistry in Organic Synthesis (3) III. Schore
Lecture—3 hours. Prerequisite: course 128C. Recent trends in organometallic synthesis, reactions, configurations, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Offered in alternate years.

236. Chemistry of Natural Products (3) II.
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include structure, determination, chemical transformations, total synthesis, biological activities and biochemistry. Offered in alternate years.

240. Advanced Analytical Chemistry (3) I. Fawcett
Lecture—2 hours. Prerequisite: course 110A or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and nonelectrolyte solutions; complex equilibria in aqueous and nonaqueous systems; optical rotatory dispersion and optical activity of the fourier transform infrared spectroscopy. Mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.

241A-D. Special Topics in Analytical Chemistry (3) III. Land
Lecture—2 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics will vary each time the course is offered.

261. Current Topics in Inorganic Research (3) II, III. The Staff
Lecture—2 hours. Prerequisite: course 124A or the equivalent. Laboratory/discussion—9 hours. Prerequisite: consent of instructor. Introduction to identification, formulation, and solution of meaningful scientific problems in the area of inorganic chemistry, and for theoretical analysis of new and prevailing techniques, theories and methodology. May be repeated for credit when topic differs. (SU grade only.)

264. Advanced Chemical Research Methodology (3) III. The Staff
Lecture/demonstration—18 hours. Prerequisite: course 263 or consent of instructor. Applications of the methodology developed in Chemistry 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscript for publication. May be repeated for credit when topic differs. (SU grade only.)

290. Seminar (2) I, II, III. Land, Power
Seminar—2 hours. Prerequisite: consent of instructor. (SU grade only.)

293. Introduction to Chemistry Research (1) I. The Staff
Lecture—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. (SU grade only.)

295. Industrial Chemistry (1) I. Kurth
Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth perspective of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. May be repeated for credit. (SU grade only.)

298. Group Study (1-5) 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. (SU grade only.)

Professional Courses

390. Methods of Teaching Chemistry (2) I, II, III.
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in Chemistry and 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 student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (SU grade only.)

392. Advanced Methods of Teaching Chemistry (2) III. The Staff
Lecture—2 hours. Prerequisite: course 390. Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (P/NP grade only.)

Chicana/Chicano Studies

(College of Letters and Science)
Beatriz Pesquera, Ph.D., Program Director
Program Office, Hart Hall, 2nd Floor (916-752-2421)
George Singh, Program Coordinator/Student Affairs (916-752-2429)

Committee on Charge
Rina Alcalay, Ph.D. (Rhetoric and Communication)
Richard Bertaux, Ph.D. (Environmental Design)
Angie C. Chabram, Ph.D. (Chicana/o Studies)
Yvette Flores-Ortiz, Ph.D. (Chicana/o Studies)
Rosa Linda Fregoso, Ph.D. (Chicana/o Studies, Women's Studies)
Malaquias Montoya, B.F.A. (Chicana/o Studies)
Beaizt Pesquera, Ph.D. (Chicana/o Studies)
Adaliza Saca-Riddell, Ph.D. (Chicana/o Studies)
Regulo I. Rinch, Ph.D. (Chicana/o Studies, Agricultural Economics)

Faculty
Angie C. Chabram, Ph.D., Associate Professor (Chicana/o Studies)
Yvette Flores-Ortiz, Ph.D., Assistant Professor (Chicana/o Studies)
Rosa Linda Fregoso, Ph.D., Associate Professor (Chicana/o Studies, Women's Studies)
Malaquias Montoya, Professor (Chicana/o Studies)
The Major Program

The Chicana/Chicana/o Program offers an interdisciplinary curriculum which focuses on the Chicana/o experience through an analysis of class, race/ethnicity, gender and sexuality, and cultural expression. The program offers a major leading to the Bachelor of Arts degree and a minor that can satisfy breadth requirements for the College of Letters and Science. Both the major and minor frame an analysis within the historical and contemporary experiences of Chicanas/os in the Americas. The Chicana/Chicana Studies (Mexican-American) major gives students an opportunity to specialize within one of two emphases: a Humanities/Arts emphasis or a Social Sciences emphasis. Majors are expected to read, write, and speak Spanish at a level suitable for future study and work in Chicana/o and Latino/a settings. There is no language requirement for the minor. Minors must complete 24 units from courses specified below and must register for the minor at the Chicana/Chicana/o Studies Program Office. All Chicana/Chicana Studies courses are open to program minors and non-majors. Some upper division courses require prerequisites.

The Program. At the lower division level, the curriculum for the major provides an interdisciplinary overview of Chicana/o and Latino/a studies. Students are advised to take lower division courses that serve as prerequisites for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary coursework in both the humanities/arts and the social sciences. At this level, students will find courses in Chicana/o history, theory, and method, and several courses taught from a variety of disciplinary perspectives. The upper division courses give majors the opportunity to specialize in one of two emphases for the B.A. degree. Each emphasis has a different focus and each requires completion of different sets of courses. The Humanities emphasis integrates literature, culture, and artistic expression and provides a choice of focus in one of two subject areas: 1) creative arts/creative writing, and 2) literature/cultural studies. The Social Science emphasis incorporates social theory, research methods, and a specialization in one of two areas: 1) economics, political economy, and 2) family and society/health studies.

Career Alternatives. The Humanities/Arts emphasis prepares students for professional work in cross-cultural education, cultural/arts centers, arts criticism, and community development. The Social Science emphasis prepares students for careers in human service delivery, community development, legal services assistance, health services, social welfare, and education. Both emphases in the major prepare students for graduate study and/or professional work in related fields.

Chicana/Chicana Studies

A.B. Major Requirements:

Humanities/Arts Emphasis:

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<th>Preparatory Subject Matter</th>
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Chicana/o Studies 100

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<th>Courses from Chicana/o Studies</th>
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Minor Requirements:

| Minor requires students to attain an interdisciplinary perspective by including courses from two of the emphases. The minor is open to all students with or without coursework in Spanish. |

| Chicana/o Studies 100 | 4 |
| Chicana/o Studies 110 | 8 |
| Chicana/o Studies 120 | 8 |
| Chicana/o Studies 130 | 8 |
| Chicana/o Studies 140 | 8 |
| Chicana/o Studies 150 | 8 |
| Chicana/o Studies 160 | 8 |
| Chicana/o Studies 170 | 8 |
| Chicana/o Studies 180 | 8 |

*Course not offered this academic year.

Courses in Chicana/o Studies (CHI)

Lower Division Courses

10. Introduction to Chicana/o Studies (4) I. Sosa-Roldan

Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas.

21. Chicana/o and Latina/o Health Care Issues (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education in limited access to health care.

30. United States Political Institutions and Chicanas/os (4) II. The Staff

Lecture/discussion—3 hours; term paper. Overview of the major political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, effects from, and responses to them. Theory, methods and critical analysis.

40. Chicanas/os in the Economy (4) I. Rochin

Lecture—4 hours. Introduction to Chicana/o studies in the economy and related institutions. Topics include censuses, data, demographics, immigration, education, labor markets, local economies, and government roles and policies in employment and income generation. General Education credit: Contemporary Societies.

50. Chicana and Chicano Culture (4) I. III. The Staff

Lecture—3 hours; discussion—1 hour. Interdisciplinary survey of Chicana/o cultural representation in the 20th century. Examines Chicana/o culture within a national and transnational context. Explores the cultural forms and practices intersect with social, historical, political, and economic influences. General Education credit: Contemporary Societies.

60. Chicana and Chicano Representation in Cinema (4) III. Fregoso

Lecture—4 hours; term paper. Introductory level study of Chicana and Chicano representation in Chicana/o and Chicano/a filmmaking. The depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanas/os, including independent filmmakers and the commercial industry. Offered in alternate years.

70. Survey of Chicana/o Art (4) Montoya

Lecture—4 hours. Survey of contemporary Chicana/o art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist.

73. Chicana/o Art Expression Through Silk Screen (4) I. Montoya

Lecture—4 hours. Laboratory—1 hour. Introductory level studio course using silk screen and basic printing techniques to explore and develop images of Chicana/o cultural themes and expressions. Students will experiment with images and symbols from their immediate environment/culture. Integrated approach to Chicana/o philosophy of art.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(PNP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(PNP grading only.)

Upper Division Courses

100. Chicana/o Chicano Theoretical Perspective (4) I. II. The Staff (Director in charge)

Lecture/discussion—3 hours; term paper. Prerequisite: courses 10 and 50. Critical examination of emerging Chicana/o Chicano Studies theoretical perspectives in light of contemporary intellectual frameworks in the social sciences, arts, and humanities. Includes analysis of practices of self-representation, and socio-cultural developments in the Chicana/o community.
110. Sociology of the Chicano/a Experience (4) Ill. Persuasive Lecture/discussion—4 hours. Prerequisite: course 10 or Sociology 1. The Chicano/a experience in the American society and economy viewed from the theoretical perspectives. Immigration, history of integration of Chicano/a labor into the American class structure, education inequality, ethnicity, the family and Chicana/o politics. (Former course Sociology 110.)

111. Chicana/o/Mexicana/o Contemporary Society (4) II. Persuasive Lecture/discussion—4 hours. Prerequisite: course 10 or 50, Women's Studies 50 or History 168B. Analysis of the role and status of Chicanas/Mexicanas in contemporary society. Special emphasis on their historical, cultural, economic, and social institutions that have affected their status, and their contributions to society and their community. (Former course 110.)

225. Chicana/o Psychology (4) III. Flores-Ortiz. Lecture—3 hours; discussion—1 hour. Prerequisite: course 21. Introductory psychology course recommended. Introduction to the field of Chicana/o psychology. Analysis of socio-cultural context of Chicanas/os and Latinas/os. Special attention to issues of education, development, bilingualism, and development of self esteem. Impact of minority experience, migration, acculturation are examined.

121. Chicana/o Community Mental Health (4) I. Flores-Ortiz. Lecture—3 hours; term paper. Prerequisite: course 10 or 20. Mental health needs, problems, and services utilized patterns of Chicanas/os and Latinas/os will be analyzed. An analysis of social service policy and the economic context of mental health programs.

122. Psychology Perspectives Chicana/o and Latina/o Family (4) II. Flores-Ortiz. Lecture—4 hours. Prerequisite: course 10; introductory psychology course highly recommended, and/or consent of instructor. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics: family violence, addiction, family resilience and coping strategies.

130. United States-Mexican Border Relations (4) III. Riddell. Lecture—3 hours; term paper. Prerequisite: upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth analysis of immigration issues, border industrialization, women's organizations, economic crises, and legal issues.

131. Chicana/o Politics and Public Policy (4) II. Sosa-Riddell. Lecture/discussion—4 hours. Prerequisite: course 30 or Political Science 1. Historical and political analysis of Chicana/o, Mexican political involvement and activities in the general political system, women's movements, Chicano movement, and Chicana/o movement. Course also examines the public policy process and the relationship of Chicana/o/Latina/o to public policy formation. Offered in alternate years.

132. Political Economy of Chicana/o Communities (4) III. Riddell. Lecture—3 hours; term paper. Prerequisite: upper division standing. Evaluation of Chicana/o Studies courses recommended. Historical and contemporary study of political and economic factors which define and influence the development of Chicanas/o communities. Includes critiques of Social and Marxist theories and concepts applicable to Chicana/o communities, case studies of Chicanas/o communities, especially in California and Texas. General Education credit: Contemporary Societies.

140. Chicana/o Ethnicity and Socio-Economic Inequalities (4) III. Rochin. Lecture/discussion—4 hours. Prerequisite: upper division standing. Cross-cultural comparisons of socio-economic inequalities facing ethnic minorities and, in particular, Chicanas/os in the economy. Sub-topics include theories and concepts for studying ethnicity and inequalities correlated with factors of demographics, education, labor markets, employment, occupations, housing and health.

154. The Chicana/o Novel (4) ILI. Demerseman. Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicana/o novel with special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana and Chicano novelists. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126A.)

155. Chicana/o Theatre (4) III. Demerseman. Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicana/o theatre in the contemporary period with special emphasis on El Teatro Campesino and Chicana Feminist Theater. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.)

156. Chicana/o Poetry (4) III. Demerseman. Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Survey of Chicana/o poetry with special emphasis on its thematic and formal dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.)

171. Mexican and Chicana/o Mural Workshop (4) III. Montoya. Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement. Introduces materials and techniques.

172. Chicana/o Voice Poster Silk Screen Workshop (4) II. Montoya. Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The poster as a voice art form used by Chicanas/os and other people of color to point to the defects of social and political existence and the possibility for change, from the Chicana/o artists’ perspective.

182. Internship in Chicana/o and Latina/o Community (4) I, II, III. The Staff (Chairperson in charge). Lecture/discussion—1 hour; internship—11 hours. Prerequisite: one course from 10, 21, or 50, or Spanish 3, or the equivalent. Combines academic guidance with internship in community agencies serving Mexican/Latino-Chicana/o clients. Utilization of bilingual skills, knowledge of history, culture, economics, politics, social issues and work experience. Internship project required. May be repeated twice for 12-unit maximum. (P/NP grading only.)

194HA-HB-HC. Senior Honors Research Project (2-5) I, II, III. The Staff. Independent study—6-15 hours. Prerequisite: senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. (Deferred grading only. Pending completion of sophomore.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

Graduate Courses

299. Special Study for Graduate Students (1-12) I, II, III. The Staff (Chairperson in charge). Prerequisite: graduate standing and consent of instructor. (SU grades only.)

*Course not offered this academic year.*

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Child Development

(A Graduate Group)

Keith Barton, Ph.D., Chairperson of the Group

Group Office, 1303 Hart Hall (916-752-1950)

Faculty. Includes faculty members from the division of Human Development and the departments of Anthropology, Behavioral Biology, Education, Psychology, and the Schools of Law and Medicine.

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to a M.S. degree. The aim of the program is to provide students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Opportunities are provided to work with children and families in the community including the University's Early Childhood Laboratory. Recipients of the degree gain sufficient background in the biological and social sciences to engage in professions that directly (e.g., preschool) or indirectly (e.g., social policy) involve children and families, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development, human development, clinical psychology, or related fields.

Admission applications must be in by January 15.

Graduate Adviser. Contact Group Office.

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Chinese

See Chinese and Japanese (below); Asian American Studies; and East Asian Studies

Chinese and Japanese

(College of Letters and Science)

Robert Borgen, Ph.D., Chairperson of the Department

Department Office, 184 Kerr Hall (916-752-4895)

Faculty

Robert Borgen, Ph.D., Professor (Japanese)
Chia-neng Chang, Ph.D., Assistant Professor (Japanese)
Susan Griswold, Ph.D., Assistant Professor (Japanese)
Mau-sai Ng, Ph.D., Associate Professor (Chinese)
Michelle Yeh, Ph.D., Associate Professor (Chinese)

Emeritus Faculty

Donald A. Gibbs, Ph.D., Professor Emeritus
Key H. Kim, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus

Related Courses. See East Asian Studies course list.

The Major Program

The department serves the student in two ways: it offers a core language program in both Chinese and Japanese, and it offers courses in literature and cinema. The core language program is designed for students who have no background whatsoever in Japanese or Chinese. The separate program is designed for students who have prior language background.

The Program. A student elects to major in either Japanese or Chinese. Practical language skills are taught using the most modern methods so that upon
entering the upper division a student will have attained functional fluency in the spoken language (hearing and speaking) and the written language (reading and writing). By this time, students will have begun to read authentic texts and to write short compositions. Upper division courses balance the need for further language skills with the need to understand and appreciate the culture richness of either Chinese or Japanese civilization. All students are encouraged to combine their study of Chinese or Japanese language and literature with courses in related fields, and to study abroad through the UC International Summer Session programs, the Education Abroad Program, or through internships.

**Career Opportunities.** UCSC graduates have learned that a major in Chinese or Japanese is a genuine, earned distinction that facilitates entrance to graduate programs and professional schools. In addition, job opportunities abound in virtually all career paths, especially for those who have completed study abroad.

### Chinese

#### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
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<tbody>
<tr>
<td>Chinese 1, 2, 3, 4, 5, 6, or 7, 17, 27, or 8, 18, 28, and one 4-unit lower division Chinese language course</td>
</tr>
</tbody>
</table>

**Recommended:**

- Japanese 10, Linguistics 1, History 9A

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
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<tbody>
<tr>
<td>Chinese 106, 107, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126</td>
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</tbody>
</table>

<table>
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<tr>
<th>Recommended</th>
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<tbody>
<tr>
<td>Japanese 101, 102, 103, 104, 105, 106; Anthropology 148A-148B; Art History 163A-163B; East Asian Studies 112; History 100A-100B, 101C, 191A-191B; Religious Studies 172; or other advanced literature courses selected with consultation with the undergraduate adviser.</td>
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</tbody>
</table>

**Total Units for the Chinese Major:** 55/70

### Japanese

#### A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
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</thead>
<tbody>
<tr>
<td>Japanese 1, 2, 3, 4, 5, 6, or 8, 18, 29</td>
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</tbody>
</table>

**Recommended:**

- Japanese 10, 15, 25, Chinese 10, Linguistics 1, History 98

<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
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</thead>
<tbody>
<tr>
<td>Japanese 101, 102, 103, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128</td>
</tr>
<tr>
<td>Eight units selected from: Japanese 104, 105, 106, 107, 109A-I, 110, Anthropology 148A-148B; Art History 164; Comparative Literature 153; History 194A, 194B, 194C; Religious Studies 172; or other advanced literature courses selected with consultation with the undergraduate adviser</td>
</tr>
</tbody>
</table>

**Total Units for the Japanese Major:** 55/70

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**Minor Program Requirements:**

- Minors are offered in Chinese and in Japanese for students wishing to follow a formally recognized program of study in those languages and their literatures.

<table>
<thead>
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<th>UNITs</th>
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<tr>
<td>Chinese</td>
</tr>
<tr>
<td>Japanese</td>
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</table>

All upper division courses, including both language courses and literature in translation courses, may be used to meet this requirement. One approved lower division course (Chinese 10, 11, 50; Japanese 10, 15, 25, 50) may also be used in addition. In addition, students must demonstrate competence in proficiency, normally through completion of Chinese 111 or Japanese 111. Only four units from 192, 197, 199, and 109 may be applied to the minor. For details, consult the undergraduate adviser.

### Courses in Chinese (CHN)

#### Lower Division Courses

1. **Elementary Chinese (1)**
   - Lecture/discussion: 5 hours. Introduction to Chinese grammar and development of all language skills in a cultural context with special emphasis on communication. (Successfully completed Chinese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no probation is required. All other students who complete this course will receive a letter grade unless a P/NP petition is filed.)

2. **Introductory Elementary Modern Chinese (10)**
   - Lecture: 5 hours. Discussion: 5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

3. **Elementary Chinese (5)**
   - Lecture/discussion: 5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

4. **Elementary Chinese (10)**
   - Lecture/discussion: 5 hours. Prerequisite: course 2. Continuation of course 2. Completion of grammar sequence and continuing practice of all language skills.

5. **Elementary Chinese (3)**
   - Lecture: 5 hours. Discussion: 5 hours. Prerequisite: course 3 (may be taken concurrently). Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and substitution drills, students have greater opportunities to develop spoken skills than is possible in course 3.

6. **Intermediate Chinese (5)**
   - Lecture/discussion: 5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 3.

7. **Intermediate Chinese (1)**
   - Lecture: 5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 4.

8. **Intermediate Chinese (5)**
   - Lecture/discussion: 5 hours. Prerequisite: course 5 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5.

9. **Advanced Chinese (2)**
   - Lecture: 2 hours. Discussion: 2 hours. Prerequisite: course 6 (may be taken concurrently). Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and oral repetition, students develop spoken fluency and appropriateness of expression as skills requisite to internships and Chinese studies in China.

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**Course not offered this academic year**

7. **Mandarin for Cantonese Speakers I (5)**
   - Lecture: 5 hours. Prerequisite: ability to read and write Chinese characters at the elementary school level. Accelerated training is possible, particularly in the phonetic transcription system known as pinyin, for students who already can read and write Chinese. Course assumes no knowledge of spoken Mandarin Chinese.

8. **Accelerated Written Chinese I (5)**
   - Lecture: 5 hours. Prerequisite: ability to speak and listen to Mandarin Chinese. Designed for students who are already familiar with some degree of fluency in spoken Mandarin, but who cannot read Chinese characters. This course concentrates on written reading ability and accelerates progress to the upper division.

9. **Modern Chinese Literature (In English) (4)**
   - Lecture: 3 hours. Discussion: 1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what Chinese has experienced in the twentieth century.

10. **Modern Chinese Literature (In English) (4)**
    - Lecture: 3 hours. Discussion: 1 hour. Selected readings in English translation are supplemented with background information on periods, authors, and the interrelationships of culture, political and social change. Methods of analysis are introduced and applied in class discussions. General Education credit: Civilization and Culture.

11. **Mandarin for Cantonese Speakers II (5)**
    - Lecture: 5 hours. Prerequisite: course 7. Continuation of course 7. Training in spoken Mandarin for students who already can read and write Chinese.

12. **Accelerated Written Chinese II (5)**
    - Lecture: 5 hours. Prerequisite: course 8. Continuation of course 8. Designed to accelerate the progress of students who already know spoken Mandarin but cannot read or write Chinese characters.

13. **Mandarin for Cantonese Speakers III (5)**
    - Lecture: 5 hours. Prerequisite: course 17. Continuation of course 17. Preparatory for entering upper division courses in Chinese.

14. **Modern Chinese Literature (In English) (4)**
    - Lecture: 3 hours. Discussion: 1 hour. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (translation, original text). Eastern Asian cultural traditions will also be introduced. (Same course as Japanese 50.)

15. **Directed Group Study (1-5)**
    - Lecture: Chairperson in charge. (P/NP grading only.)

16. **Directed Study for Undergraduates (1-5)**
    - Lecture: Chairperson in charge. (P/NP grading only.)

### Upper Division Courses

104. **Twentieth-Century Chinese Fiction (In English) (4)**
    - Lecture: 3 hours. Discussion: 1 hour. Prerequisite: course 10 or a course in Chinese history recommended. English language survey of Chinese literature as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres.

105. **Western Influences on Twentieth-Century Chinese Literature (In English) (4)**
    - Lecture: 3 hours. Discussion: 1 hour. Prerequisite: course 10 or History 9A recommended. Introduction of Western literary thought into modern China, the
115. Introduction to Classical Chinese: Mencius (4) II. Ng
Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the text of the Mencius.

116. Introduction to Classical Chinese: Narrative Styles (4) III. Ng
Lecture—3 hours; discussion—1 hour. Prerequisite: course 115. Continues course 115 by reading selections from the Records of the Grand Historian and other early, influential works.

120. Advanced Chinese (4) I, II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from all genres to develop advanced skills in reading, writing, aural comprehension, and translation. May be repeated once for credit.

*130. Readings in Traditional Chinese Fiction (4) II. Ng
Lecture—1 hour; discussion—3 hours. Prerequisite: course 112 or the equivalent; course 114 recommended. Close reading in Chinese of representative works from the Tang Dynasty (618-907) to modern times. May be repeated once for credit where content varies.

*131. Readings in Traditional Chinese Poetry (4) I. Yeh
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poems that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry.

132. Readings in Modern Chinese Poetry (4) II. Yeh
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture.

140. Readings in Classical Chinese (4) I, II, III. The Staff
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated twice for credit.

160. The Chinese Language (4) III. The Staff
Lecture/discussion—4 hours. Prerequisite: course 6 may be taken for non-majors. A fine presentation on the Chinese language including linguistic and historical background, basic vocabulary, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors.

192. Chinese Internship (1-12) I, II, III. The Staff
Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on topic approved by instructor. (P/NP grading only.)

1977. Tutoring in Chinese (1-5) I, II, III. The Staff
Tutoring—1-5 hours. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
(Supervised in charge) (P/NP grading only.)

Graduate Course
299. Research (1-12) I, II, III. The Staff (SU grading only.)

Courses in Japanese (JPN)

Lower Division Courses
7. Elementary Japanese (5) I. The Staff
Lecture/discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. (Students who have successfully completed Japanese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

1A. Intensive Elementary Japanese (10) II. The Staff
Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

1B. Accelerated Intensive Elementary Japanese (15) Summer special session. The Staff
Lecture/discussion—5 hours. Combines the work of courses 1, 2, and 3, into a single 12-week summer session. Those who complete this course may go on to course 4 in the fall.

2. Elementary Japanese (5) II. The Staff
Lecture/discussion—5 hours. Prerequisite: course 1 or the equivalent. Continuation of training in basic spoken and written skills.

3. Elementary Japanese (5) III. The Staff
Lecture/discussion—5 hours. Prerequisite: course 2 or the equivalent. Continuation of training in basic spoken and written skills.

4. Intermediate Japanese (5) I. The Staff
Lecture/discussion—5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in courses 3.

5. Intermediate Japanese (5) II. The Staff
Lecture/discussion—5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4.

6. Intermediate Japanese (5) III. The Staff
Lecture/discussion—5 hours. Prerequisite: successful completion of course 5 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5.

8. Accelerated Japanese for Bilingual Students I (5) I. The Staff
Lecture—5 hours. Prerequisite: bilingual background in Japanese. A special course for students with bilingual background in Japanese. Emphasis is on speaking at an educated level and learning to read and write Japanese. First of a three-course sequence accelerating advancement to upper division courses.

10. Masterworks of Japanese Literature (In English) (4) II. The Staff
Lecture—3 hours; discussion—1 hour. An introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present.

15. Introduction to Traditional Japanese Culture (2) I. Bergen
Lecture—2 hours; discussion—1 hour. General introduction to Japanese culture from its beginnings through 1850, focusing on religion, thought, and the arts (visual and performing). Indigenous traditions and the assimilation of foreign influence will be discussed. Readings and discussions in English.

18. Accelerated Japanese for Bilingual Students II (5) II. The Staff
Lecture—5 hours. Prerequisite: course 8. Continues course 8. A special course for students with some bilingual background in Japanese. Emphasis is on increasing knowledge of kanji and on reading and writing longer passages. Second of a three-course sequence accelerating advancement to upper division courses.
25. Japanese Language and Culture (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or Linguistics 1 or Anthropology 4 recommended. Classification and communication of experience in Japanese culture: principles of language use in daily interaction; historical development and structure of language; language and gender; minority languages. (Limited to 8.) Offered in alternate years.

28. Aspects of Japanese for Bilingual Students I (3) III. Chag
Lecture—5 hours. Prerequisite: course 25 or high school Japanese. Introduction to reading and writing in Japanese. Offered in alternate years.

50. Introduction to the Literature of China and Japan (3) II. Borgen
Lecture—3 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature. Course includes film. East Asian cultural traditions will also be introduced. (Same course as Chinese 50.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(PNP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(PNP grading only.)

Upper Division Courses
Lecture—3 hours; discussion—1 hour. Early Japanese literature from the 7th to the 12th century, with special emphasis on the Nara and Heian periods. Special emphasis on the influence of Chinese culture. Offered in alternate years.

102. Japanese Literature in Translation: The Medieval Period (4) II. Griswold
Lecture—3 hours; discussion—1 hour. The major literary genres from the 14th century to the 18th century and their influence on modern Japanese culture. Offered in alternate years.

Lecture—4 hours; discussion—1 hour. Major works of modern Japanese literature from the Meiji period to the present. Offered in alternate years.

*104. Modern Japanese Literature: War and Revolution (3). I. Chang
Lecture/discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the tragic and often poignant experiences of war and political upheaval in the late 19th century and to the present. Offered in alternate years.

*105. Modern Japanese Literature: Hero and Antihero (3). II. Chang
Lecture/discussion—3 hours. The ways in which representative heroes and anti-heroes in modern Japanese literature perceive, confront, struggle with, and resolve a wide array of social, moral, and intellectual problems in their times. Offered in alternate years.

106. Japanese Culture Through Films (4) II. Fahey
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Film as an introduction to Japanese culture and society. Offered in alternate years.

107. Modern Japanese Autobiographies (in English) (4). I. Chang
Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: upper division standing. Exploring the modern and contemporary Japanese social and cultural landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. Offered in alternate years.

108. Poetry of China and Japan (in English) (4) II. Borgen
Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. Offered in alternate years. (Same course as Chinese 108.)

111. Modern Japanese: Reading and Discussion (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings.

112. Modern Japanese: Reading and Discussion (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Continue course 111.

113. Modern Japanese: Reading and Discussion (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Continue course 112.

114A. Spoken Japanese (2) I. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: course 6 or the equivalent. Training in spoken Japanese for students with a basic working knowledge of the language. (PNP grading only.)

114B. Spoken Japanese (2) II. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: course 114A or consent of instructor. Continue course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (PNP grading only.)

114C. Spoken Japanese (2) III. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: course 114B or consent of instructor. Continue course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (PNP grading only.)

115. Japanese Composition (2) I. The Staff
Lecture—2 hours; discussion—2 hours. Prerequisite: course 6 or consent of instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese.

131. Readings in Modern Japanese Literature: 1920-1945 (4) III. Chang
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Readings of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the military era, to the end of the war years in 1945.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Continue course 131, but may be taken independently. Focused on selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery.

133. Readings in Modern Japanese Literature: 1970 to Present (4) I. Griswold
Lecture—2 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Continue course 132, but may be taken independently. Covers selected texts from 1970 to the present. Offered in alternate years.

134. Readings in the Humanities: Traditional Culture (4) III. Borger
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 113. Fourth-year level reading of modern works by major specialists on traditional Japanese culture. History, religion, thought, art, contemporary studies of the Meiji period. Focus is equally on developing reading skills and knowledge about Japanese culture.

135. Readings in the Humanities: The Modern Period (4) III. Chang
Lecture—3 hours; term paper. Prerequisite: course 113. Fourth-year level reading of authentic modern writings on Japanese culture, philosophy, society, religion, war, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars.

136. Readings in Newspapers and Magazines (4) I. Griswold
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. Offered in alternate years.

192. Japanese Internship (1-12) I, II, III. The Staff (Chairperson in charge)
Lecture—0.5 hours; discussion—0.5 hours. Prerequisite: upper division standing and consent of instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (PNP grading only.)

197T. Tutoring in Japanese (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture—1 hour. Tutoring—1 hour. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (PNP grading only.)

Graduate Courses
*201. Introduction to Classical Japanese (4) I. Borger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Introduction to essential grammatical structure of classical Japanese using selections from classical Japanese prose and poetry.

*202. Introduction to Classical Japanese (4) II. Borger
Lecture—3 hours; discussion—1 hour. Prerequisite: course 201. Readings of relatively easy texts of classical Japanese prose and poetry assisted by annotations written in modern Japanese.

*203. Introduction to Classical Japanese (4) III. Griswold
Lecture—3 hours; discussion—1 hour. Prerequisite: course 202. Readings of classical and pre-modern Japanese prose and poetry beginning with late Heian works and proceeding to Kamakura; Momochi and later periods. Readings include plays, Edò narratives, classical Chinese text and early Meiji writings.

*291. Seminar in Modern Japanese Literature: Major Writers (4) I. Chang
Seminar—4 hours. Prerequisite: any one of courses 131, 132, 133, 134, 135, or the equivalent. In-depth reading and critical analysis of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogasawara, Shimazaki Toson, Akutagawa Ryûnosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Offered in alternate years.

299. Research (1-12) I, II, III. The Staff (SU grading only.)
Classics

(Class of Letters and Sciences)
David A. Trall, Ph.D., Program Director
Department Office: Spanish and Classics, 616 Sprout Hall (916-752-0805)

Faculty
Lynn E. Roll, Ph.D., Associate Professor
David A. Trall, Ph.D., Professor
Emeriti Faculty
Richard E. Grimm, Ph.D., Professor Emeritus
Wesley E. Thompson, Ph.D., Professor Emeritus

The Major Programs
Classics can be defined broadly or narrowly: broadly, it is the study of all aspects of ancient Greek and Roman life; narrowly, it is the study of the Greek and Latin languages and their literatures. The department offers three majors that reflect these different definitions of the subject: the Classical Civilization major offers a broad interdisciplinary approach to the world of the Greeks and Romans, while the Latin and Greek majors focus on language and literature.

The Program
The core of the major in classical civilization consists of a two-year study of either Latin or Greek during which students learn the rudiments of the language and read three or more major authors in the original language. Students complete the major requirements by selecting about ten courses from a broad range of offerings on different aspects of classical civilization. Latin majors and Greek majors spend a year learning the rudiments of the language, then read a selection (36 units) of major Greek or Latin authors.

Career Opportunities
Majors in classics can make direct use of their knowledge in careers in library science, museum work, or high school teaching, or by going on to graduate work in classics, philosophy, art history, archaeology, history or theology. Students planning to go on to graduate work in classics should bear in mind that good graduate schools look for students who have a minimum of two years work in both Latin and Greek and having knowledge of French or German. A degree in classics is also an excellent preparation for professional schools; in the past 20 years, practically all majors in classics from Davis have sought admission to law or medical school have been accepted.

Classical Civilization
A. B. Major Requirements:

Preparatory Subject Matter: 25-27
Greek 1, 2, 3, or Latin 1, 2, 3 or the equivalent. 10-12
(a) Classics 1A, 1B, 1C, 20.
(b) Classics 4A, 10. 15

Depth Subject Matter: 40
Three upper division courses in Latin or Greek. 12
At least 28 units from the following, with or without emphasis in a single area, chosen in consultation with a major advisor: 28
(a) Language and Literature: All upper division courses in Latin and Greek; Classics 140, 141, 142, 143
(b) History: History 11A, 11B, 11C, 102B, Religious Studies 102
(c) Art, Archaeology, and Drama: Classics 174, 175, Art History 154A, 154B, 155, Dramatic Art 156
(d) Philosophy and Political Theory: Philosophy 143, 161, 162, Political Science 118A, Rhetoric and Communication 110

Total Units for the Major: 65-67

Recommended
Art History 1A; History 2; Philosophy 21; Comparative Literature 1; Religious Studies 40.

Greek
A. B. Major Requirements:

Preparatory Subject Matter: 0-15
Greek 1, 2, 3 (or the equivalent) 15

Depth Subject Matter: 36
Upper division courses in Greek may be chosen from department-approved courses in related fields.

Total Units for the Major: 36-51

Recommended
Latin 1, 2, 3.

Latin
A. B. Major Requirements:

Preparatory Subject Matter: 15
Latin 1, 2, 3 (or the equivalent) 15

Depth Subject Matter: 36
Latin 121 5
At least 31 additional upper division units in Latin. 31

Total Units for the Major: 36-51

Major Advisers: D.A. Trall, LE. Roll (Classical Civilization); W.E. Thompson (Greek); and R.E. Grimm (Latin).

The Minor Program
The department offers minors in Greek and Latin for those wishing to follow a shorter but still formally recognized program of study in classics.

Minor Program Requirements:

Greek 21
Four upper division courses in Greek. 16

Latin 21
Four upper division courses in Latin. 16

Prerequisite credit: Credit will normally not be given for a lower division course in Latin or Greek if the prerequisite of a course already successfully completed. Exceptions can be made by the Program Director only.

Graduate Program
The department offers a master’s degree in Classics with emphasis on either Greek or Latin. The program is suitable for high school teachers seeking to improve their qualifications and for students wishing to prepare themselves for admission to one of the more competitive doctoral programs in Classics. Admission into the graduate program has been suspended.

Courses in Classics (CLA)

Lower Division Courses

4A. Classical Civilization (3) II. The Staff Lecture—3 hours. An introduction to the literature, art, and institutions of ancient Greece. General Education credit: Civilization and Culture.

10. Greek and Roman Mythology (3) III. The Staff Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.


17A. Mediterranean Bronze Age Archaeology (4) I. Roller Lecture—3 hours; term paper. Archaeological monuments of the Aegean and Greece and Crete during the Bronze Age. Special emphasis on the Minoan and Mycenaean civilizations. General Education credit: Civilization and Culture.

17B. Greek Archaeology (4) II. Roller Lecture—3 hours; term paper. Archaeological monuments of the Aegean and Greece and Crete during the Bronze Age. Special emphasis on the Minoan and Mycenaean civilizations. General Education credit: Civilization and Culture.

17C. Later Greek and Roman Archaeology (4) III. The Staff Lecture—3 hours; term paper. Archaeological monuments of the Greek world after the conquests of Alexander the Great, and the monuments of Rome and the Roman Empire. Offered in alternate years. General Education credit: Civilization and Culture.

20. Pompeii AD 79 (4) III. Trall Lecture—3 hours; term paper. Roman life in an urban community as it existed at the time of the eruption of Vesuvius. Slides presentations of the city and its destruction will be supplemented by selected readings from Petronius’ Satyricon and other ancient authors. Offered in alternate years. General Education credit: Civilization and Culture.

30. Greek and Latin Elements in English Vocabulary (3) I. The Staff Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected.

31. Greek and Latin Elements in Technical Vocabulary (3) III. The Staff Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms.

50. The Rise of Science in Ancient Greece (4) II. Rosenstock Lecture/discussion—3 hours; term paper. Prerequisite: Mathematics 16A or the equivalent. Study of the emergence of science and rationality in ancient Greece and its political and social context; concentration on four areas: mathematics, medicine, cosmology, and psychology. Readings from the Presocrates, Hippocrates, Plato, Aristotle, and Hellenistic philosophers. General Education credit: Civilization and Culture.

Upper Division Courses

140. Homer and Ancient Epic (4) I. The Staff Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of Iliad, Odyssey, and Aeneid in English. Discussion of Homer’s and Vergil’s techniques of composition, the beliefs and values of their respective societies and the influence of Homer on Vergil. Offered in alternate years. General Education credit: Civilization and Culture.

141. Greek and Roman Comedy (4) III. The Staff Lecture—3 hours; conference—1 hour. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in alternate years. General Education credit: Civilization and Culture.

142. Greek and Roman Novel (4) I. Trall Lecture—3 hours; term paper. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius’ Satyricon, and the religious mysticism of Apuleius’ The Golden Ass.

143. Greek Tragedy (4) I. Allan Lecture—3 hours; term paper. Prerequisite: course 4A or 10. Reading in English of selected plays of Aeschylus, Sophocles and Euripides. Lectures on the development and influence of Athenian tragedy. Offered in alternate years. General Education credit: Civilization and Culture.
156. Socrates and Classical Athens (4) III. Rosenstock Lecture/discussion—3 hours; term paper. Prerequisite: course 4A. Study of the major sources of our knowledge of Socrates to assess his role in the politics and culture of ancient Athens; his method of teaching and its place in Western thought. General Education credit: Civilization and Culture.

174. Ancient Greek Sanctuaries (4) III. Roller Lecture/discussion—4 hours. Prerequisite: course 175B or consent of instructor. The history, cults, and monuments of Olympia, Delphi, and other sanctuaries. Student reports on major monuments. Offered in alternate years.

175. Topography and Monuments of Ancient Athens (4) III. Roller Lecture/discussion—4 hours. Prerequisite: course 174A or consent of instructor. The history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis placed on restoration, chronology, and on the relating of documentary and excavational evidence. Offered in alternate years.

197TC. Community Tutoring in Classical Languages (1-5) I, II, III. The Staff Tutor—5 hours. Prerequisite: consent of instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated for credit up to 5 units. (P/NP grading only.)

Graduate Courses

201. Introduction to Classical Philology (4) I. Trail Seminar—9 hours; term paper. Survey of major contemporary areas of classical scholarship with special attention to current problems in literary and textual criticism.

202. Homer (4) I. Roller Seminar—9 hours; term paper. Readings in the Iliad and Odyssey; the origins and transmission of the poems. Major and minors.

203. Vergil (4) I. Trail Seminar—9 hours; term paper. Reading of selected books of the Bucolics, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilian poetic language.

204. Greek and Roman Comedy (4) I. The Staff Seminar—3 hours; term paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit.

205. Latin Lyric and Elegy (4) III. Trail Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

206. Greek Historiography (4) II. Thompson Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

207. Greek Drama (4) II. The Staff Seminar—3 hours; term paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

299. Research (1-12) I, II, III. The Staff Prerequisite: consent of instructor. (SU grading only.)

Courses in Greek (GRK)

Lower Division Courses

1. Elementary Greek (5) I. The Staff Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. (Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although students earning a passing grade will be charged to the student’s P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Greek (5) II. The Staff Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

2NT. Elementary New Testament Greek (1) II. The Staff Lecture—1 hour. Prerequisite: course 2 (concurrently). Supplementary study of New Testament Greek.

3. Intermediate Greek (5) III. The Staff Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Greek authors.

3NT. Elementary New Testament Greek (1) III. The Staff Lecture—1 hour. Prerequisite: course 3 (concurrently). Supplementary study of New Testament Greek.

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

Upper Division Courses

100. Ovid (4) I. Allan Lecture—3 hours; term paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid.

101. Livy (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

102. Roman Comedy (4) II. The Staff Lecture—4 hours; term paper. Prerequisite: course 3. Offered in alternate years.

103. Vergil: Aeneid (4) I. Trail Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

105. Catullus (4) I. Allan Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

106. Horace: Odes and Epodes (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

109. Roman Elegy (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

110. Caesar (4) II. The Staff Lecture—3 hours; substantial paper. Prerequisite: course 3. Translation and discussion of selected readings from Caesar, Grammar review and introduction to Latin prose composition. Offered in alternate years.

111. Silver Age Latin (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal, Martial, and other writers of the Silver Age. Offered in alternate years.

112. Cicero: Political Writings (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

114. Cicero: Philosophical Works (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

115. Lucretius (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

116. Vergil: Eclogues and Georgics (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years.

121. Prose Composition (5) I. Trail Lecture—4 hours; term paper.

125. Medieval Latin (4) III. Trail Lecture—3 hours; term paper. Prerequisite: course 3 and two upper division courses in Latin. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin language and literature from the fourth to the fifteenth centuries. Offered in alternate years.

198. Directed Group Study (1-5) I, II, III. The Staff (Program Director in charge) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Thompson in charge) (P/NP grading only.)

Courses in Latin (LAT)

Lower Division Courses

1. Elementary Latin (5) I. The Staff Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. (Students who have successfully completed Latin 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although students earning 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 Latin (5) II. The Staff Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

2X. Intensive Latin (10) III. The Staff Lecture—10 hours. Prerequisite: course 2. Intensive course that combines elements of courses 2 and 3 in a single quarter. Those who have completed course 2 may receive only 5 units for course 2X.

3. Intermediate Latin (5) III. The Staff Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Latin authors.

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

Course not offered this academic year.
Clinical Nutrition and Metabolism

See Internal Medicine in Medicine, School of

Clinical Psychology

See Medicine, School of

Communication

See Rhetoric and Communication

Community Development

(A Graduate Group)

Isao Fujimoto, Chairperson of the Group
Group Office, 1303 Hart Hall (Applied Behavioral Sciences), (916-752-1926)

Faculty. The interdisciplinary faculty include those in Anthropology, Asian American Studies, African American and African Studies, Landscape Architecture, Environmental Design, Geography, Psychology, Sociology, and Women's Studies.

Graduate Study. The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program is designed to prepare students for professional roles as administrators, designers, planners, researchers, or technicians with some emphasis upon rural, nonmetropolitan communities and human service organizations. Training in community development is also aimed at preparing individuals to work within government or non-profit organizations in the realm of social and economic change. There is an opportunity available for specialization in: (1) Community design and planning, (2) ethnic and cultural diversity, (3) women's issues in the community, (4) community health and human services, (5) environmental issues, (6) rural and agricultural issues, and (7) community economic development.

Preparation. Applicants to the program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, cultural geography, or political science, and courses in community studies.

Graduate Advisers. Contact the Group Office.

Community and International Health

See Medicine, School of

Community Nutrition

(College of Agricultural and Environmental Sciences)

The Major Program

Community nutrition teaches students the identification of nutrition-related health problems and the biological, behavioral, economic, and sociocultural factors that influence the nutrition of individuals and groups. The aim of community nutrition is to apply this knowledge to the development of programs that improve the nutritional status of the community.

The Program. The community nutrition major is designed for students who seek to combine a foundation in the biological and nutritional sciences with study in the social sciences. All students in major are required to complete a common core of preparatory and depth subject matter courses. Students select one of three subject matter options emphasizing sociocultural, psychological, or economic aspects of food, diet, and nutrition, and an additional area of consultation in consultation with the advisor.

Career Alternatives. The community nutrition major prepares students for jobs in administrative, teaching, research, or public health/public service positions or for graduate or professional training in nutrition and other health sciences. Students who complete the academic requirements for an internship in dietetics are also qualified for careers in dietetics, following completion of an internship.

B.S. Major Requirements:

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

English Composition Requirement .......................... 0-8 UNITS

See College requirement

Preparatory Subject Matter ....................................... 49-50

Biological sciences (Biological Sciences 1A, 1B, 1C) ........... 15

Chemistry (Chemistry 2A, 2B, 8A, 8B) ................. 16

Computer science (Agricultural Systems and Environment 21 or Computer Science Engineering 16) .................. 3-4

Cultural food habits (Nutrition 20) ....................... 4

Cultural social science (Anthropology 2, Geography 2, or Sociology 3) .............. 4

Social research methodology (Sociology 46A or Psychology 41) .................. 4

Statistics (Sociology 46B or Statistics 131) .............. 4

Breadth/General Education ..................................... 6-24

Satisfaction of General Education requirement .............. 6-24

(Note that some of the Option Subject Matter may meet General Education requirements.)

Depth Subject Matter ........................................... 62

Biological Sciences 102 and 103 ................................

Food Science and Technology 100A, 100B, 101A, 101B .................. 10


Nutrition 192 ............................................. 2

Neurobiology, Physiology, and Behavior 110, 110L ............. 7

Option Subject Matter ......................................... 28-32

Course work chosen from one of the following three options in consultation with adviser .................. 18-20

Additional units in a related social or health science chosen in consultation with adviser .................. 10-12

(May include a minor program in fields such as physical education, environmental toxicology, community development, statistics or the social sciences.)

Behavioral-Psychological Option

Psychology 1, Education 110 or Psychology 130

Psychology 112 or Human Development 100A or 100B

Psychology 115 or Human Development 100C


Applied Behavioral Sciences 173, 178

Consumer Science 100

Food, Anthropology and Technology 107, 117

Sociology 154

Anthropology 129, 130

Rhetoric and Communication 115

Economics and International Development Option

International Agricultural Development 10

Economics 1A, 1B

Mathematics 16A

Agricultural Economics 100A, 100B, 120, 130, 141

International Agricultural Development 103, 110, 111, 195

Economics 100, 101, 115A, 115B, 118, 123, 180, 182

Consumer Science 103

Anthropology 122, 126

Sociology 170

Economics 151A

Environmental Studies 1, 165

Rhetoric and Communication 116

Sociocultural Option

Foreign language (10 units or the equivalent strongly recommended)

Anthropology 101, 126, 133, 135

Geography 170, 175

Afro-American Studies 100

Applied Behavioral Sciences 2

Rhetoric and Communication 115

Regional courses, choose 8 units from one of the following four areas (alternative courses may be selected in consultation with the advisor):


Additional Recommended Courses

Applied Behavioral Sciences 151, 152


Unrestricted Electives ........................................... 13-38

Total Units for Degree ......................................... 180

Major Adviser, R.B. McDonald (Nutrition).

Advising Center for the major is located in 1151 Meyer Hall (916-752-2512).

Internship. To fulfill the academic requirements for an internship in dietetics, the following courses must be included: Economics 1B, Agricultural Economics 112, Food Service Management 123, 123L, 121, 122, 123, Applied Behavioral Sciences 173 or Education 110, Psychology 1, Nutrition 116A, and Rhetoric and Communication 1. Consult the Advising Center prior to the first quarter of the junior year for information on procedures.

Graduate Study. For information on graduate study, see the Graduate Studies section in this catalog.

*Course not offered this academic year.
One lower division course other than Comparative Literature 1, 2, 3, and 10A-N—3, 4
Foreign language: sufficient preparation to insure satisfactory performance at the upper division level

Depth Subject Matter—10
Five upper division courses (including at least three in a language other than English) distributed between the first and second literatures of concentration with the approval of the major advisor—20

Comparative Literature 141

Two additional upper division Comparative Literature courses, including at least one in a major literary period (such as 1640-8, 1618-B, or 1664-B), or movement (such as 1618-A or 169)

Two additional upper division courses in one or both literatures of concentration or in Comparative Literature, selected with the approval of the major advisor—8

Total Units for the Major—55-56

Recommended
Anthropology 2: Art History 10; Classics 10: English 171A, 171B; French 114; History 101; Linguistics 1, 115; Philosophy 24, 241; Religious Studies 2.

Major Adviser. The Staff
All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

Honors Program. Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. For this purpose, in addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 164H during the first two quarters of the senior year. Only students who have attended a cumulative GPA of 3.5 in all courses satisfying the major (except elementary foreign language courses) at the end of the junior year will be eligible for the honors program.

Minor Program Requirements:
The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no foreign language requirement for the minor.

Comparative Literature—24

At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended)—8
Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature —12

Courses should form a coherent program and should be chosen in consultation with, and with the approval of, the adviser.

Minor Adviser. Same as Major Adviser.

All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

Teaching Credential Subject Representative. The Staff. See also the Teacher Education Program.

Graduate Study. Refer to Comparative Literature (A Graduate Course). See also the Graduate Studies section in this catalog.

Courses in Comparative Literature (COM)

Lower Division Courses
1. Great Books of Western Civilization: From Myth to Faith (1) I, II, III. Director in Charge

Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion, to the great literatures of the ancient and medieval world—one of the most important developments of human thought. The written word and its influence on the western world. Literature from across the world.

2. Great Books of Western Civilization: From Faith to Reason (1) I, II, III. Director in charge
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion, to the great literatures of the ancient and medieval world—one of the most important developments of human thought. The written word and its influence on the western world. Literature from across the world.

3. Great Books of Western Civilization: The Modern Crisis (1) I, II, III. Director in charge
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion, to the great literatures of the ancient and medieval world—one of the most important developments of human thought. The written word and its influence on the western world. Literature from across the world.

4. Major Books of the Contemporary World: The Struggle for Freedom (1) I, II. The Staff
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. A study of selected major Western and non-Western texts composed in the period from 1945 to the present. Intensive focus on the reading of the texts, with frequent papers written about them. General Education credit: Civilization and Culture.

5. Fairy Tales, Fables, and Parables (1) I, II. Reed, Allosso, and staff
Lecture—3 hours; discussion—1 hour. An introduction to the study of fairy tales, fables, and parables as recurring forms in literature, with such readings as tales from Aesop and Grimm, Chaucer and Shakespeare, Bierce and Borges, Buddhist and Taoist parables, the Arabian Nights, and Afrikan-American folklore. General Education credit: Civilization and Culture.


7. Literature of Fantasy and the Supernatural (1) I, II. Reed, Allosso
Lecture—3 hours; discussion—1 hour. An introduction to the literature of fantasy and the supernatural, focusing on works from different ages, of visionary and rational variations on the perfection of a lost paradise, Golden Age, or Atlantis—and of the inhuman nightmares that occasionally result from perversion of the utopian dream. General Education credit: Civilization and Culture.

8. Utopias and Their Transformations (1) I. Reed, Allosso, and staff
Lecture—3 hours; term paper. An introduction to certain of the major theoretical and practical questions that have been raised by utopian literature. General Education credit: Civilization and Culture.

9. The Short Story and Novella (1) II, III. Reed, Allosso
Lecture/discussion—3 hours; term paper. An introduction to the short story and the novella, with selected readings from various periods and cultures. General Education credit: Civilization and Culture.

10A-N. Master's Author's in World Literature (1) I, II, III. The Staff (Director in charge)
Lecture/discussion—1-2 hours per week. An introduction to a select group of works from different periods, with emphasis on the major literary traditions of the world. General Education credit: Civilization and Culture.

*Course offered this academic year.
188 Comparative Literature

Tales: (C) Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur; (D) Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight; (E) Swift, Rabelais, La Celestina, Simplicissimus; (F) Cervantes, Sairaiku, Fielding, Voltaire; (G) Machiavelli, Shakespeare, Lope de Vega/Cervantes, Molino/Florence; (H) Lessing/Schiller, Goethe, Byron, Stendhal, Pushkin, Lermontov; (I) Hoffmann, Gogol, Poe, Hawthorne, Maussan, Chekhov, Melville; (J) Flaubert, Twain, Turgenev, Galdós, Dostojevski, Dostoevsky, Hardy, Shaw, Strindberg; (K) Unamuno, Lewy, Cocteau, Gide, Kafka, Faulkner; (L) Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanzaki, O'Neill/Brecht, Lorca/Piafandoj, Camus/Sartre, García Márquez; (G) Balzac, Flaubert, Balzac, Bellow/Naipaul, Bellow/Beckett/Pinter, Genet/Dürrenmatt. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only.)

12. Introduction to Women Writers (4) III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement. Survey of fiction, drama, and poetry by women writers from all continents. Concerned with women compared in light of the diverse social and cultural traditions. Students will present literary analysis of voice, imagery, narrative strategies and diction. General Education credit: Civilization and Culture.

13. Dramatic Literature (3) II. Finney Lecture—3 hours; Prerequisite: Subject A or the equivalent. Introduction to the dramatic form through reading of selected plays, to some of the major forms of Western drama, from the earliest tragedies of ancient Greece to the contemporary American theater. Offered in alternate years. General Education credit: Civilization and Culture.

14. Introduction to Poetry (3) II. Hanoch Lecture/discussion—3 hours. Prerequisite: completion of Subject A requirement. Comparative study of poetry in various centuries and other poetic forms from different historical periods and different linguistic, national, and cultural traditions. Offered in alternate years. General Education credit: Civilization and Culture.

15. The Spiritual Quest (3) I. Torrance Lecture/discussion—3 hours. An exploration of the unending search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in literature by such figures as the Bhagavad Gita, The Quest of the Holy Grail, Dante's Purgatory, and Melville's Moby Dick.

16. Man and the Natural World (4) II. McLean Lecture/discussion—3 hours; term paper. Examination of the 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 Heideg, Virgil, Rousseau, Wordsworth, and Thoreau. General Education credit: Civilization and Culture.

17. Ethnic Minority Writers in World Literature (4) I, II. The Staff Lecture—3 hours; term paper. Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. General Education credit: Civilization and Culture.

53A. Literature of China and Japan (3) II. Ury Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of East Asia with readings in such works as The Story of the Stone, The Peach Blossom Fan, Tang and Sung poetry, classical Japanese poetry, drama, and travel diaries, and The Tale of Genji.

53B. Literature of India and Southeast Asia (3) II. The Staff Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of South Asia with readings from such works as the Mahabharata and Ramayana, The Cloud Messenger, Shakuntala, The Little City Cart, and the stories and poems of both ancient and modern India and Southeast Asia. General Education credit: Civilization and Culture.

98. Directed Study (1-5) I, II, III. The Staff (Director in charge) Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Director in charge) (P/NP grading only.)

Upper Division Courses

120. Writing Nature: 1750 to the Present (4) I. McLean Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the representation of natural settings and issues of environmental desires and concerns in both literary texts and art forms. General Education credit: Civilization and Culture.

135. Women Writers (4) II. Reed, Lokke Lecture/discussion—3 hours; term paper. An exploration of women's differing views of self and society as recorded in major authors of various times and cultures. Readings, primarily of fiction, will include such works as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. General Education credit: Civilization and Culture.

138. Gender and Interpretation (4) L. Schlesser Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the representation of gender roles and gender hierarchy in literary texts from various periods, societies, and cultures in light of research and theory on gender, with attention to gender as a topic for literary interpretation. General Education credit: Civilization and Culture.

140. Theesthetic and Structural Study of Literature (4) II. Murav Lecture/discussion—3 hours; term paper. Interpretation of selected works illustrating the historical evolution of their themes, as well as of formal and structural elements. May be repeated for credit when substance of course varies. General Education credit: Civilization and Culture.

141. Literary Theory and Criticism (4) II. Torrance Lecture/discussion—3 hours; term paper. Exploration of literary theories with emphasis on specific objectives of individual literary periods. General Education credit: Civilization and Culture.

142. Critical Reading and Analysis (4) III. The Staff (Director in charge) Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the "proseque" in selected texts from the Renaissance to the 20th century, with attention to the "proseque" as a means of social, cultural, and political commentary, as well as of aesthetic innovation. Offered in alternate years. General Education credit: Civilization and Culture.

143. The Grotesque (4) II. Hanoch Lecture—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the "grotesque" in selected texts from the Renaissance to the 20th century, with attention to the "grotesque" as a means of social, cultural, and political commentary, as well as of aesthetic innovation. Offered in alternate years. General Education credit: Civilization and Culture.

145. Representations of the City (4) I. Hannoch Lecture/discussion—3 hours; term paper. Examination of the portrayal of the city in 19th and 20th century western literature. Readings include works by Balzac, Dickens, Poe, Baudelaire, Dostoevsky, Whitman, Zola, T.S. Eliot, and William Carlos Williams.

146. Myth in Literature (4) II. Schrödinger, Lokke Lecture—3 hours; term paper. Prerequisite: completion of Subject A requirement. Course 6 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions.

152. Literature of the Americas (4) I. Blanchard Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the various stylistic, historical, and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. Offered in alternate years. General Education credit: Civilization and Culture.

153. The Forms of Asian Literature (4) III. Ury Lecture/discussion—3 hours, term paper. Prerequisite: upper division standing, introduction to distinctively Asian literary forms, such as Sei, Haiku, No, and the Chinese novel and tale, through reading of major works. Comparison with Western genres and study of native and Western critical traditions. General Education credit: Civilization and Culture.

157. War and Peace in Literature (4) II. Blanchard Lecture/discussion—3 hours; term papers. Prerequisite: course 1, 2, or 3, or consent of instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the similarities and differences of such writers as Joyce, Proust, and Mann. The present has dealt with the antimonies peace/war through the ages. General Education credit: Civilization and Culture.

158. The Detective Story as Literature (4) I. The Staff Lecture—3 hours; term paper. Study of the origins, literary and social background, development and implications of the literature of detection in a comparative context.

158A-G. Special Topics in Comparative Literature (4) I, II, III. Ury Lecture/discussion—3 hours; term paper. Intensive study of selected subjects: (A) The Play Within the Play, (B) The Lyric Novel, (C) Women in Literature, (D) The Role of Psychology in Literature, (E) The Role of Psychology in Literature, (F) The Religious Experience in Literature, (G) Literary Attitudes and Judgment. May be repeated for credit in different subject area. General Education credit: Civilization and Culture.

160A. The Modern Novel (4) III. Torrance Lecture/discussion—3 hours; term paper. The changing image of man and his world as seen in novels by such authors as Joyce, Proust, and Mann. General Education credit: Civilization and Culture.

160B. The Modern Drama (4) I. The Staff Lecture—discourse—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, and Chomsky. General Education credit: Civilization and Culture.

161A. Tragedy (4) III. Schein Lecture/discussion—3 hours; term paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. General Education credit: Civilization and Culture.

161B. Comedy (4) I. Finney Lecture/discussion—3 hours; term paper. Comic attitudes towards life in literary works of different ages. General Education credit: Civilization and Culture.

163. Biography and Autobiography (4) I. Ury Lecture—discourse—3 hours; term paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. Offered in alternate years. General Education credit: Civilization and Culture.

164A. The Middle Ages (4) II. The Staff Lecture—discourse—3 hours; term paper. Readings in heroic epics, chivalric romances, and such major authors as Dante and Chaucer; with emphasis on shared assumptions concerning man's place in the world. General Education credit: Civilization and Culture.

164B. The Renaissance (4) I. Torrance Lecture/discussion—3 hours; term paper. Readings in major authors such as Petrarch, Machiavelli, Erasmus, Montaigne, Rabelais, Cervantes, and Shakespeare, with particular emphasis on changing conceptions of the possibilities and limitations of man. General Education credit: Civilization and Culture.

"Course not offered this academic year."
164C. Baroque and Neoclassicism (4) III. Torrance
Lecture/discussion—3 hours; term paper. Readings in major authors such as Calderón, Cervantes, Racine, Voltaire, Rousseau, Sterne, and Kant, with emphasis on philosophical ideas and literary forms. General Education credit: Civilization and Culture.

168A. The Epic (4) III. Schein
Lecture/discussion—3 hours; term paper. Study of various formulations of epic poetry in both the oral and literary traditions. May be repeated for credit in different subject area. General Education credit: Civilization and Culture.

169. The Novel (4) I. Hanooch
Lecture/discussion—3 hours; term paper. Readings in various forms of the novel such as the picaresque, the development, and the confessional, with emphasis on the evolution of the genre. May be repeated for credit in different subject area. General Education credit: Civilization and Culture.

167. Comparative Study of Major Authors (4) I. Schein
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Fiction of the literary masters of the Western tradition, including Dante, Shakespeare, Cervantes, Goethe, Voltaire, and Dostoevsky. General Education credit: Civilization and Culture.

168. Romanticism (4) I. Loke
Discussion—3 hours; term paper. Prerequisite: any intro to English; term paper. Prerequisite: consent of instructor. Novels and plays by Dickens, D. H. Lawrence, Voltaire, and Strindberg. General Education credit: Civilization and Culture.

169. The Avant-Garde (4) II. The Staff
Lecture/discussion—3 hours; term paper. Studies in movements such as surrealism, expressionism, and the absurd. General Education credit: Civilization and Culture.

170. The Contemporary Novel (4) II. Torrance
Lecture—3 hours; term paper. Study of important novels from different parts of the world, including Asia, Africa, Latin America, Europe, and the United States. In the period since the Second World War to the present. General Education credit: Civilization and Culture.

180. Selected Topics in Comparative Literature (4) III. Mural
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in English literature. Study of a selected topic or topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated on credit when taken on different topics.

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Director in charge)
Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. General Education credit: Civilization and Culture.

195. Seminar in Comparative Literature (4) III. The Staff (Director in charge)
Seminar—3 hours; term paper. Prerequisite: senior standing and major in Comparative Literature, or consent of instructor. Advanced comparative study of selected topics and texts, with explicit emphasis on the theoretical and interpretive approaches that define Comparative Literature as a discipline and distinguish it from other literary disciplines. May be repeated for credit with topic differing.

197T. Tutoring in Comparative Literature (1-5) I, II, III. The Staff (Director in charge)
Discussion—2-4 hours. Prerequisite: upper division standing with declared major in Comparative Literature. Course open only to Comparative Literature majors only. Leadership and small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated for credit for a total of 6 units. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge) (P/NP grading only.)

Graduate Courses

200. Introduction to the Graduate Study of Comparative Literature (4) II. Finney
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language. Introduction to research techniques, library resources, and critical concerns of Comparative Literature, with a focus on the comparative study of a single work, culminating in a related research project.

201. Theories of Comparative Literature (4) II. Torrance
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language; course 141 or the equivalent recommended. An examination of international theories of literature with reference to language, genre, thematics, social and historical context.

202. History of Literary Theory (4) I. Loke
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Study of classical theoretical works from the Greeks to the late 19th century. Emphasis on these works' treatments of such topics as textuality, representation, genre, meaning, structure, style, allegory and canonicity.

210. Topics and Themes in Comparative Literature (4) II, III. Schein, Finney, Harnoosh
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative, interpretative study of specific topics and themes in literature from various periods, societies, and cultures. May be repeated for credit when topic differs.

215. Forms of the Spiritual Quest (4) III. Torrance
Seminar—3 hours; research paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative study of major works in a particular genre from various linguistic, national, and cultural traditions. Study of opposing mythological and psychological developments within the genre and to genre theory. May be repeated for credit when topic differs.

250A. Research in Comparative Literature (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: course 200. Individualized guided research, under the supervision of a faculty member, in a comparative topic culminating in a term paper. Required of M.A. and Ph.D. candidates.

250B. Research in Comparative Study of Author, Period, or Genre (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: courses 200 and 201. Individually guided research, under the supervision of a faculty member, in the specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of Ph.D. candidates.

250C. Basic Research for the Dissertation (4) I, II, III. The Staff (Director in charge)
Individual instruction—1 hour. Prerequisite: courses 200 and 201. Individually guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.

259. Directed Group Study (1-5) I, II, III. Prerequisite: graduate standing. (S/U grading only.)

265. Individual Study (1-12) I, II, III. The Staff (Director in charge) (S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12) I, II, III. (S/U grading only.)

Professional Courses

390. Teaching Comparative Literature in College (3) I. Allocco
Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with specific application to the introductory courses 1, 2, and 3, in relation to major cultural and social developments. Discussion also of ways to teach analytical writing. (S/U grading only.)

392. Teaching Internship in Comparative Literature (1) I, II, III. Allocco
Discussion—1 hour. Regular consultation between the student-instructor teaching Comparative Literature courses and a supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (S/U grading only.)
B.S. Major Requirements:

Preparatory Subject Matter: 48-49

Computer Science Engineering 30 or 35, 40: 8

Mathematics 21A-21B-21C, 22A-22B: 18

Statistics 30: 3

One series from the following four: 15-16

(a) Chemistry 2A-2B-2C
(b) Chemistry 2A-2B and Biology

Physics 9A-9B-9C and Mathematics 21D

Depth Subject Matter: 53-55

Computer science, core courses: 29

Computer Science Engineering 100, 110, 120, 122A, 140A, 150 or 151A

Computer Science Engineering 154A-154B

Computer science electives: 14

Minimum of 14 units from Computer Science Engineering 122B, 140B, 150

151A, 142, 151B, 152, 158, 160, 163, 165A, 165B, 168, 170, 172, 175, 199

(maximum 3 units and departmental approval required), Electrical and Computer


Upper division mathematics: 10-12

Mathematics 108, and one course from Mathematics 115A, 115B, 115C, 125,

127A, 127B, 127C, 131 (or Statistics 131A), 141, 145, 147, 149A, 149B, 150A,

150B, 150C; one upper division Mathes

ics course numbered below 186.

Total Units for the Major: 101-103

*Completion of only 150 or 151A will satisfy the core requirement, but not a computer science elective simultaneously.

**Completion of Mathematics 160 and/or 164 will satisfy either a computer science elective or a mathematics elective, but not both requirements simultaneously.


Minor Program Requirements

Computer Science: 24

Computer Science Engineering 50: 4

Computer Science Engineering 110: 4

Upper division Computer Science Engineering: 16

Any courses chosen from the following

Mathematical Sciences 120, 122A, 122B, 140A, 140B, 142, 150, 151A,


Graduate Study. See the Graduate Studies section in this catalog.

Computer Science (A Graduate Group)

Charles U. Marté, Ph.D., Chairperson of the Group

Office: 206 Engineering II (Department of Computer Science) (916-752-7004; gradinfo@cs.ucdavis.edu)

Faculty. Consists primarily of faculty members from the Department of Computer Science, the Department of Electrical and Computer Engineering, the Department of Applied Science (Livemore), the Department of Mathematics, and the Graduate School of Management.

Graduate Study. The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. The varied nature of the faculty brings a wide variety of research interests to the program. Research strengths lie in algorithms, artificial intelligence, computer architecture, computer graphics, computer systems design, database systems, computer security, computer networks, fault tolerance, natural language processing, cognitive science, numerical analysis, program specifications and verification, programming languages, parallel and distributed systems, operating systems, performance evaluation, robotics, scientific computation, and software engineering. Interdisciplinary research in computer science is encouraged.

Preparation. Normal preparation for the program is a bachelor's degree in either computer science or in a closely related field (such as electrical engineering or mathematics, with substantial coursework in computer science). Applications are also considered from students with outstanding records in other disciplines. M.S. students may either complete a thesis or pass written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. candidates must pass preliminary written examinations in three areas of specialization as defined by the Graduate Group. The candidates must also pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

Graduate Advisers. N.S. Matloff, N. Max, B. Mukherjee.

Conservation Biology

See Ecology (A Graduate Group); Environmental Biology and Management; and Wildlife and Fisheries Biology

Consumer Economics

College of Agricultural and Environmental Sciences

Faculty. See under Department of Agricultural Economics.

Major Program and Graduate Study. See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Studies section in this catalog.

Related Courses. See Agricultural Economics.

Courses in Consumer Economics (CNE)

142. Personal Finance (3) I. Sheppard, II. Butler; summer
Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of credit cards and consumer loans, by households. Principles of tax, retirement, and estate planning. (Same course as Agricultural Economics 142.)
Consumer Science
(College of Agricultural and Environmental Sciences)
Faculty. See under the Division of Textiles and Clothing.

Major Programs and Graduate Study, Consumer
Food Science is a related major. For graduate study, see the
Graduate Studies section in this catalog.

See Consumer Economics, Food Science and
Technology, Nutrition, and Textiles and Clothing.

Courses in Consumer Science (CNS)
Questions pertaining to the following courses should
be directed to the Division of Textiles and Clothing
Advising Office, 129 Everson Hall.

Lower Division Courses
47. Food Product Development Field Study (1) III.
Schutz
Discussion—three 2-hour sessions; field trip—2 days.
To observe commercial aspects of the large-scale
development, distribution, and evaluation of food
products intended for human consumption. Course
given between Winter and Spring Quarters. Advance
enrollment with instructor required Winter quarter.
(P/NP grading only.)

92. Internship in Consumer Science (1-12) I, II, III.
Rucker
Internship—3-36 hours. Prerequisite: consent of
instructor. Internship on and off campus in a
consumer science related area. (P/NP grading only.)

Upper Division Courses
100. Consumer Behavior (3) I. Rucker
Lecture—3 hours. Prerequisite: prepared in areas
of psychology or sociology and economics recom-
mended. Provides a set of behavioral concepts and
theories useful in understanding consumer behavior
on the part of the individual, business, and social
organizations. Conceptual model to help guide and
understand consumer research will be presented.
General Education credit: Contemporary Societies.

192. Internship in Consumer Science (1-12) I, II,
III. Rucker
Internship—3-36 hours. Prerequisite: completion of
a minimum of 84 units; consent of instructor. Internship
on and off campus in a consumer science related area.
(P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. Rucker
(P/NP grading only.)

199. Special Study for Advanced Undergraduates
(1-5) I, II, III. Rucker
(P/NP grading only.)

Graduate Course
299. Research (1-12) I, II, III. Rucker
(S/U grading only.)

Critical Theory
Marc E. Blanchard, Agrégé de Lettres, Program
Director (916-752-4787)
Program Office, 516 S puberty Hall, (916-752-5464)

Committee in Charge
Phil Barrie, Ph.D. (English)
Marc E. Blanchard, Ph.D. (French, Critical Theory)
M. Kay Flavel, Ph.D. (Humanities Program, Critical
Theory)
Ruth Frankenberg, Ph.D. (American Studies)
Smadar Lavie, Ph.D. (Anthropology, Critical Theory)
Harriet Murav, Ph.D. (Rusian)
Inti Rogoff, Ph.D. (Art, Critical Theory)
Juliana Schiess, Ph.D. (Italian)
Michael Smith, Ph.D. (Applied Behavioral Sciences)
Georges Van den Abeele, Ph.D. (French)

Graduate Study. The program in Critical Theory offers
study and research leading to the Ph.D. with a
designated emphasis in Critical Theory. The program provides
theoretical emphasis and interdisciplinary approach to the study of
students already preparing for the Ph.D. in one of the eleven participating departments
(Anthropology, Comparative Literature, Education, English, French and Italian, German and Russian, His-
tory, Music, Philosophy, Psychology, Sociology, and Spanish). Other departments are in the process of
joining. Students complete all requirements for the Ph.D.,
including the dissertation, in one of the participating
departments. The additional requirements leading to
the designated emphasis consist of two core courses (200A, 200B) offered in the program in Critical Theory,
two additional graduate courses (one of which may be
Critical Theory 201), and a special examination.

Graduate Adviser. Consult Critical Theory Program Office.

Courses in Critical Theory (CRI)
Graduate Courses
200A. Approaches to Critical Theory (4) I, II. The
Staff
Lecture/discussion—4 hours. Prerequisite: graduate
standing in a participating program. Investigation into
research problems of Critical Theory and a critical
examination of various theoretical approaches (e.g.,
semiotics, hermeneutics, deconstruction, social and
Sociocritic, feminism theory, psychoanalysis) in
an interdisciplinary perspective.

200B. Problems in Critical Theory (4) I, II. III.
The Staff
Seminar—4 hours; term paper. Prerequisite: course
200A with a grade of B+ or better. Practical applica-
tion of critical theoretical perspectives to a common
problem defined in interdisciplinary terms. Topics will
vary.

201. Critical Theory Special Topics (4) I, II. III.
The Staff
Seminar—4 hours; term paper. Prerequisite: course
200A. Application of theoretical principles to one spe-
cific research topic.

298. Directed Group Study (1-5) I, II, III. The Staff
(Critical Theory in charge)
299. Individual Study (1-12) I, II, III. The Staff
(S/U grading only.)

Dermatology
See Medicine, School of

Design
(College of Agricultural and Environmental Sciences)
Faculty. See under the Department of Environmental
Design.

The Major Program
The design program offers a creative, challenging,
and flexible approach to the study of design. The phil-
sophy of the program encourages self-direction and
creativity, not only in design work but also in planning
the overall undergraduate education.

The Program. Basic introductory design courses such as
introduction to design, drawing, and media are part of all
design majors. Beyond these, stu-
dents take specialized courses in their area of interest.
A student who emphasizes costume design, for exam-
ple, might have a study plan that includes courses in
photographic media, personal adornment, history of
costume design, and the upper division studio
course design series. Textile design students take
courses in hand-constructed, layered, and loomed
textiles, as well as the printed textile design series.
Environmental design is an area that includes courses
drifting and practice, exhibit design, furniture
design, and the two-year studio interior design series.
These areas are strongly complemented by classes in
related design history.

Portfolio. Students will be required to keep a contin-
ing portfolio of their creative work to be evaluated
by faculty for the purposes of declaring the major,
according to this plan. The student may deviate from
the plan, for example, to pursue courses in other similar
fields. Students may be required to take additional
courses as part of their preparation, design students are
required to become involved in internships in design firms,
museums, art galleries, textile galleries, and in interior
designers and architects offices. Design graduates
have gone directly from this program into retail cloth-
ing and interior design and architectural firms, exhibit
and display work in galleries and museums, and the-
archical and textile companies. In addition, students
also create their own jobs through freelance and com-
mission work in many related areas.

B.S. Major Requirements:

English Composition Requirement..................................................0-6
See College requirement

Preparatory Subject Matter.................................................................32-34
Art (one course from Art History 1A, 1B, 1C or
1D).................................................................4
Design (Design 1, 3, 11, 12, 13).......................................................20
Other two courses from American Studies 10,
Anthropology 2, Geology 2, Psychology 1,
Sociology 1, 25, Rhetoric and Communication
1, 3)...............................................................7-9

Breadth/General Education...............................................................32
Satisfaction of General Education requirement
inwidth=1.0

Depth Subject Matter.................................................................48
Design history, select from Design 140, 142A,
142B, 143, 144)...........................................................12
Design, select with advisor's approval) 12
Design, upper division courses..................................................24

Restricted Electives.................................................................21
(Courses to be selected with approval of
advisor.)

Unrestricted Electives.................................................................25-28

Total Units for the Degree.............................................................180

Additional Requirement
Development of a course of study, in consultation with
an advisor, no later than the second quarter of the
junior year.

Major Adviser. J. Stabb.
Courses in Design (DES)
Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 152 Walker Hall (916-752-1165).

Lower Division Courses
1. Design and Visual Culture (4) I. Hethorn Lecture—4 hours. Introduction to design awareness; role of designer in contemporary culture, emphasis on visual literacy and perception, creative problem solving, and design culture.

3. Fantasy Design (4) III. Gotelli Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Investigation of fantasy as found in the environment. All aspects of design are explored and fantasy is presented as a problem-solving device.

11. Drawing Studio (4) I. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: course 1 must be taken concurrently; priority enrollment to Design majors. Drawing for the designer as an aid to perception and communication of ideas, objects, and plans. May be repeated once with a different instructor (course 1 should not be repeated).

12. Media Studio (4) II. Rainer and staff Studio—8 hours; field trip. Prerequisite: course 2 must be taken concurrently; priority enrollment to Design majors. Tools, materials, and techniques used in the designer's studio.

13. Photographic Media Studio (4) III. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: course 1 or 2; course 3 must be taken concurrently; priority enrollment to Design majors. Film and video tape for description, simulation, analytical research, and design development.

21. Drafting and Perspective (4) I. Olsen and staff Studio—8 hours. Prerequisite: course in drawing recommended. Creation of three-dimensional designs on two-dimensional surfaces.

22. Basic Imagery (4) I. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: courses 11, 12. Presentation of the fundamentals of designed images, combining a theoretical perspective with practice using the components of visual literacy. Specific focus upon (1) abstraction structure, (2) symbolism, and (3) representation.

23. Personal Adornment (4) I. Stabb Studio—8 hours; field trip. Exploration of the human image altered through ornament and its relationship to the human structure.

24. Hand Constructed Textiles (4) I. Laky Studio—8 hours; one or two field trips. Prerequisite: courses 11, 12. Contemporary approach to textile techniques of construction such as satchets, piecing, knotting, and braidery.

25. Reproduction Graphics (4) II. The Staff (Stabb in charge) Studio—8 hours; field trip. Prerequisite: courses 11 or 12, and 13. Basic studio and photographic skills for the design: continuous tone, line and halftone films, mechanical and four-color screen separations.

77A. Soft Product Development (4) II. Hethorn Studio—8 hours. Prerequisite: course 11 or 12 recommended. Basic theories and principles of soft product development from two-dimensional shapes to three-dimensional forms. Approaches include flat pattern, draping, as well as processes of joining and building. Structural development of clothing in relation to bodies is emphasized.

77B. Soft Product Development (4) III. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: course 77A. Study and practice of designing clothing for the human body through pattern development and structural joining sequences. Problems emphasize theories and principles of soft product development.

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

Upper Division Courses
121. Design Delineation (4) II. The Staff (Stabb in charge) Studio—8 hours; field trip. Prerequisite: courses 11, 12, and 21. Exploration of the process of delineation, including principles of perspective drawing, rapid visualization techniques (the quick sketch), rendering, and graphic presentation methods.

124. Textile Structures (4) III. Laky Studio—8 hours; field trip. Prerequisite: course 23 or 24. Art and science of designing hand building structures in flexible materials. Studio projects in experimental two- and three-dimensional forms with some emphasis on relationships to architecture, furniture, and interiors.

125. Textiles in the Landscape (4) IV. The Staff (Stabb in charge) Lecture—2 hours; studio—5 hours. Prerequisite: courses 21, 22, 24. Structuring organic and mathematical forms in textiles, working with the symbolic relationship of these textiles and their immediate placement in the outdoor landscape.

126A. Visual Presentation: Visual Merchandising (4) I. Gotelli Studio—8 hours; field trip. Prerequisite: course 11, 12 or consent of instructor. Exploration of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on visual merchandising.

126B. Visual Presentation: Exhibition Design (4) II. Gotelli Studio—8 hours; field trip. Prerequisite: course 11, 12 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on the museum and gallery environment.

127C. Visual Presentation: Installation and Display (4) III. Gotelli Studio—8 hours; required field trips. Prerequisite: courses 126A and 126B. Advanced principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on self-expression and alternative exhibition spaces.

131. Layered Textiles and Costumes (4) III. The Staff (Stabb in charge) Studio—8 hours; field trip required. Prerequisite: course 11 or 12 recommended. Exploration of surface embellishments and structural techniques derived from historical and contemporary world cultures. Emphasis on unique qualities of hand made textiles/costumes and their individual expression. Topics included mola and applique, piecing and quilting, beadwork, embroidery, and dimensional surfaces. Offered in alternate years.

132A. Loom-Constructed Textile Design (4) I. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: course 23 or 24. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic draft, basic weaves and their derivatives explored in context of original color effects and yarn combinations.

132B. Loom-Constructed Textile Design (4) II. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

132C. Computer-Aided Textile Design (4) III. The Staff (Stabb in charge) Studio—8 hours. Prerequisite: course 132B. Microcomputer applications to the structure, design, and weaving of fabrics, emphasizing advanced compositions, drafting, and plotting of multi-dimensional, original weave structures.

133A-133B. Visual Metaphor (4-4) II-III. Butler Studio—8 hours. Prerequisite: courses 13, 22, 25. Study and practice of image generation and production with emphasis on clarity of visual expression, the perception and use of color, and visual composition in the three-dimensional context.

134A. Fundamentals of Interior Architecture (4) I. Harrison and staff (Stabb in charge) Studio—8 hours. Prerequisite: courses 11, 12, 13, and 21 and junior standing. Introduction to design process through simple space planning problems focused on residential and small commercial installations.

134B. Fundamentals of Interior Architecture (4) II. Berettea and staff Studio—8 hours. Prerequisite: course 134A. Problems emphasize energy consumption of design, structure, building systems, and architectural harmony in the urban environment.

134C. Fundamentals of Interior Architecture (4) III. Harrison and staff (Stabb in charge) Studio—8 hours. Prerequisite: course 134B. Problems emphasize the design of special and technical environments such as laboratories, medical facilities, and computer installations and environments for the handicapped, aged, and very young.

135. Furniture Design (4) II. The Staff (Stabb in charge) Studio—8 hours; one or two field trips. Prerequisite: course 21; course 130A recommended. Development of form for interior and exterior spaces. Includes behavioral and physical requirements; cultural and historical expression; structural and aesthetic considerations.

140. History of Design (4) II. The Staff (Stabb in charge) Lecture—4 hours. Prerequisite: Art History 1A or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological change and development of design terminology, consumer goods, handworkmanship, and industrial design.

142A. World Textiles: Far East and Pacific (4) I. The Staff (Stabb in charge) Lecture—4 hours. Field trip. Prerequisite: courses 132A, 132B, 160A, or 170A (concurrently) highly recommended; course 1, Art History 1A, 1B, or 1C also recommended. Textile arts of Japan, China, Africa, India, Oceania, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of textiles from these cultures.

142B. World Textiles: Middle East, Europe and the Americas (4) II. Lecture—4 hours; two field trips. Prerequisite: course 1; a studio class highly recommended; course 24, 124, 131, 132A, 132B, 160A-160B or 160C or 170A-170C (concurrently). Study of early concepts and methods significant in the historical, social, aesthetic, and stylistic development of the textile arts.

143. History of Costume Design (4) II. Stabb Lecture—4 hours. Field trip. Prerequisite: course 140. History of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

144. History of Interior Design (4) III. The Staff (Stabb in charge) Lecture—4 hours. Prerequisite: course 140 and Art 1C or the equivalent. History of interior design in Europe and America from the classical period to modern times. Emphasis on the dwelling in its cultural setting and the development of the theory of modern interior decoration.

160A. Textile Design: Pattern and Resist (4) I. Rivers Studio—8 hours. Prerequisite: courses 11, 12, or the equivalent. Open to senior majors in Design and Textiles and Clothing. Exploration of the design, dyeing and patterning of hand-printed textiles. Emphasis on the unique qualities oft he individual producer. Techniques include tie-dye, direct dyeing (with fiber-reactive dyes and indigo) and batik resists.

160B. Textile Design: Screen Printing and Advanced Technique (4) II. Rivers Studio—8 hours. Prerequisite: course 160A. Open to senior majors in Design and Textiles and Clothing. Exploration of the design, decoration and mastering of hand-printed textiles; emphasis on the unique qualities of the individual producer. Techniques include

*Course not offered this academic year.
199. Special Study of Advanced Undergraduates (1-5) I, II, III. The Staff (Stabb in charge) (P/NP grading only.)

Graduate Courses

290. Seminar in Design (4) I, II, III. The Staff (Rivers in charge) Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit.

298. Directed Group Study for Graduate Students (1-5) I, II, III. The Staff (Rivers in charge) Studio—variable hours. Prerequisite: consent of instructor. (SU grading only.)

299. Directed Individual Study for Graduate Students (1-5) I, II, III. The Staff (Rivers in charge) Studio—variable hours. Prerequisite: consent of instructor. (SU grading only.)

Dietetics

(College of Agricultural and Environmental Sciences)

The Major Program

The dietetics major provides students 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.

The Program. The dietetics major takes the basic core of nutrition classes as nutrition science majors, but in dietetics there is less emphasis on laboratory aspects of the sciences courses. Instead, dietetics majors take additional courses such as education, sociology, communication skills, and food service management to prepare for work with the public.

Dietetics students spend the first two years completing preparatory coursework in the basic biological sciences, along with several of the social sciences. In the final two years students take courses in nutrition, food science, biochemistry, and management techniques.

Career Alternatives. The dietetics major qualifies students to apply for the American Dietetics Association "accredited internship," enabling them to become a Registered Dietitian, the professional credential necessary to work in 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

English Composition Requirement: 0-4

See College Requirement

Preparatory Subject Matter: 52-53

Biological sciences (Biological Sciences 1A, 1B) 10

Chemistry (Chemistry 2A, 2B, 9A, 9B) 16

*Course not offered this academic year.
Guest Artists. The department’s Granada Artists-in-Residence program brings distinguished British theatre artists to the department each quarter to teach and direct 4 elective units. Participation must include active class attendance and viewing opportunities in community theatres, amusement parks, museums, lighting firms, the fashion industry, and advertising. Training in acting helps those interested in pursuing law, business, public relations, or public office to those few who—talented and lucky—succeed as actors, directors, or designers for stage, film, or television.

A.B. Major Requirements:

Preparatory Subject Matter

UNITs
Dramatic Art 20, 21A, 24, 25, 26............22
Dramatic Art 21B or 27..............3-4
Additional units to achieve a total of 22 lower division units in Dramatic Art..............4-5

Depth Subject Matter

UNITs
Dramatic Art 124A or 124B, 124C or 124D, 127A, 127B or 160B, 156, 157, 158, 159, 160A..............36
Additional units chosen from the following: Dramatic Art 115, 121A, 121B, 124C, 124D, 126, 150, 153, 155; or, with the advisor’s consent, from appropriate literature courses in language and literature departments..............4

Additional Requirements

During the undergraduate career majors are to participate in at least 8 dramatic productions (exclusive of classroom projects). Participation must include work in acting, scene construction, costume construction, costume design, lighting, and stage management or directing. Majors are also expected to attend theatre performances.

Total Units for the Major..............62

Minor Program Requirements:

UNITs
Dramatic Art..............20
Dramatic Art 124A, 160A, 156, 157 or 158, 159..............20

Major Advisers. J. Hunt, H. Johnson.

Transfer Students. If you are a transfer student you should see the major adviser for an evaluation of your experience.

Teaching/Inferential Subject Representative. E. Carlin. See also the Teacher Education Program.

Graduate Study. The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. (acting, design, directing, or playwriting), and Ph.D. (theater research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Adviser. W.E. Kleb.

Courses in Dramatic Art (DRA)

Lower Division Courses

20. Introduction to Dramatic Art (4) I, II, III. The Staff Lecture—5 hours; discussion—1 hour. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts.
21A. Fundamentals of Acting (4) II, III. Sellers-Young Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Physical and psychological resources of the actor. Experience in individual and group context and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.
21B. Fundamentals of Acting (4) III. Sellers-Young Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on character analysis, interpretation, and development. Acting in a student directed project. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.
24. Visual Aspects of Dramatic Art (4) III. The Staff Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.
25. Technical Aspects of Dramatic Art (4) II. Winn Lecture—1 hour; laboratory—2 hours. Understanding and appreciation of the technical principles of dramatic production; basic tools and materials; principles of scene construction: scene painting, costume construction, stage rigging, lighting and sound equipment and control systems.
27. Fundamentals of Playwriting and Directing (3) I. Kleb Discussion—2 hours; workshop—2 hours; reading of selected texts in the theory of directing and playwriting. Prerequisite: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the creative collaboration of playwright and director.
30. Theatre Laboratory (1-5) I, II, III. The Staff Prerequisite: course 25 or consent of instructor. Projects in acting, production, scene design, costume design, lighting, set design, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.
98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Primarily for lower division students. (P/NP grading only.)
99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

115. Advanced Study of Major Film Makers (4) II. The Staff Lecture—discussion—3 hours; film viewing—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied.
121A. Advanced Acting (4) I. Johnson Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21B and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.
121B. Advanced Acting (4) II. The Staff Lecture—2 hours; laboratory—4 hours. Prerequisite: course 121A and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.
124A. Principles of Theatrical Design: Scenery (4) I. J. Hunt Lecture—laboratory— discussion—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scenic design, elements of design, execution of designs for modern and period plays.
124B. Principles of Theatrical Design: Scenery (4) II. J. Hunt Lecture—laboratory—discussion—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scenic design, elements of design, execution of designs for modern and period plays.
124C. Principles of Theatrical Design: Lighting (4) III. Winn Lecture—laboratory—discussion—4 hours. Prerequisite: course 24 or consent of instructor. Theory of lighting the stage, equipment and control systems, execution of lighting plots.
124D. Principles of Theatrical Design: Costume (4) II. Krese Lecture—laboratory—discussion—4 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costume, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.
126. Production Management (3) I. Winn Lecture—3 hours. Prerequisite: course 25. Theoretical study of stage production from audition through performance: techniques of stage management, technical direction, cueing procedures and audience control. Offered in alternate years.
127A. Principles of Directing (4) I. The Staff Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. The director’s creative approach to the play and to its staging.
127B. Principles of Directing (4) II. The Staff Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A and consent of instructor for non-majors. The director’s creative approach to the play and to its staging.
150A. American Theatre and Drama (4) II. Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in alternate years.
150B. The American Musical (4) III. Kleb Lecture—4 hours. History and development of the American Musical as a unique theatrical form. Offered in alternate years.
150C. Asian Theatre and Drama: Contexts and Forms (4) II. Sellers-Young Lecture—discussion—4 hours. Prerequisite: upper division standing. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance—the fusion of Asian and Western traditions. Offered in alternate years.
150D. Black Theatre and Drama (4) III. Johnson Lecture—4 hours. Black Theatre and drama today; the history, impact and current direction of the work of Blacks in the theatre today. Offered in alternate years.
156. Theatre and Drama: Aeschylus to Machiavelli (4) I. The Staff Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece through Italian and Spanish Renaissance. General Education credit: Civilization and Culture.
157. Theatre and Drama: Shakespeare to Schiller (4) II. The Staff Lecture—4 hours. Selected plays and the history of the theatre from the English Renaissance through German and French Romanticism. General Education credit: Civilization and Culture.
158. Theatre and Drama: Ibsen to Albee (4) III. Hammer Lecture—4 hours. Selected plays and the history of the theatre from English Romanticism to the present.
159. Contemporary Experimental Theatre and Drama (4) I. Kleb Lecture—4 hours. Examination and evaluation of the “New Theatre.” Course includes attending theatre events.
160A-160B. Principles of Playwriting (4-4) I, II. Kleb Lecture—laboratory—discussion—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays.
180. Theatre Laboratory (1-5) I, II, III. The Staff Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit.
192. Internship in Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: upper division or graduate work in dramatic art; upper division course related to the project; consent of instructor and Department Chairperson. Internship outside the academic department enabling students to practice their skills. May be repeated for credit for a total of 12 units. (PINP grading only.)

194HA-194HB. Special Study for Honors Students (3-5) I, II, III. The Staff Independent study—9 hours. Prerequisite: qualification for Letters and Science Honors Program and admission to Dramatic Art Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Dramatic Art. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Dramatic Art (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1-5 hours. Prerequisite: upper division or graduate standing with major in dramatic art; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (PINP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PINP grading only.)

Graduate Courses

200. Methods and Materials in Theatre Research (4) I. The Staff Seminar—3 hours; term paper. Essential research tools in theatre and related fields: bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (2) I, II, III. The Staff Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. May be repeated for credit.

212. Advanced Stage Movement (2) I, II, III. Sellers-Young Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythmic movement patterns relating to acting problems in classical and modern plays. May be repeated for credit.

221. Special Problems in Advanced Acting (4) I, II, III. Johnson, Sellers-Young Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit.

222A. Visual Problems in Theatre and Performance (4) II. The Staff Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to Dramatic Art, Art History, Art Studio, and Design majors. May be repeated for credit.

222B. Advanced Principles and Theories of Theatrical Design (4) III. The Staff Seminar—3 hours; term paper. Selected problems in the design of stage scenery and costumes; practice in design. May be repeated for credit.

222C. Advanced Principles and Theories of Theatrical Design (4) III. The Staff Seminar—3 hours; term paper. Design of a production for three different types of theatres: open stage, arena, and proscenium. May be repeated for credit.

222D. Advanced Principles and Theories of Theatrical Costume Design (4) III. Kress Seminar—3 hours; research and design projects—30 hours (minimum) total. Prerequisite: course 124D or consent of instructor. Course and design projects emphasizing research, principles, and theories; the planning and presentation of costume renderings, detail accessory sketches, and scale drawings of patterns. Projects from classic theatre, musical comedy, ballet, and opera. Offered in alternate years.

222E. Advanced Principles and Theories of Theatrical Lighting Design (4) II. Winn Seminar—3 hours; laboratory—2 hours. Prerequisite: course 124C, a scenic design course, and consent of instructor. Design concepts, script/role analysis, color, composition and style. Projects presented in studio atmosphere. Also included: renderings, written analyses, and drafted plots. Offered in alternate years.

227. Seminar in Directing Theory: Realism (4) III. Granada Artist Seminar—3 hours; term project. Modern directing theory as it applies to theatrical realism; development of directorial concepts for productions of selected realistic plays; emphasis on textual analysis. Offered in alternate years.

228. Seminar in Directing Theory: Non-Realism (4) III. Granada Artist Seminar—3 hours; term paper. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for productions of selected non-realistic plays—Greek to the present; emphasis on textual analysis. Offered in alternate years.

229. Special Problems in Directing (5) I, II, III. The Staff and Chairs-Staff Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated for credit.

230A-230B. Classic and Medieval Theatre (4-4) II-III. Kibb Seminar—3 hours; term paper. The theatre of Greece, Rome, and Middle Ages; emphasis on relationship of dramas of the period to physical circumstances of production. Course 230A (may be taken separately) includes readings and discussion; 230B emphasizes research culminating in a substantial scholarly paper.

235A-235B. Renaissance and Baroque Theatre (4-4) II-III. Fahm and staff Seminar—3 hours; term paper. The theatre of Italy, Spain, England, and France, 1500-1660; emphasis on relationship of dramas of the period to physical circumstances of production. Course 235A (may be taken separately) includes readings and discussion; 235B emphasizes research culminating in a scholarly paper.

240A-240B. Neoclassical and Romantic Theatre (4-4) II-III. Fahm and staff Seminar—3 hours; term paper. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of dramas of the period to physical circumstances of production. Course 240A (may be taken separately) includes readings and discussion; 240B emphasizes research culminating in a scholarly paper.

250. Modern Theatre (4) II. Seminar—3 hours; term paper. The theatre of Europe and America after 1860; emphasis on the relation of the dramatics of the period to the physical circumstances under which they were produced. Offered in alternate years.

259. Contemporary Theatre (4) I. The Staff Seminar—3 hours; term paper. Selected aspects of contemporary Western theatre, with attention to their modes of production.


265. Theory of Dramatic Art (4) II. Kibb Seminar—3 hours; term paper. Theory and aesthetic principles of dramatic art as a fine art. Offered in alternate years.

*Course not offered this academic year.

280. Theatre Laboratory (1-12) I, II, III. The Staff Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.

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

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Course

413. Stage Make-up (1) I. The Staff Lecture/laboratory—2 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

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Earth Sciences and Resources

See Hydrologic Science; Hydrologic Science (A Graduate Group); and Environmental and Resource Sciences

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East Asian Studies

(China, Korea, Japan, and Other East Asian Studies)

Susan Mann, Ph.D., Program Director
Program Office, Interdepartmental Programs (916-752-1219)

Faculty

Beverly Bossier, Ph.D., Assistant Professor (History)
Robert Borgen, Ph.D, Professor (Chinese and Japanese)
Chia-nung Chang, Ph.D., Assistant Professor (Chinese and Japanese)
Mary H. Kong, Ph.D., Professor (Art History)
Donald Gibbs, Ph.D., Associate Professor (Chinese and Japanese)
Susan Griswold, Ph.D., Assistant Professor (Chinese and Japanese)
Walter W. Lai, Ph.D, Professor (Religious Studies)
Susan Mann, Ph.D, Professor (History)
Mau-sang Ng, Ph.D., Associate Professor (Chinese and Japanese)
Don C. Price, Ph.D., Professor (History)
G. William Skinner, Ph.D., Professor (Anthropology)
Janet S. Smith, Ph.D., Associate Professor (Anthropology)
Michel Hurvitz, Ph.D., Professor (Comparative Literature)
Michelle Yeh, Ph.D., Associate Professor (Chinese and Japanese)

Emeriti Faculty

Joyce K. Kallgren, Ph.D., Professor Emerita
Kwang-Ching Liu, Ph.D., Professor Emeritus
Benjamin Wallacker, Ph.D., Professor Emeritus

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 that combine sustained work in an East Asian language with courses on East Asian countries.

The Program. The program offers core courses in East Asian history, humanities, social sciences, and languages. After taking the core courses in conjunc-
Courses in East Asian Studies. The following courses count toward the major and are open to students throughout the campus. Refer to departmental listings for course descriptions.

**Anthropology**
- 148A. Traditional Chinese Society
- 148B. Family, Gender, and Population in Contemporary China
- 149A. Traditional Japanese Society
- 149B. Contemporary Japanese Society

**Art History**
- 10. Asian Art
- 163A. Chinese Art
- 163B. Chinese Painting
- 163C. Painting in the People's Republic of China
- 164. The Arts of Japan

**Chinese**
- All courses.

**Comparative Literature**
- 53A. Literature of China and Japan
- 153. Forms of Asian Literature

**Economics**
- 171. Economy of East Asia

**Geography**
- 127. Contemporary East Asia

**History**
- 9A. History of East Asian Civilization (China)
- 9B. History of East Asian Civilization (Japan)
- 102C. Undergraduate Seminar: China to 1800
- 102D. Undergraduate Seminar: China since 1800
- 102N. Undergraduate Seminar: Japan

**Humanities**
- 163A. Chinese 101, 104, 106, 107, 109, 131, 132

**Linguistics**
- 100. Languages of Eastern Asia

**Political Science**
- 133. The American Role in East Asia
- 135. International Relations: East Asia
- 148A. Government and Politics in East Asia: China
- 148B. Government and Politics in East Asia: Pacific Rim
- 148C. Government and Politics in East Asia: Southeast Asia

**Religious Studies**
- 70. Introduction to Buddhism
- 75. Chinese Philosophy: An Introduction
- 172. Ch'an (Zen) Buddhism

**Sociology**
- 147. Sociological Perspectives on East Asia

**Social Science**
- Anthropology 148A, 148B, 149A, 149B
- Economics 171
- Geography 127
- Political Science 148A, 148B
- Sociology 147

**Religious Studies**
- 70. Introduction to Buddhism
- 75. Chinese Philosophy: An Introduction
- 172. Ch'an (Zen) Buddhism

**Sociology**
- 147. Sociological Perspectives on East Asia

**Courses in East Asian Studies**

**Upper Division Courses**
- 113. Cinema and Society in China (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: one course from History 190C, 193, or consent of instructor. Knowledge of Chinese not required. Viewing and analysis of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic technique, social values and film topics from 1930s to today. Not open for credit to students who have completed Chinese 113.

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**Ecology (A Graduate Group)**

Theodore C. Foin, Ph.D., Chairperson of the Group
Graduate Office, 3122 Wickson Hall (916-752-6752)

**Ph.D.**
The Group includes faculty from 26 departments in five schools and colleges, and the Bodega Marine Laboratory.

**Graduate Study**
The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in several areas of specialization within the spectrum of ecology.

The Ecology program is one of the most diverse on the Davis campus. In order to accommodate varied student interests, the Group depends on close consultation between students and faculty for program development. Several curricular plans are now available in specific areas of emphasis. For details, contact the group office.

**Preparation**
Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed two courses each in introductory biology, general chemistry and physics; one course each in calculus, ecology, statistics, and evolution are also required. Applicants in human ecology may substitute quantitative social science courses for up to two courses of chemistry or physics. Each of the three broad areas requires certain advanced preparation appropriate to the option. Details may be found in the Group Announcement.

**Graduate Advisers**
T.C. Foin, W.W. Weathers.

**Courses in Ecology**

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**Graduate Courses**

**200A. Principles and Application of Ecological Theory**
Lecture–3 hours; discussion–1 hour. Prerequisite: first course in ecology; Statistics 102; Mathematics 16A, 16B. Critical evaluation of ecological theory and applications to ecological management. Historical development of ecological theory is emphasized. Critical evaluation of ecological principles pertaining to the structure and dynamics properties of ecological systems, their organization and evolution.

**200B. Principles and Application of Ecological Theory**
Lecture–3 hours; discussion–1 hour. Prerequisite: course in 200A. Continuation of course 200A. Critical
evaluation of theory and application in the areas of ecologically adaptation and system plasticity, spatial and temporal scales, ecological energetics, and system dynamics. Synthesis of ecological theory into new areas is encouraged. Undergraduates are accepted with consent of instructor.

201. Ecosystems and Landscape Ecology (4) I. U. Daston Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A and 200B. Overview of ecosystem and landscape ecology. Key ecological and social processes (e.g., species diversity, landscape heterogeneity, change and stability), building understanding of ecological and sociological theories of economy. Introduction to analysis tools (remote sensing, geographic information systems, modeling) applied to landscape systems.

202. Physiological Ecology of Animals (3) I. E. S. T. O. Lecture—2 hours; discussion—1 hour. Prerequisite: Zoology 125 or Physiology 110 or the equivalent. Elementary calculus. Comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of the animal groups.

204. Population and Community Ecology (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 120 or Zoology 125. Mathematical A-Z: Introduction to Mathematics strongly recommended. Review of major theoretical concepts of population and community ecology, with emphasis on both the rationale of the theory and the major phenomena to which the theory applies.

205. Structure of Ecological Communities (4) I. A. Q. (Environmental Studies) Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125 or Botany 117. Genetics 120 or Botany 100 or Zoology 148, and Mathematics 21A-21B; Ecology 204 and Mathematics 22A-22B strongly recommended. Provides entry-level graduate students and advanced undergraduates an introduction to literature and contemporary research in the theoretical and ecological communities. Particular emphasis placed on ecological phenomena with a significant spatial component, e.g., gene flow, coloration, and extinction.

206. Concepts and Methods in Plant Community Ecology (4) I. B. T. (Botany) Lecture—2 hours; laboratory—4 hours. Prerequisite: introductory courses in statistics and plant ecology. Concepts and methods of studies in plant ecology. Principles and techniques in vegetational analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures, association analysis, ordination, processes and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories. Offered in alternate years.

207. Plant Population Biology (3) I. Rice (Agronomy) Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104) and advanced undergraduate course in genetics and/ or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced undergraduates an introduction to both theoretical and empirical techniques of plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in alternate years. (Same course as Agronomy 207.)

208. Issues in Conservation Biology (4) I. H. K. Lecture—3 hours; discussion—1 hour. Prerequisite: Conservation Biology 200. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and dissection. Emphasis will be placed on students' approaches to the literature. Specific topics will reflect the research interests of UCD conservation biology faculty.

209. Demography for Biologists (3) I. Carey Lecture—3 hours. Prerequisite: course 104 or Zoology 105. An introduction to the fundamental concepts and techniques including current, abridged and multiple demographic life tables, analysis of reproduction, stable population theory, stochastic, two-sex and regional models and demographic applications such as life history scaling, growing theory of population and age-structured populations. Offered in alternate years.

210. Advanced Topics in Human Ecology (4) I. Olivo (Environmental Studies) Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Course stresses the consonance that human activities have with the natural world and the interplay between the two in causing environmental problems. Offered in alternate years.

211. Advanced Topics in Culture Ecology (4) I. Olivo (Environmental Studies) Lecture—3 hours. Prerequisite: graduate standing. Discussion and evaluation of theories which relate environment, culture and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in alternate years. (Same course as Anthropology 211.)

212. Environmental Policy Analysis (4) I. P. Smith Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: Economics 106 (or the equivalent course in economic science 107 or 108); courses in bureaucratic policy making (e.g., Environmental Studies 166 or Political Science 116); course in intermediate statistics (e.g., Sociology 104 or Statistical Methodology 106). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in alternate years. (Same course as Environmental Studies 212A.)

213. Population, Environment, and Social Change (4) I. Cramer Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environmental and ecological issues, or one of Environmental Studies 168A (or the equivalent course in resource economics); intermediate level statistics (e.g., Sociology 106 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs and plans. Ex-ante and ex-post evaluation will be studied. Offered in alternate years. (Same course as Environmental Studies 213.)

214. Use of Temporal/Spatial Landscape Analysis in Conservation (4) I. Brumfield-Cox Lecture—discussion—3 hours; laboratory—3 hours. Multidisciplinary analysis of geometrical and temporal landscape change applied to conservation. Population and economic change are examined in the context of the spatial and ecological processes. Transportation systems in fragmented habitat. Laboratory applies methodologies to analysis of specific sites. Offered in alternate years.

215. Thermal Ecology and Energetics (3) I. Weathers Lecture—2 hours; discussion—1 hour. Prerequisite: general chemistry and physics and ecology (e.g., Environmental Studies 100). Review of principles that govern the distribution of organisms and the application of energy budget analysis to diverse ecological problems. Scaling (allometric analyses) and comparative methodologies as techniques for developing empirical-ecological theories. Offered in alternate years.

219. Ecosystem Biogeochemistry (4) I. Dahlgen, Bledsoe Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology and biogeochemistry highly recommended; undergraduates accepted with consent of instructor. Multi-disciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and interactions in intra- and inter-systems hierarchy, between the atmosphere, biosphere, lithosphere, and hydrosphere. Laboratory section uses biochemical simulation models to examine case studies. (Same course as Soil Science 219.)

221. Chemical Aspects of Ecology (3) I. Lecture—3 hours. Prerequisite: Chemistry 1A-1B and 2B or 128C (or the equivalent); in a course in biological ecology, graduate standing and consent of instructor. A week will be spent on each of nine subjects including chemical ecology of reproduction, nutrition, defense, communication, adaptation, and ecosystem structure and function. Offered in alternate years.

225. Terrestrial Field Ecology (4) I. A. F. K. Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing projects. Ecological hypothesis testing, data gathering, analysis, and writing and original presentation of results will be stressed. (Same course as Entomology 225.)

230. Analysis of a Selected Ecosystem (4) I. Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized.

231. Mathematical Methods in Population Biology (3) I. Hastings Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Limiting difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology are emphasized. (Same course as Population Biology 231.)

232. Theoretical Ecology (3) I. Hastings (Environmental Studies) Lecture—3 hours. Prerequisite: course 204 or the equivalent, and Mathematics 16C or 21C, or one of courses 100 C or 121 or Evolution and Ecology 101, and a strong mathematics background (Mathematics 22A-22B-22C or the equivalent). Examination of major concepts and methodological issues in theoretical ecology. Model formulation and development will be emphasized. Topics will vary from year to year. May be repeated for credit. Offered in alternate years.

290. Seminar in Ecology (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—1 to 3 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present oral seminars on a particular aspect of the general topic under consideration. (S/U grading only)

291. Biological Conservation (3) I. Schneewald-Cox (Environmental Studies) Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Examination of characteristics of populations that make them vulnerable to extinction and examines various methods that can be used in the restoration process. Although both plants and animals of interest, emphasis will be on vertebrates. Offered in alternate years.

296. Topics in Ecology (1) I, II, III. The Staff Lecture—1 hour. Prerequisite: graduate standing in Ecology. (S/U grading only.)

297T. Tutoring in Ecology (1-4) I, II, III. The Staff (Chairperson in charge) Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in ecology; consent of instructor. Teaching ecology including conducting discussion.
A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Subject Matter</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>22-26</td>
</tr>
<tr>
<td>Economics 1A-1B</td>
<td>10</td>
</tr>
<tr>
<td>Statistics 13, 32, or 102</td>
<td>3-4</td>
</tr>
<tr>
<td>Mathematics 16A-16B-16C or 21A-21B-21C</td>
<td>9-12</td>
</tr>
<tr>
<td>Depth Subject Matter</td>
<td>10</td>
</tr>
<tr>
<td>Economics 100, 101</td>
<td>10</td>
</tr>
<tr>
<td>One course from Economics 110A, 110B, 111A, 111B</td>
<td>4</td>
</tr>
<tr>
<td>Additional economics courses to achieve a minimum of 40 upper division units</td>
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<tr>
<td>Total Units for the Major</td>
<td>62-66</td>
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</tbody>
</table>

Recommended:
- Students considering graduate study in economics or business administration are strongly urged to take Mathematics 21A-21B-21C and 22A.
- The Economics Department suggests that economics 100 and 101 be taken as soon as possible after the introductory course.
- All other economics courses are to be taken in any order. In special cases, economics courses may be taken in any order.
- Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis (P/NP grading only).
- Economics 101 is required in all cases.

Graduation with High or Highest Honors:
- To be eligible for departmental recommendation for High or Highest Honors in Economics, a student must take all upper division courses in Economics for a letter grade, earn at least a 3.5 grade-point average in those courses, and complete at least 8 units of course work that result in the submission of a thesis.
- Graduates in Economics 111A, 111B (See also Undergraduate requirements).

Graduate Study:
- Students who have completed the requirements of Graduate Study and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees.
- For information on admission to graduate study, degree requirements, and financial aid, the Graduate Admissions Office is available.

Graduate Advisers:
- Contact Department Office.

Courses in Economics (ECN)

Lower Division Courses

1A, Principles of Microeconomics (5) I, II, III. The Staff
- Lecture—3 hours, discussion—2 hours. Courses 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies.

Economics (College of Letters and Science)
Robert Fenners, Ph.D., Chairperson of the Department
Department Office, 381 Kerr Hall (916-752-9741)

Faculty
- Giacomo Bonanno, Ph.D., Associate Professor
- Steven Borestein, Ph.D., Associate Professor
- Colin Cameron, Ph.D., Assistant Professor
- Gregory Clark, Ph.D., Associate Professor
- Robert C. Fenners, Ph.D., Professor
- L. Jay Howes, Ph.D., Associate Professor
- Kevin D. Hoer, D.Phl., Associate Professor
- Hirotsu Kaneda, Ph.D., Professor
- Peter H. Lindert, Ph.D., Professor
- Louis Matzakis, Ph.D., Professor
- Klaus Nahring, Ph.D., Assistant Professor
- Julie A. Nelson, Ph.D., Assistant Professor
- Alan L. Osmund, Ph.D., Professor
- Martine Quadri, Ph.D., Professor
- John E. Boos, Ph.D., Professor
- Kevin D. Salyer, Ph.D., Assistant Professor
- Steven M. Sheffrin, Ph.D., Professor
- Jocquim Silvastr, Ph.D., Professor
- Robert K. Tiet, Ph.D., Assistant Professor
- Elias H. Tuma, Ph.D., Professor
- Gary W. Wellon, Ph.D., Professor
- Leon L. Wegge, Ph.D., Professor
- Wing T. Woon, Ph.D., Professor

Emeriti Faculty
- Andreu Bresolin, Ph.D., Professor Emeritus
- Bruce Glaubser, Ph.D., Professor Emeritus
- W. Eric Gustafson, Ph.D., Senior Lecturer Emeritus

Academic Senado Distinguished Teaching Awards
- Thomas Mayer, Ph.D., Professor Emeritus
- T. Y. Shen, Professor Emeritus

The Major Program
Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these resources are turned into the things people want.

The Program: Economics majors complete an introductory course sequence in economics, in addition to several courses in quantitative methods, intermediate theory and economic history are taken on the upper division level and then students are free to concentrate the remainder of their units in various areas of interest including more courses in economic theory or history, international economics, labor, income, interrelated economic systems, economic development, public finance, economic theory, or mathematical economics.

Internships and Career Alternatives: Internships for economics majors are arranged at banks, brokerage houses, other business enterprises, and governmental units. The internships must complement the student's course work. A degree in economics is excellent preparation for students who want to go on to law school, business school, advanced work in economics, or graduate work in international relations. It is also a good background for careers in management and positions with the government.

1B, Principles of Macroeconomics (5) I, II, III. The Staff
- Lecture—3 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; income fluctuations, international trade, economic development; the role of public policy. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies.

*00X, Lower Division Seminar (1-2) I, II, III. The Staff
- Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Economics through shared readings, discussions, and written assignments. May not be repeated for credit. Limited enrollment.

92, Internship and Field Work (1-12) I, II, III. The Staff
- Internship—3-36 hours; term paper. Prerequisite: junior or senior standing; availability of internship position or approved field work project; stock-brokering internships must have completed Management 11A-11B; consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis (P/NP grading only).

98, Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only).

99, Individual Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
- Prerequisite: consent of instructor. (P/NP grading only).

Upper Division Courses

100, Intermediate Micro Theory (5) I, II, III. The Staff
- Lecture—4 hours; discussion—1 hour. Prerequisite: course 1A, 1B, and Mathematics 16A or Mathematics 21A with a grade of C- or better in each course. Price and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open to students who have received credit for Agricultural Economics 100A or 100B. Only 2 units of credit will be allowed to students who have credit for course 104.

101, Intermediate Macro Theory (5) I, II, III. The Staff
- Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A, 1B and Mathematics 16A or Mathematics 21A with a grade of C- or better in each course. Theory of income, employment and prices under static and dynamic conditions, and long term growth. Only 2 units of credit will be allowed to students who have credit for course 105.

*013, Economics of Uncertainty and Information (4) I, II. Bonanno
- Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, Mathematics 16A and 16B or Mathematics 21A and 21B. Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signaling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle.

104, Intermediate Microeconomics (4) I, II, III. The Staff
- Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and Mathematics 16A or 21A. Price and distribution theory under conditions of perfect and imperfect competition. Not open to students who have received credit for course 100A or 100B. Intended for non-majors.

105, Intermediate Macroeconomics (4) I, II, III. The Staff
- Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and Mathematics 16A or 21A. Theory of income, employment and prices, with policy implications. Not open to students who have received credit for course 101. Intended for non-majors.

110A, Economic History (4) I, II. Clark
- Lecture—3 hours; to be arranged—1 hour. Prerequisite—
110B. Economic History (4) III. Clark
Lecture—3 hours; discussion—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.

111A. Economic History (4) I. Walton
Lecture—3 hours; discussion—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.

111B. Economic History (4) III. Clark
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, or consent of instructor. Survey of economic change in the United States from Colonial times to 1865; reference to other regions in the Western Hemisphere.

115A. Economic Development (4) I, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major issues encountered in emerging from international poverty. Issues include problems of growth and structural change, human welfare, distribution of income and wealth, health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization.

115B. Economic Development (4) I, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries.

116. Comparative Economic Systems (4) II. Reomer
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100 or 104, Mathematics 16A and 16B, or 21A and 21B. Economic analysis of the relative virtues of capitalism and socialism, including welfare economics. Marxian exploitation theory, the socialist calculation debate (Hayek and Lange), alternative capitalist systems (Japan, Germany, U.S.) and contemporary models of market socialism.

121A. Industrial Organization (4) I. Bonanno
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries.

121B. Industrial Organization (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy: antitrust and other policies toward industry; economies of regulated industries.

123. Ecology and Economics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Economics and populations as self-regulating systems; economic repercussions with the environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources: prospects for agricultural growth.

125. Urban Economics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, and 100 or 104. Explores the market forces behind the development of cities, explaining the interaction between urban expansion and the spatial distribution of activity within cities. Explores the effects of policies that address problems such as poverty, inadequate housing, congestion, pollution, urban education, and crime.

130. Public Microeconomics (4) III. Silvestre
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104, or consent of instructor. Public expenditures; theory and applications. Efficiency and equity of competitive markets; externalities, public goods, and market failures; positive and normative aspects of public policy for expenditure, including benefit-cost analysis. Topics include consumer protection, pollution, education, poverty, and crime.

131. Public Finance (4) I. Halvorsen
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 104. Assessing the economic burden of taxation; equity and efficiency considerations in tax design; and economic effects of the U.S. tax system (including personal income tax, capital income tax, and property tax); tax loopholes; recent developments; tax reform proposals.

134. Financial Economics (4) II. Quinlan
Lecture—4 hours; 1 hour. Prerequisite: courses 1A, 1B, and 100 or 104; Mathematics 16A; Statistics 13. General background and rationale of corporation, finance as resource allocation over time, decision making under uncertainty, role of information, capital market and interest rate structure, financial decisions. Students who have completed Agricultural Economics 171 may not receive credit for this course.

135. Money, Banks and Financial Institutions (3) II, III, I. Staff
Lecture—2 hours. Prerequisite: courses 1A-1B or consent of instructor. Monetary institutions, the banking system, money, banking, Federal Reserve System, the tools of monetary policy.

138A. Monetary Theory (4) I. Makowski
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 105. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

138B. Monetary Policy (4) I. Salyer
Lecture—3 hours; discussion—1 hour. Prerequisite: course 138A. Analysis of the role of financial intermediaries in the economy and the theory and practice of monetary policy.

140. Econometrics (4) II. The Staff
Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 100 or 104, and 101 or 105; Mathematics 16A or 16B or 21A; Statistics 13. Introduction to the use of statistical methods in economics and an introduction to standard techniques of inference and hypothesis testing.

151A. Economics of the Labor Market (4) I. Cameron
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. The supply and demand for labor in the labor market. Economics of labor unions. Policy issues: labor force participation by married women; minimum wage and youth unemployment; effect of unions on wages.

151B. Economics of Human Resources (4) II. Nelson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. Human resource analysis: introduction to human capital theory and economics of education; an economic theory of wage differentials, including theories of labor market discrimination; income distribution, poverty, and income inequality; public and corporate training programs; the labor market.

160A. International Microeconomics (4) I. Swenson
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or 104, or consent of instructor. International trade theory: impact of trade on the domestic and world economies; public policy toward international trade; students who have completed course 162 may receive credit for course 160A.

160B. International Macroeconomics (4) I. Swenson
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or 104, or consent of instructor. Macroeconomic theory of an open economy. Stability of payment mechanisms, international monetary economics issues, international financial institutions and their policies. Students who have completed course 162 may receive credit for course 160B.

162. International Economic Relations (4) I. Swenson
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment. Emphasis on current policy issues. Course intended for non-majors. Students who have completed course 160A or 160B may not receive credit for this course.

170. Economy of the Middle East (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of the Middle East. Cornell department for course scheduling.

171. Economy of South Asia (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of South Asia. Consult department for course scheduling.

172. Economy of South Asia (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of South Asia. Consult department for course scheduling.

173. Economy of South-East Asia (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of South-East Asia. Consult department for course scheduling.

174. Economy of Europe (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of Europe. Consult department for course scheduling.

175. Economy of Sub-Saharan Africa (4) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of the Sub-Saharan. Consult department for course scheduling.

190. Topics in Economics (4) III. Lindert
Lecture/discussion-seminar—4 hours. Select topics in economic analysis and research. Topic, policy, variable content. May be repeated for credit.

190X. Upper Division Seminar (1-4) I. The Staff
Seminar—1 hour. Prerequisite: courses 100 or 104; and 101 or 105; and consent of instructor. In-depth examination at an upper division level of a special topic in Economics. Enrolled on focused analytical work. May not be repeated for credit. Limited enrollment.

192W. Internship in the Davis-Inashington Program (6-8) I, III. The Staff
Internship—18-24 hours. Prerequisite: Junior or senior standing in Economics; completion of 84 units of credit, with a minimum grade average of 3.00; admission to the Davis-Inashington Program. Internship in Washington, D.C. with associated research project. Students must arrange for a faculty sponsor before embarking on the internship. Maximum of 3 units will count toward satisfying Economics major requirements. (PINP grading only.)

194A-194HB. Special Study for Honors Students (4-4) I-II. The Staff (Salyer in charge)
Independent study—3 hours; discussion—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum grade point average of 3.5 in courses counted toward the major. A program of research culminating in the writing of a thesis under the direction of a faculty advisor. (Deferred grading only, pending completion of course.)

*Course not offered this academic year.*
197. Tutoring in Economics (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—3–5 hours. Prerequisite: consent of instructor. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. Units may not be counted toward satisfaction of major requirements. (P/NP grading only.)

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

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

Graduate Courses

200A. Microeconomic Theory (5) I, Caputo Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Agricultural Economics 200A.)

200B. Microeconomic Theory (5) II. Quonzi Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (Same course as Agricultural Economics 200B.)

200C. Microeconomic Theory (5) III. Masokwi Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Basic concepts of price and information economics. Individual decision making under uncertainty, introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Agricultural Economics 200C.)

200D. Macroeconomic Theory (5) I, Hoover Lecture—4 hours; discussion—1 hour. Prerequisite: course 101, Mathematics 21A, 21B, and 21C. Macro theory of national income, employment, and prices.

200E. Macroeconomic Theory (4) II, Salyer Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently) and 2002. Macrodynamics: theory of income, employment, and prices.

201A. History of Economic Thought (4) II, Hoover Lecture—3 hours; discussion—1 hour. Economic thought from the classical Greek era to modern times. Offered in alternate years.

201B. History of Economic Thought (4) I, Hoover Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

202A. Advanced Economic Theory I (4) I, Silvestre Lecture—4 hours. Prerequisite: course 200A. 200B. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency, intertemporal economies; uncertainty.

202B. Advanced Economic Theory II: Game Theory (4) I, The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Covers the most recent developments in game theory, with the focus changing from year to year. Main topics are: representations of Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory.

203C. Topics in Economic Theory (4) III, Nehring Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Selected topics in contemporary microeconomic theory. May be repeated for credit with the consent of the Graduate Studies Committee.

204. Microeconomic Analysis (5) I. Hazlett (Agricultural Economics) Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 (or 100M) or Agricultural Economics 100A-100B. Mathematical analysis of microeconomic concepts. Open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Agricultural Economics 204.)

207. Contemporary Economics Seminar (1) I, II, III. The Staff Seminar—2 hours. Prerequisite: graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (SU grading only.)

208A. Economics of Distributive Justice (4) I, Roemer Lecture—4 hours. Prerequisite: course 200B. Introduction to social choice theory; easy-favors allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers J. Rawls, R. Dworkin, R. Nozick and J. Cohen.

208B. Public Ownership Economics (4) II, Silvestre Lecture—4 hours. Prerequisite: course 200B. Public ownership from the viewpoint of microeconomics, in particular general equilibrium and welfare economics. Topics include returns to scale and firm ownership, common-pool resources, externality, and solution concepts for economies with public and private ownership. Offered in alternate years.

209C. Foundations of Decision Theory (4) II, Nehring Lecture—4 hours. Prerequisite: course 200B. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include: intertemporal decision, learning, incompleteness and ambiguity; individual and social choice; game theory as interactive decision theory; bounded rationality. Offered in alternate years.

210A. Economic History (4) II, Clark Lecture/discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest.

210B. Economic History (4) I. Ornat Lecture/discussion—4 hours. The United States from Colonial times to the present. Other areas of the western hemisphere may be studied, depending on student interest.

210C. Economic History (4) III, Lindert Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexibly.)

214. Development Economics (4) II, Janis Lecture—4 hours. Prerequisite: course 200A, 200B, 200C. Agricultural Economics 100A-100B, course 101; Agricultural Economics/ 204 and course '60A-160B recommended. View of the principal theoretical and empirical issues in the analysis of development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Agricultural Economics 214.)

215A. Agriculture and Economic Development (4) I, Taylor Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204 and 214. Agricultural Economics 100A-100B recommended. Analysis of rural-urban linkages and their role in economic development, food price policy, and interactions between economic development and the environment. Analytical focus on household farm and intersectoral models. (Same course as Agricultural Economics 215A.)

215B. Open Macroeconomics of Development (4) I, Wio Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200A or 204, 200D or 205, and 214 or 215A. Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and the balance of payments discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Agricultural Economics 215B.)

215C. Empirical Approaches to Development Analysis (4) III, The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 215A, 215B. Extension of development models to policy analysis including Household Production Models, models of resource allocation under uncertainty. Social Accounting Matrix and Commodity General Equilibrium models. Analysis and case studies of methods of project evaluation with and without income-distribution weights. (Same course as Agricultural Economics 215C.)

221A. Industrial Organization (4) I, Bonanno Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic performance under conditions of limited governmental interference.

221B. Industrial Organization (4) III, The Staff Lecture—2 hours; seminar—2 hours. Social standards and public policies toward the business sector of the economy.

221C. Topics in Industrial Organization (4) III, The Staff Lecture—3 hours; seminar—1 hour. Prerequisite: course 221A. Advanced topics in industrial organization and applied microeconomics. Spontaneous research. Contents may vary from year to year.

222. Urban Economics (4) III, The Staff Lecture—2 hours; discussion—2 hours. Prerequisite: course 200A or 204. Explains development of cities and urban systems pattern formation, demand and supply factors, social and economic implications of anchor institutions. Housing, crime, public policy, regulatory and spatial implications.

223. Urban Economics (4) II, Whitten Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in property taxation, corporate taxation, and social insurance; evaluation of effective tax rates.

230B. Public Economics (4) I, Iheime Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Effects of tax policies on economic behavior, production, consumption, savings, investment, and labor supply. Distribution and equity; social welfare evaluation and the measurement of inequality.

230C. Public Economics (4) II, Iheime Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Advanced topics in economics of the public sector, with emphasis on current research. Content may vary from year to year.

235A. Alternative Approaches to Monetary Analysis (4) II, Sheshin Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D (may be taken concurrently). Focuses on relation between changes in money supply and changes in nominal GNP. Also discusses the effect of changes in money supply on interest rates.

235B. Monetary Theory (4) III, Salyer Lecture—3 hours; discussion—1 hour. Prerequisite: course 235A. Explores problem of finding an appropriate place for money in macroeconomic general equilibrium models. Consideration given to meaning of money, its relation to inflation and the real economy and to its role in models of finance.

235C. Monetary Policy (4) II, The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Organization of the Federal Reserve System, the definition of money, goals and tools of monetary policy, alternative targets for monetary policy, impact of monetary policy, the problem of lags, alternative policies.

240A. Econometric Methods (4) II, Green Lecture—4 hours. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model, linear restrictions, het-
Economy, Justice, and Society

John E. Roemer, Ph.D., Program Director and Professor of Economics
Program Office, 370 Kerr Hall (916-752-0743)

Committee in Charge
Fred Block, Ph.D. (Sociology)
David Copp, Ph.D. (Philosophy)
Robert Jackman, Ph.D. (Political Science)
Klaus Nehring, Ph.D. (Economics)
John Roemer, Ph.D. (Economics)
Joaquim Silvestre, Ph.D. (Economics)
Richard Sinopoli, Ph.D. (Political Science)

Graduate Study. The Program on Economy, Justice, and Society offers a designated emphasis in Economy, Justice, and Society. This program is open to students pursuing a doctoral degree in philosophy, political science, or economics. The designated emphasis provides interdisciplinary training in related aspects of economic theory, political theory, and public philosophy. Students will take one or two core courses offered by the program, a designated field in their home department, a choice of three designated courses in the other two departments, and attend an advanced seminar run by the program. For students choosing the emphasis, these requirements will be in lieu of some requirements for the Ph.D. in the participating departments. After graduation, students will receive a Ph.D. in their major with a designated emphasis in Economy, Justice, and Society.

Graduate Adviser. Consult program office or a program graduate adviser in one of the three departments listed above.

Courses in Economy, Justice, and Society (EJS)

Upper Division Course
100. Microeconomic Theory (4) III. Nehring Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A; or graduate standing. Basic concepts, modes of reasoning and fundamental results in modern microeconomics. Emphasis on, first, Utility Theory; second, the logic of the equilibrium methods; third, welfare economics and public policy.

Graduate Courses
207A. Interdisciplinary Social Analysis (3) II. The Staff (Director in charge) Lecture—2 hours; term paper. Prerequisite: graduate standing in economics, philosophy, or political science; course 100, Philosophy 117, or the equivalents. Analysis of practical and theoretical social problems with tools of economic theory, philosophy, and political theory, e.g., the welfare state, risk and public policy, equality of opportunity, individual rationality and cooperation. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

207B. Interdisciplinary Social Analysis (3) II. The Staff (Director in charge) Lecture—2 hours; term paper. Prerequisite: course 207A. Continuation of course 207A. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

*Course not offered this academic year.

*209A. Economics Models of Distributive Justice (4) I. Roemer Lecture—4 hours. Prerequisite: course 100 or the equivalent, and graduate standing. Introduction to social choice theory: envy-free allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers. Offered in alternate years.

*209B. Economic Models of Public Ownership (4) II. Silvestre Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Public ownership from the viewpoint of microeconomics, in particular, general equilibrium and welfare economics. Topics include returns to scale and firm ownership, common-pool resources, externalities, and solution concepts for economies with public and private ownership. Offered in alternate years.

*209C. Foundations of Decision Theory (4) III. Nehring Lecture—4 hours. Prerequisite: course 100 or the equivalent and graduate standing. Rigorous exposition of subjective expected utility theory; foundations, normative and empirical challenges. Topics include intertemporal decision; learning; incoherence and ambiguity; individual and social choice; game theory as interactive decision theory; bounded rationality. Offered in alternate years.

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Education

(Intercollegiate Division)
Jon Wagner, Ph.D., Director of the Division (2075 Academic Surge)
Jonathan H. Sandoval, Ph.D., Associate Director of the Division
Barbara J. Merino, Ph.D., Director of Teacher Education
Barbara G. Goldman, Ph.D., Associate Director of Teacher Education
Sandra M. Murphy, Ph.D., Director of the CRESS Center
Division Office, 2074 Academic Surge (916-752-0258; FAX: 916-752-5411)
Student Services, 2078 Academic Surge (916-752-0757)
CRESS Center Office, 2060 Academic Surge (916-752-0281; FAX: 916-752-6135)

Faculty
Donald G. Armini, Ph.D., Professor
Concha Delgada-Gallant, Ph.D., Associate Professor
Sharon S. Dugdale, Ph.D., Professor
Richard A. Figueroa, Ph.D., Professor
Michele L. Foster, Ph.D., Associate Professor (Education, African American and African Studies)
Patricia C. Gandara, Ph.D., Assistant Professor
Barbara G. Goldman, Ph.D., Lecturer in and Supervisor of Teacher Education (Education, Applied Behavioral Sciences)
Pauline V. Holmes, M.A., Supervisor of Teacher Education
Anna T. Kato, Ed.D., Supervisor of Teacher Education
Barbara J. Merino, Ph.D., Professor
Sandra M. Murphy, Ph.D., Associate Professor
Keith H. Otsauma, Ph.D., Assistant Professor (Education, Asian American Studies)
Jonathan H. Sandoval, Ph.D., Professor
Robert M. Van Dyne, Ed.D., Supervisor of Teacher Education
Jon Wagner, Ph.D., Professor
David R. Warnper, Ph.D., Lecturer in and Supervisor of Teacher Education
Karen A. Watson-Geggo, Ph.D., Professor
Emeriti Faculty
Hugh C. Black, Ph.D., Professor Emeritus
Cooperative Research and Extension Services for Schools (CRESST) Staff
Sandra Murphy, Ph.D., Director, CRESS Center
Nancy Aasberg, M.A., Director, Northern California Mathematics Project
Pam Cestari, M.A., Director, Sacramento Area Science Project
Jacqueline Cheng, Ph.D., Director, Assessment, Research and Development Project
Karen Don, Ph.D., Publications Editor
Beth Hart, M.A., Education Extension Specialist for Healthy Start
Barbara Hoffman, M.A., Co-Director, Sierra North Arts Project
Pauline Holmes, M.A., Associate Director for Inservice Programs, Area 3 Writing Project
Judith Kysy, M.A., Education Extension Specialist for Mathematics; Co-Director, College Preparatory Mathematics
Rachel Lodge, M.A., Director, Healthy Start Field Office
Robin Marion, B.S., Education Extension Specialist for Science
Jayne Marlink, M.A., Director, Area 3 Writing Project
Kathy Medina, M.A., Director, Area 3 History and Culture Project
Deborah Pismans, D.D.A.B.D., Co-Director, Sierra North Arts Project
Wendell Potter, Ph.D., Director, Instructional Technology for LEP Students
Keith Prior, B.S., Co-Director, Instructional Technology for LEP Students
Tom Salle, Ph.D., Co-Director, College Preparatory Mathematics Project

Program of Study
The Division of Education does not offer an undergraduate major program. However, it does offer a minor.

Minor Program Requirements:
Educational theory is considered to be the foundation or basic area for undergraduates to elect a minor if they wish to (1) major in an allied program, (2) obtain a master’s degree in education or allied field, (3) obtain a Ph.D. degree in education, (4) enter a profession that focuses on work with people, (5) seek employment in government or industrial training programs, or (6) obtain a better understanding of the issues and concerns of public and private education.

Units
Education (minimum units)
20-23
Education 110 or 111 ........................................... 4
One course from Education 120 or 123 ........... 4
Depth courses .................................................. 12-15
At least 12-15 units from Education not listed above: 100, 110, 111, 115, 120, 123, 130, 145, 151, 152, 153, or 163 chosen in consultation with an Education advisor.

Minor Advisers: All faculty members who teach undergraduate courses.

Teacher Education
For a statement of complete requirements and appointments with credential advisers, contact the divisional Student Services Office, 2078 Academic Surge. Interested students are urged to do this as early as possible in their academic career.

Applicants to the elementary or secondary credential programs should contact the divisional Student Services Office, 2078 Academic Surge. Interested students are urged to do this as early as possible in their academic career.

Graduate Adviser: B. Merino, B. Goldman (Credential Program).
Graduate Study: The Division offers programs of study and research leading to the M.A. and Ph.D. degree in Education. The Ph.D. is offered by the Education Graduate Group. Detailed information regarding graduate study may be obtained by writing the Graduate Advisor, Division of Education, 2074 Academic Surge.

Joint UCD/CSU Fresno Doctoral Program (Ed.D.)
Rosemary Papalewski, Ph.D. (CSU Fresno) and Douglas Minnis, Ed.D. (UC Davis), Program Administrators. UC Davis Office: 252 Marak Hall (916-752-1473; FAX, 916-752-6222)
The joint (UCD/CSU Fresno) doctoral program leads to the Doctorate in Education (Ed.D.) in Educational Leadership. Contact Professor Rosemary Papalewski at CSU Fresno for information and application materials (209-228-2050; FAX: 209-228-2065).

Courses in Education (EDU)
Lower Division Course
98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Prerequisite: consent of instructor. For primarily lower division students (Prerequisites: pending only).

Upper Division Courses
100. Introduction to Social Studies (4) I, II, III. Wampler Lecture—3 hours; field work—3 hours. Prerequisite: upper division standing. Study of educational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movements; observing, aiding, and tutoring in schools.
110. Educational Psychology: General (4) I, II, III. The Staff (Director in charge) Lecture/discussion—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, cognitive development, individual differences, testing, and evaluation. General Education credit: Contemporary Societies.
111. Introduction to Psychopedagogy (4) I, II, III. Yonge Lecture/discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Introduction to the human science of pedagogy (education) with special emphasis on the psychopedagogic perspective. Such topics as the pedagogic situation, learning and becoming, teaching and the lesson structure, and the methods of pedagogical will be considered.
115. Educating Children with Disabilities (2) I, II. Figueroa, Spring Lecture—2 hours. Prerequisite: upper division standing. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes.
117. Psychology of Reading (4). I. The Staff (Director in charge) Lecture/discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Theory and research on psycholinguistic processes involved in learning to read. Topics include reading readiness, word recognition and spelling, knowledge of the orthographic system, phonological awareness, interactive processes, influence of dialect, difficulties of poorer readers.
120. Philosophical and Social Foundations of Education (4) I, II. Wagner, Amstine, Foster Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society. General Education credit: Civilization and Culture.
122. Civil Rights of Teachers and Students (4) I, II. The Staff (Director in charge) Discussion—4 hours. Prerequisite: upper division standing. Rights of teachers and students under the U.S. and California Constitutions and under Federal and State laws. Emphasis on the rights of speech, press and assembly, religious autonomy, due process, equal protection and privacy. General Education credit: Contemporary Societies.
123. John Dewey and the Foundations of Education (4) I. Amstine Lecture/discussion—4 hours. Prerequisite: upper division standing. The philosophical and social foundations of education as interpreted by Dewey. While focusing on his critique of American education and his systematic proposals for reform, attention will also be given to criticisms of Dewey.
130. Issues in Higher Education (4) I, II. Amstine Discussion—3 hours; field work—3 hours. Prerequisite: upper division standing; course 122 or the equivalent. Analysis of the decisions of the United States Supreme Court applying the free exercise and establishment clauses of the First Amendment to the relationship between church, state, and schools. General Education credit: Contemporary Societies.
148. Aesthetics in Education (4) I. Amstine Lecture/discussion—4 hours. Prerequisite: upper division standing. Considers the role of the arts in education. Examines various conceptions of the nature of art and aesthetic experience, and relates this to instructional procedures.
151. Language Development in the Chicanos Child (3) I, II. Merino Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, consent of instructor. The role of dialect varieties in the classroom.
152. Communication Skills for Bilingual Teachers (3) I, II. The Staff (in charge). Lecture—2 hours; field work—3 hours. Prerequisite: course 151; Spanish 2, 8A-8B. The development of communication skills of prospective educators with an emphasis on the study and use of standard Spanish and Southwest Spanish dialects in teaching science, mathematics, social science, music, art, and language arts to bilingual elementary school pupils.
153. Cultural Diversity and Education (2) I. Merino and staff Lecture/discussion—2 hours. Prerequisite: upper division standing. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool.
160A. Introduction to Peer Counseling (2) I, II. Rodolfa Lecture/discussion—2 hours. Prerequisite: upper division standing and consent of instructor. Introduction to peer counseling techniques and development of peer counseling skills. (P/NP grading only.)
160B. Issues in Peer Counseling (2) I, II. Rodolfa Lecture/discussion—2 hours. Prerequisite: upper division standing and consent of instructor. Course 160A recommended. In-depth review and development of skills for specific counseling topics. May be repeated once for credit when topic differs. (P/NP grading only.)
163. Guidance and Counseling (4) I, II. Figueroa, Sandoval, and staff Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). Nature and scope of pupil-per-
sennel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment.

180. Computers in Education (3) I, II, III. Dugdale Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Applications of computers in education as instructional, intellectual, and communication tools.

192. Internship (1-5) I, II, III. The Staff (Director in charge) Discussion—1 hour; field work—2 to 15 hours; term paper. Prerequisite: upper division standing; consent of instructor. Internship in schools under supervision of a faculty member. May be repeated once for credit. (P/NP grading only.)

197T. Tutoring in Education (1-2) I, II, III. The Staff (Director in charge) Tutoring—1 to 2 hours. Prerequisite: upper division standing and consent of instructor. Leading of small voluntary discussion groups affiliated with the Division’s upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student’s work. May be used twice for credit for a total of 4 units. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Director in charge) Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

200. Educational Research (4) III. Spring, Gandara Lecture—2 hours; discussion—2 hours. Prerequisite: introductory statistics and graduate standing in education or consent of instructor. Desirable to be a master’s degree student in education with emphasis on educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research.

201A. Ethnographic Research in Schools I: Current Theory and Practice (4) I. Delgado-Gaitan, Watson-Geoge Lecture—4 hours. Prerequisite: graduate standing. Review of current literature from anthropology and sociology related to schools, with emphasis on the organizational structure of institutions, and the analysis of face-to-face interaction. Will explore the relationship between field-based research and theory development in the acquisition of knowledge in specific social and institutional settings.

201B. Ethnographic Research in Schools II: Field-Based Research Projects (4) II. Watson-Geoge Discussion—4 hours. Prerequisite: graduate standing and course 201A. Student research projects in specific schools with cooperative critical analysis of the design, data collection, and interning by researchers. Students will continue to meet with instructors as a group throughout the quarter to discuss specific ethnographic projects and arguments, and an opportunity for students to locate and critique some contemporary studies of the philosophy of education. Offered in alternate years.

202. Philosophy of Education: Models and Methods (4) III. Arnstein Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examples of some major philosophical points of view about educational aims, illustrations of several types of philosophical discourse and argumentation, and an opportunity for students to locate and critique some contemporary studies of the philosophy of education. Offered in alternate years.

203. Qualitative Research in Education (4) III. The Staff Seminar—2 hours; lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments).

204. School Change and Educational Reform (4) II. Wagner Lecture/discussion—2 hours; seminar—2 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent, or consent of instructor. Analysis of models, processes, and case studies of school change and educational reform with respect to variable characteristics of schools and school change, planned and unplanned change, the moral evaluation of school change, and the role of educational research.

205. The Concept of Mind in Teaching (4) III. Arnstein Seminar—4 hours. Philosophical analysis of the problems of educational practices which are created, aggravated, and sometimes solved by varying conceptions of mind and thinking. Offered in alternate years.

207. Concepts of the Curriculum (4) I. Arnstein Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis and argumentation in the evaluation of the content of teaching. In the consideration of curriculum theory and practice, classical and contemporary approaches to subject matter and activity emphasis, hidden curriculum, and moral education.

209. Pedagogics (4) III. Yonge Seminar—4 hours. Critical analysis of the literature available in English dealing with theoretical and practical issues in education in terms of Pedagogics (i.e., an existential phenomenological approach to the systematic study of education).


211. Psychopedagogics (4) II. Yonge Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Phenomenological approach to the psychological aspects of the educational situation (psychopedagogics). A critical consideration of how psychopedagogics contributes to the theory and practice of education.

213. Individual Assessment (4) III. Sandoval Lecture—4 hours. Prerequisite: courses 114 and 210. Admission to school psychology credential program. Theories of intellectual functioning and the measurement of cognitive abilities of school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children’s Ability.

214. Assessment of Children’s Personality (4) III. Sandoval Lecture—3 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program; courses 213 and 210; and familiarity with basic psychological principles and theories of motivation. Study of the projective hypothesis; concepts of personality and its measurement; legal and ethical issues in personality assessment; interviewing techniques in assessment; the social context of personality assessment; specific measures in personality assessment; reporting on personality assessments; school interventions. Offered in alternate years.

215. Motivation and Behavior Modification (4) II. Spring Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Factors related to influencing behavior in educational settings, including analyses of intrinsic and extrinsic motivation, psychological reac- 
sions, locus of control, achievement attribution, and behavior modification.

218. Testing Minority Children (4) I. Figueroa Lecture—3 hours; field work—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Exploration of tests and techniques that are appropriate for use with Hispanic students. The use of multicultural pluralistic assessment. Review studies and guidelines on use of tests with minority children. Offered in alternate years.

219. Educational Testing and Evaluation (3) Gandara Seminar—3 hours. Prerequisite: courses 114 and 200 or consent of instructor. Study of test theory as it applies to research and evaluation in education. Fosters an emphasis on general ability and reading tests. Offered in alternate years.

231. Culture and Learning (4) II. Delgado-Gaitan Seminar—4 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent, or consent of instructor. Analysis of major theories of relationships between learning and the sociocultural context in which learning takes place, issues related to the academic achievement of different language groups, and implications for research and pedagogical reform.

232. Families and Communities as Educational Contexts (4) I. Delgado-Gaitan Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Families and cultural communities are important social contexts of education for children. An interdisciplinary perspective is presented in an attempt to understand how learning in these social contexts influences the schooling of children.

233. Anthropology of Education (4) I. Foster Seminar—3 hours; term paper. Prerequisite: one of the following courses: Anthropology 117, 127, 129, or 222; or Education 291, 291A, or 291B, or consent of instructor. Uses concepts of anthropology to examine education in such settings as family, community, and formal institutions of schooling. Course goal is to raise questions about educational issues often taken for granted and provide a perspective from which problems may be analyzed. Offered in alternate years. (P/NP grading only.)

235. Critical Pedagogy (4) III. Delgado-Gaitan Seminar—4 hours. Prerequisite: Critical Theory 200A and graduate standing. A sociocultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences.

237. Education and Social Policy (4) III. Gandara Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Focuses on understanding the social and political context of education in the U.S. and California and how education policy is formed in the broader public policy arena. Develops skills in educational policy analysis. Offered in alternate years.

239. Discourse Analysis in Educational Settings (4) II. Watson-Geoge Seminar—3 hours; term paper. Prerequisite: graduate standing and at least one previous course in linguistics or sociolinguistics, or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactive sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting.

241. Research on Reading and Spelling Acquisi- tion (4) III. Murphy, Spring Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis and critique of research on psychological processes in learning to read and spell. Topics include writing systems, theories of processes and acquisition, emergent reading readiness, decoding, word reading, oral text reading, spelling stages, instructional methods, disability, dialect. Offered in alternate years.

*Course not offered this academic year.*
242. Research on Text Comprehension (4) I.
   Spring
   Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Analysis and evaluation of research related to the comprehension of written and oral text, with an emphasis on the teaching and learning of comprehension processes in school settings. The course will focus on current issues and research methodology. Offered in alternate years.

243. Research on the Teaching and Learning of Writing (4) I.
   Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Study of issues in research on composition; history of composition studies; rhetorical theories; techniques; product and process approaches; cognitive and social perspectives. Offered in alternate years.

251. Research in Bilingual and Second Language Education (3) III.
   Seminar—3 hours. Prerequisite: course 151; knowledge of a foreign language. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms, use of the vernacular in classroom offerings. Offered in alternate years.

252. Multicultural Teaching and Curriculum (3) III.
   Seminar—2 hours; field work—3 hours. Prerequisite: graduate standing or consent of instructor. Cross-cultural studies in education, motivation, language acquisition and cognition and its application to effective classroom strategies and curriculum development for minority students. Students will develop and implement multicultural curriculum as well as use ethnographic techniques in an educational setting. Offered in alternate years.

253. Language and Literacy in Linguistic Minorities (3) II.
   Seminar—2 hours; field work—3 hours. Prerequisite: familiarity with another language and culture; graduate standing. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum.

255. Curriculum Development and Evaluation in Mathematics (4) I.
   Dugdale
   Seminar—4 hours. Prerequisite: graduate standing in Education with upper division coursework in mathematics or consent of instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, prospective issues, and effective strategies. Selected curricular projects will be examined.

256A. Research in Mathematics Education (4) II.
   Dugdale
   Seminar—4 hours. Prerequisite: graduate standing in education with upper division coursework in mathematics or consent of instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evaluation of trends, issues, theories, and hypotheses in various areas of mathematics education research. Course emphasizes research foundations. Offered in alternate years.

256B. Research in Mathematics Education (4) II.
   Seminar—4 hours. Prerequisite: graduate standing in education with upper division coursework in mathematics, or consent of instructor. Current research issues and problems in mathematics education, status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Offered in alternate years.

257. Computer Technology in Mathematics Education (4) III.
   Dugdale
   Seminar—4 hours. Prerequisite: graduate standing in Education with mathematics coursework, or consent of instructor. The roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Offered in alternate years.

271. Recent Developments in Social Studies Education (3) III
   Lowry
   Lecture—2 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rationales, goals, objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

275. Effective Teaching (4) I.
   Minnis
   Seminar—4 hours. Review of research on the relationship of effective teacher behavior and student learning. Use of research on teacher effectiveness to develop teaching strategies. Ways to decide on the most appropriate instructional strategies in specific teaching situations.

290C. Research Conference in Education (1) I, II, III.
   The Staff (Director in charge)
   Discussion—1 hour. Prerequisite: graduate standing. Presentations and critical discussions of research in education by graduate students with their major professor. May be repeated twice for credit. (SU grading only.)

291. Proseminar in Education (3) I, II, Sandalow
   Seminar—3 hours. Prerequisite: admission to the Ph.D. graduate program in education. Seminar for first-year doctoral students. The study of multi-disciplinary research approaches to educational issues. Reports and discussion of recent advances in education. Speakers from the graduate group faculty in education will be taken twice for credit.

293. Topical Seminar in School Psychology (3) III, Sandalow
   Seminar—3 hours. Prerequisite: graduate standing in education and consent of instructor. Critical study of selected issues in education and school psychology related to the learning and mental health of children and adolescents in schools. May be repeated once for credit.

296. Group Study (1-5) I, II, III.
   The Staff (Director in charge)
   (SU grading only.)

299. Individual Study (1-6) I, II, III.
   The Staff (Director in charge)
   Independent study—3-18 hours. Individual study under the direction of a faculty member. (SU grading only.)

299D. Research (1-6) I, II, III.
   The Staff (Director in charge)
   Independent study—3-18 hours. Research for individual graduate students. (SU grading only.)

Professional Courses

330. Reading in the Elementary School (3) III.
   The Staff (Merino in charge)
   Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.

331. Reading in the Secondary School (4) I, II.
   Murphy
   Discussion—4 hours. Prerequisite: admission to graduate standing, enrollment in the secondary credential program, or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations.

352. Language Arts in the Elementary School (2) I.
   The Staff (Merino in charge)
   Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children’s literature in elementary schools.

303. Art Education (3) III.
   The Staff (Merino in charge)
   Lecture/discussion—2 hours; laboratory—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in art. Study of various processes of art, exposure to concepts, introduction to media, and techniques suitable for the elementary school with emphasis on cross-discipline exploration.

304A. Teaching in Elementary Schools (5-8) I.
   The Staff (Merino in charge)
   Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.

304B. Teaching in the Elementary Schools (5-8) II.
   The Staff (Merino in charge)
   Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Current concepts of elementary school curriculum, emphasis on contributions from the social, biological, and physical sciences. Emphasis on effective teaching methods.

304C. Teaching in the Elementary Schools (5-8) III.
   The Staff (Merino in charge)
   Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304B; acceptance into teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Evaluation of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.

305A. Teaching in the Middle Grades (5-8) I.
   The Staff (Merino in charge)
   Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle-grade curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.

305B. Teaching in the Middle Grades (5-8) II.
   The Staff (Merino in charge)
   Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in intermediate grades. Selection, organization, and evaluation of teaching materials including audio-visual aids. Effective teaching methods.

305C. Teaching in the Middle Grades (5-8) III.
   The Staff (Merino in charge)
   Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in junior high school. Current conceptions of the junior high school with emphasis on effective teaching methods and selection of curriculum materials. Alternative programs.

   The Staff (Merino in charge)
   Seminar—2 hours; student teaching—10-21 hours. Prerequisite: acceptance into teacher education program. Supervised teaching in regular or special education secondary school classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of individual problems of adolescents; audio-visual techniques. Must be repeated by undergraduates for a total of 15 units: 21 units by graduates in Physical Education and Music, and 24 units by graduates in English and Mathematics.

307. Methods in Elementary Science (2) II.
   Wampler
   Lecture/discussion—2 hours. Prerequisite: acceptance into teacher education program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.
Education Abroad Program

James Gallant, Ph.D., E.A.P. Campus Director
Program Office, 307 South Hall (916-752-3014)

Programs of Study

The Education Abroad Program (EAP) of the University of California offers students who meet the minimal admission requirements the opportunity to experience a different culture while making progress toward degree objectives. Students interested in the language, literature, art, culture, history, or governmental or social institutions of the countries or areas where study centers are located will gain substance from first-hand academic and practical experience. The same is true for students of foreign affairs. All students, whatever their field of study, will broaden their outlook and gain new skills as the result of study in a foreign country. The academic—non-academic—debts and credits of participation in the EAP should be weighed carefully prior to departure, however. Estimated all-inclusive minimum costs for the three- to twelve-month program range from $3,000 to $20,000 (varies depending upon the country).

Application

Normally, students participate in the program during their junior year, but a limited number of students may be selected for participation as seniors. A few programs are open to sophomores and to graduate students as well. Students considering study abroad with the EAP should contact the EAP Office early in the fall quarter concerning application and filing deadlines. This is important, as deadlines for some centers, including the United Kingdom and Ireland, are in early November.

Eligibility requirements include:

- At least three regular session quarters completed in residence at UC by the time of participation.
- At least 84 quarter units completed by the time of participation, except for specific short-term programs.
- At least a 3.0 grade point average for course work completed at UC at the time of application and departure.
- In about half of the programs we offer, 2 years (6 quarters) of University-level foreign language (with a 3.0 grade point average) or the equivalent is required, but there are a number of EAP programs that do not require previous knowledge of a second language for participation. Consult the EAP Office for specific requirements.
- An academic plan approved by your major adviser and the campus coordinator.
- Endorsement of the Academic Senate Committee on the Education Abroad Program

Application forms are available from the EAP Office. A provisional academic planning form, prepared in consultation with the EAP Adviser and the major adviser, must be submitted along with the completed application to the EAP Office prior to the appropriate deadline. Applications received after the official deadline cannot be considered.

For study abroad during the 1995-96 academic year, the application deadlines are as follows: October 15 for the Japan Global Studies Studies spring quarter program; early November for the United Kingdom and Ireland, Japan, and the spring quarter programs in Mexico and Costa Rica; early May for programs in Brazil, Chile, Mexico-Tacito: Language Program, New Zealand, and the year program in Costa Rica; and mid-to-late January for all other study centers. If you intend to participate in a study program during your senior year, careful advance planning is necessary to make sure that all degree requirements will be met. Consult with your major adviser, the Dean’s Office of your college, and the campus EAP Coordinator. Students who will have accumulated more than 145 units prior to the beginning of their planned year of study abroad must receive permission from the Campus Coordinator before submitting an application; the probability of such students being accepted is low.

Selection

The Academic Senate Committee on the Education Abroad Program is intimately involved in the selection of EAP participants on the Davis campus. This committee strongly recommends that prospective participants take appropriate courses dealing with the country of their interest in preparation for the year.

*Course not offered this academic year.
abroad. Applicants who are taking or have completed such courses at the time of the campus selection process will have an increased probability of receiving the endorsement of the Committee, other factors being equal. Lists of suggested courses and reading materials are available in the EAP Office.

Once the completed application materials have been filed, students are interviewed by a selection committee consisting of faculty and EAP returnees. Among other things, academic goals, knowledge of the host country and the United States and proficiency in the language of the host country, when applicable, will receive considerable attention during the interviews.

Files of applicants receiving the endorsement of the Senate Committee on EAP are forwarded to the Systemwide Office of the EAP on the Santa Barbara campus, where further selections will be made.

**Academic Program**

In most situations, students from the University of California live as the students of the host country do, and in some cases students attend the same courses, taught by faculty of the host country in their own language. This creates a rich learning environment that provides a cross-cultural experience.

To aid adjustment of UC students to different cultural environments, tutorials are a part of the academic program of most centers. Tutorials also assist students with language problems and provide cultural background information presupposed in the courses. Tutorials are taught by graduate students or junior staff of the host university and are offered in association with courses in which a sufficient number of UC students have enrolled.

To assist in the adjustment and the academic work of the students, faculty members of the University of California serve as Directors and/or Associate Directors at most of the study centers abroad.

The academic program for each student includes: (1) an intensive preparatory course in the language of the host country (except for the programs in the Australia, Canada, Egypt, Ghana, Hungary, Ireland, New Zealand, United Kingdom); (2) a full-year of academic courses; (3) broad opportunity to audit courses within the host university. It is expected that students will complete a minimum of 36 units during the academic year in addition to units earned in the intensive language program.

**Graduation Requirements**

All prospective applicants, but particularly students who intend to study abroad during their senior year, should plan their course programs for Davis and abroad carefully in order to satisfy University, College, and study center requirements for the degree. The provisional plan of study is intended to take care of this, but a few potential problems deserve emphasis.

Although units and grade points earned in the EAP are incorporated into the University transcript and GPA, the major departments and programs retain the right to determine which EAP courses will be accepted in satisfaction of major requirements. Several major programs have identified key upper division courses which must be completed in residence at Davis. Major advisors should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must meet the University residence requirement. Students planning to graduate immediately upon completion of the EAP may satisfy residence requirements within the final 45 units preceding entrance into the EAP. Otherwise, the student must complete a significant portion of the degree in residence. For a description of the degree program or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 36 units must be completed in residence and 18 units of the degree must be completed after returning from EAP participation. With this option, no more than 5 units taken abroad may be applied toward the unit requirement for graduation. The applicant's College or School is responsible for the student's course registration.

Participants who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive the degree in September. Unfortunately, transcripts from abroad take a long time to get to the home campus and are not received in time for EAP returnees to be included on the December 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 listings of centers below incorporate selected information concerning these points. More detailed information is available in the flyers describing each of the centers and from the EAP advisor in 307 South Hall.

In addition to the programs listed below, Davis students have access to a variety of study and work abroad opportunities. Information can be obtained at the EAP Office in 307 South Hall.

**Europe**

**Austria.** The program is small and is designed to offer an opportunity to pursue a specialized interest to a limited number of highly qualified students. A compulsory intensive language course in Slovenian and German precedes the academic year. All courses are taught in German.

University of Vienna. Eastern European studies (Balkans, Russia), fine arts (history of art, music, theater), folklore, history.

Vienna University of Economics and Business Administration.

**Denmark.** A compulsory summer intensive language program precedes the academic year and continues through the fall semester. Instruction is in Danish, although examinations in English may be available. Most concentration on their major or a closely related field; independent study under tutor supervision is expected. Students may also apply to the Summer Intensive Language Program only as a short-term program.

University of Copenhagen. Broad availability of humanities and social sciences. Programs in communications, economics and international politics, history, linguistics, and medieval studies are of particular interest.

**France.** A compulsory intensive language course precedes the beginning of the academic year. All courses in the universities are taught in French. UC faculty directors are in residence at Bordeaux, Lyon, and Paris.

A new French language program is also available during Fall quarter at the Centre International d'Etudes Francaises.


Ecole Normale Superieure at Fontenay-Saint Cloud, Paris Region. Coursework in social sciences and the humanities.


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 Universite des Sciences Sociales (Grenoble II); some humanities. Offerings in anthropology and psychology are limited. Not suitable for physical or life sciences.

University of Lyon. Social sciences, art history: modern languages and linguistics; Arab studies.

Paris Center for Critical Studies. Film theory, literary criticism, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

**Paris Center for Critical Studies.** In addition to required core courses in French civilization, students choose among a wide range of courses in humanities and social sciences, with emphasis on comparative cultural studies, French language, and critical studies.

University of Toulouse. EAP students take regular university courses at Toulouse (Social Sciences) and Toulouse II (Humanities). Note are possible courses in business/management studies, comparative literature, economics, international relations, and political science.

**Germany.** A compulsory intensive language program precedes the beginning of the academic year. All courses are taught in German.

Language and Society Program. Short-term program will be available for Fall 1996. Georg-August University, Göttingen. Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics. Space in laboratory courses in biology and psychology may be limited.

Hungary. Eotvos Lorand University, Budapest. A fall semester or a year-long program are offered with an emphasis on Central European studies. Students take courses especially designated for EAP, and the courses are taught in English.

Italy. A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may become eligible for participation by attending a summer intensive-language program in Italy in order to attain the required third-year level, followed by the normal compulsory intensive-language program in Padua. A UC faculty director resident in Padua administers all EAP programs in Italy. All courses are taught in Italian. A short-term language program will be available spring quarter 1996. Bocconi University, Milan. This institution offers studies in business administration, economics, management and public administration, with a special emphasis on Italian and European entrepreneurial systems.

University of Bologna. Humanities, social sciences, economics, history.

University of Padua. History of art (including archaeology), Italian literature (including linguistics), and political science (which includes history, social sciences, geography, and demography, as well as political science in the American sense). Sciences are not available for UC students.

University of Venice. Economics, history; history of art.

Scuola Normale Superiore, Pisa. Medieval and renaissance studies and links to faculty members need to be approved by the host university prior to admission into the program.


Il Bisonte International School of Graphic Arts. Etching and lithography for advanced undergraduates. Colored sides of portfolio of etchings must be submitted for admission.

A new short-term Italian language program will be available during Spring Quarter 1996. Additional information will be available summer 1994.

**Netherlands.** Year or Fall/European Studies semester available.

**Spain.** A compulsory intensive language program precedes the beginning of the academic year. All instruction is in Spanish.

University of Alcala de Henares. Spanish language and literature, history and economics.

University of Barcelona. Humanities (with emphasis on Spanish art, history, literature, linguistics) and some social sciences. Courses developed for the Center and taught by the University of Barcelona form the core of the program. EAP students are required
Asia

Hong Kong. A limited selection of courses is offered in English. Knowledge of Chinese is not required for acceptence; however, all students are required to complete at least two courses in Chinese culture, history, or language prior to departure. A compulsory intensive Cantonese program precedes the beginning of the academic year. All students are required to include 18 units of Mandarin or Cantonese in their annual program.

Chinese University of Hong Kong. Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available. (Information about courses to be offered in English begins.)

India. Instruction is in English. A compulsory intensive language program in conversational Hindi preceding the academic year. Students will take a year-long core program on modern India and Indian culture and tradition, as well as continue their study of Hindi. During the second and third quarters, students will also take regular course work at the University of Delhi. Fall semester also available. University of Delhi. Humanities and social sciences are well represented, with some offerings in fine arts and mathematics.

Jawaharlal Nehru University, New Delhi. EAP students majoring in economics, development studies, environment, sociology, and social sciences will find extensive coursework in these areas.

Indonesia. An eight-week intensive language program at Gadja Mada University in Yogyakarta is required for all students. Those with less than a year of University-level Indonesian must then take a ten-week inter-term program of continued study of the language, with additional courses in Indonesian history and culture, taught in English. Students enroll in regular courses at one of five institutions for the second semester. Instruction is in Indonesian; tutorial assistance may be available.

It is possible to apply for the summer intensive language program only and/or fall semester. Students may take more advanced language in subsequent years.

Gadjah Mada University. Agriculture, anthropology, biology, economics, geography, mathematics, philosophy, psychology, political science.

Institute Senti Indonesia (ISI). The Indonesian Institute of the Arts: visual arts, music, dance, theater, fine arts, ethno-musicology.

Akademi Seni Tan Indonesia (ASTI) at Denpasar and Bandung. The Indonesian Dance Institute of Bali: dance, music, and theater.

Japan. A variety of study opportunities are available to UC students. Language requirements vary depending upon the host institution and the academic focus of the program. A summer intensive language program is offered for year-long programs. The programs are administered by a director located in Tokyo.

Doshisha University, Kyoto. Humanities and social sciences; emphasis on Japanese language and culture. This center serves students having a more advanced study of Japanese; at least two, preferably three, years of UC Japanese language study.

Global Security Studies Program, Meiji Gakuin University, Yokohama. This spring quarter program offers students the opportunity to study world peace and security issues. Previous Japanese language study is preferred, but not required.

Inter-University Center for Japanese Language Studies (IUC), Yokohama. This program offers an intensive program of training for graduate students in Japanese language. The prerequisite is two years of university-level Japanese.

International Christian University, Mitaka (Tokyo). Humanities and social sciences; emphasis on Japanese language and intercultural communication. A limited number of courses taught in English are available.

Middle East

Egypt. All courses are taught in English, except courses in Arabic, Egyptian, 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 intensive language course in Haifa precedes the beginning of the academic year.

Hebrew University, Jerusalem. Broad curriculum; emphasis on Israeli and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English. The program offers courses in Judaic, Israeli, Middle Eastern studies, and a few courses in the general social sciences and humanities, science, and foreign languages. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

"Course not offered this academic year."

At least one year of university-level Japanese language study is required.

Nagoya University, Nagoya. This program is for graduate level economics students. The academic program includes intensive Core Program study and research conducted under the supervision of a Japanese professor. The prerequisite is two years of university-level Japanese.

Osaka University, Osaka. Undergraduate students study Japanese and a set program of economics courses. Instruction is in English during the fall semester and in Japanese during the spring. A minimum of two years of university-level Japanese is required.

Sophia University, Tokyo. Comparative cultural study is available. Japanese language and literature, history, political science, economics and business are available. Many are taught in English. The prerequisite is one year of university-level Japanese.

Tokohu University, Sendai. This program is primarily for graduate students in most fields with well-developed research projects. Participants will study Japanese language, in addition to working on their research projects under the guidance of a Japanese professor. Graduate study in Engineering may also be available. Undergraduates at the advanced level in Japanese may be able to participate in a language and culture program. The prerequisite is two to three years of university-level Japanese.

Tokyo Institute of Technology. Graduate students proficient in Japanese may do research and take courses in science and engineering.

Korea. Year or summer-plus-fall term with a required six-week intensive language program at Yeoung University. Students who are not fluent in Korean will take courses taught in English at Yonsei's Division of International Education. Courses in art history, business, economics, law, literature, philosophy, political science, and society are available.

People's Republic of China. EAP offers a full-year program in Beijing and a fall semester program in Tianjin. Intensive language study in Chinese is the primary emphasis of all programs.

Beijing University of Science and Technology. Students receive a half-year of academic credit and financial support for studying standard Chinese and teaching English to Chinese students. The prerequisite is two years of Chinese language and one core course in teaching English as a foreign language.

Nankai University, Tianjin. This fall semester program includes Chinese language study and subjects taught in English on Chinese culture and civilization. The prerequisite is one year of college-level Chinese and the ability to conduct courses in teaching English as a foreign language.

Peking University. A year-long program focused on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Teaching to Foreigners Division of Peking University. The prerequisite for the program is two years of college-level Chinese.

Taiwan, Republic of China. Students participating in the Chinese Language and Culture Studies program in Taipei receive instruction in the Chinese language and enroll in lecture courses (taught in English) on Chinese culture and society arranged by CSU International Programs. Courses in art history, literature, economics, history and political science are available. Prior course work in Chinese culture, history and language are recommended.

National Taiwan University. (This is a cooperative program with California State University International Programs.)

Thailand. An eight-week summer intensive language program at Chiangmai University is required for all students. This is followed by a seven-week inter-term program of continued study of the Thai language, with additional courses in Thai history and culture, taught in English. Most students will remain at Chiangmai University for the second semester and continue taking courses in Thai language and area studies classes taught in English. Students with sufficient lan-
Endocrinology

(A Graduate Group)

Judith Turegon, Ph.D., Chairperson of the Group
Group Office, 4136 Medical Sciences-1A (Human Physiology, 752-3250)

Faculty. The Group includes faculty from the Schools of Medicine, Veterinary Medicine, the California Primate Research Center, and the College of Agricultural and Environmental Sciences.

Graduate Study. The interdepartmental Graduate Group in Endocrinology offers programs of study leading to the M.S. and Ph.D. degrees. Research and instruction are offered in topics ranging from endocrinological processes at the cellular and molecular levels to integrative systemic endocrinology. Graduate students receive a strong background in required basic cellular, biochemical and integrative endocrinology and related course work, plus have the opportunity to select specific fields of emphasis such as molecular mechanisms of hormone action, signal transduction, metabolism regulation, growth factors, neuroendocrinology, and reproduction.

Graduate Advisers. Contact the Program Office.

Courses in Endocrinology (EDO)

210. Methods in Endocrine Research (4) I, II, III. The Staff
Laboratory—9 hours; discussion—1 hour. Prerequisite: consent of instructor. Ten-week assignment in endocrinology research laboratory. Individual research problem with emphasis on experimental design and methodological/analytical experience. Exposure to and experience with a range of endocrinology faculty research activities. May be repeated three times for credit. (SU grading only.)

218. Mammalian Endocrinology and Homeostasis (4) III. Walsh, Turegon
Lecture—4 hours. Prerequisite: Biological Sciences 102 and 103, Neurobiology, Physiology and Behavior 110, and consent of instructor. Biochemical, physiological, and regulatory properties of the mammalian endocrine system, both at the cellular and systemic level. Signal transduction mechanisms and hormonal actions. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolism and minerals, fluids and electrolytes. Reproductive endocrinology.

220. Endocrinology Literature Critique (1) I, II. Turegon
Discussion—1 hour. Prerequisite: consent of instructor. Critical reading and evaluation of current original publications in endocrinology. Selected papers will be presented and discussed in detail by faculty and students. May be repeated for credit. (SU grading only.)

235. Personal Computing in the Life Sciences (3), II. Matthews
Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Current and near-future uses of "state-of-the-art" personal computers and local area networks. Applications in the Life Sciences. Running programs on Macintosh IIX and 80386-based PC-compatible computers and on 3-Com local area network in Endocrinology Graduate Computer Laboratory.

240. Biochemical Endocrinology (3) III. Adams
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Examination of recent advances in biochemical endocrinology and molecular and cell biology of endocrine systems with emphasis on processes of hormone and receptor synthesis, second messenger phenomena, and hormonal control of gene expression.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and current trends in research in endocrinology. May be repeated for credit.

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

299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
(SU grading only.)

Endocrinology and Metabolism

See Internal Medicine in Medicine, School of
Engineering
(College of Engineering)
M. S. Ghausi, Ph.D., Dean
Benjamin J. McCoy, Ph.D., Associate Dean—Research
Zuhair A. Murin, Ph.D., Associate Dean—Graduate Studies
James P. Shackleford, Ph.D., Associate Dean—Undergraduate Studies
Billy Sanders, Ph.D., Assistant Dean—Academic Affairs
College Office, 1050 Engineering II (916-752-0593)

Undergraduate Study
Fourteen undergraduate engineering curricula, including four formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Chemical, Civil, Electrical, Mechanical Engineering, Aeronautical Science and Engineering, and Computer Science and Engineering curricula are six programs which have been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), the nationally recognized accrediting body for engineering curricula. The four-year undergraduate program is divided into two parts: the Lower Division Program and the Upper Division Program.

Graduate Study
See the Graduate Studies section of this catalog for additional information. Refer to the College of Engineering Bulletin, available from the UCD Bookstore, phone the Graduate Studies Office (916-752-0592).

Lower Division Programs
If you enter the College of Engineering with fewer than 84 quarter units of credit, follow the lower division program specified for your major. If you enter the College with 84 or more quarter units of credit, you must fulfill the requirements outlined in the Bachelor's Degree Requirements section of this catalog, under "College of Engineering, Unit Requirements."

Biology and Agricultural Engineering
Lower Division Program:
Biological Systems Engineering
Requirements for majors in Biological Systems Engineering only.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus—Mathematics 21A-21B—21C—21D</td>
<td>16</td>
<td>1-2-3-4</td>
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<tr>
<td>Linear algebra—Mathematics 22A</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>General physics—Physics 9A-9B-9C</td>
<td>12</td>
<td>3-4-5</td>
</tr>
<tr>
<td>General chemistry—Chemistry 2A-2B</td>
<td>10</td>
<td>2-3</td>
</tr>
<tr>
<td>Organic chemistry—Chemistry 8A-8B (or Surveying—Civil Engineering 10)</td>
<td>6</td>
<td>4-6</td>
</tr>
<tr>
<td>Biological Sciences 1A, 1B, 1C</td>
<td>15</td>
<td>4-5-6</td>
</tr>
<tr>
<td>Biological Systems Engineering 1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applications of computers—Engineering 5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Circuits—Engineering 17</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Statics—Engineering 35</td>
<td>3</td>
<td>4-5</td>
</tr>
<tr>
<td>Properties of biological materials—Biological Systems Engineering 75</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

Total Lower Division Units...........94

†Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

Chemical Engineering and Materials Science Lower Division Program
Requirements for majors in Chemical Engineering, Materials Science, and the double majors, Chemical Engineering/Materials Science and Chemical Engineering/Biochemical Engineering, only.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Units</th>
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<tr>
<td>Linear algebra—Mathematics 22A</td>
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<td>5</td>
</tr>
<tr>
<td>Differential equations—Mathematics 22B</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>General Physics—Physics 9A-9B-9C</td>
<td>12</td>
<td>3-4-5</td>
</tr>
<tr>
<td>General Chemistry—Chemistry 2A, 2B, 2C (Chemistry 2AH, 2BH, 2CH strongly recommended)</td>
<td>15</td>
<td>1-2-3</td>
</tr>
<tr>
<td>Organic Chemistry—Chemistry 128A, 128B</td>
<td>6</td>
<td>4-5</td>
</tr>
<tr>
<td>Organic Chemistry laboratory—Chemistry 129A</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences 1A</td>
<td>6</td>
<td>4-5</td>
</tr>
</tbody>
</table>

Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

Total Lower Division Units...........90

†Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.
Computer Science and Engineering
Lower Division Program
Requirements for Computer Science and Engineering majors only:

- QUARTER
- USUALLY
- UNITS
- TAKEN

**Required Courses**
- Calculus—Mathematics 2A, 2B, 2C, 2D or 2IA, 2IB, 2IC, 2ID
  - 16 units
- Linear Algebra—Mathematics 22A 3
  - 3 units
- Differential Equations—Mathematics 22B 3
  - 3 units
- General Physics—Physics 9A, 9B, 9C, 9D 3
  - 3 units
- General Chemistry—Chemistry 2A 3
  - 3 units
- Introductory Programming—Computer Science Engineering 30 or 35 4
  - 4 units
- Software Development—Computer Science Engineering 40 4
  - 4 units
- Computer Structure & Assembly—Computer Science Engineering 60 or Electrical and Computer Engineering 70 2
  - 2 units
- Circuits—Engineering 17 4
  - 4 units
- Statics—Engineering 35 4
  - 4 units
- Properties of Materials—Engineering 45 4
  - 4 units
- Expository Writing—English 1 or 3 or Comparative Literature 1, 2, 3, 4 1
  - 1 unit
- Public Speaking or Group Communication—Rhetoric and Communication 1 or 3 4
  - 4 units
- Humanities—General Education electives 4
  - 4 units
- Total Lower Division Units 90

- Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

**Mechanical and Aeronautical Engineering Lower Division Program**

Requirements for Aeronautical Science and Engineering, Mechanical Engineering, and Mechanical Engineering/Materials Science majors only:

- QUARTER
- USUALLY
- UNITS
- TAKEN

**Required Courses**
- Calculus—Mathematics 2A, 2B, 2C, 2D or 2IA, 2IB, 2IC, 2ID
  - 16 units
- Linear algebra—Mathematics 22A 3
  - 3 units
- Differential equations—Mathematics 22B 3
  - 3 units
- General Physics—Physics 9A, 9B, 9C, 9D 3
  - 3 units
- General chemistry—Chemistry 2A 3
  - 3 units
- Engineering graphics in design—Engineering 4
  - 4 units
- Aeronautical engineering fundamentals—Aeronautical Science and Engineering 5
  - 5 units
- Statics—Engineering 35 3
  - 3 units
- Dynamics—Engineering 46 3
  - 3 units
- Properties of materials—Engineering 45 4
  - 4 units
- Manufacturing processes—Mechanical Engineering 50
  - 5 units
- Expository writing—English 1 or 3 or Comparative Literature 1, 2, 3, 4
  - 4 units
- Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3
  - 4 units
- Humanities—General Education electives 12
  - 12 units

- Total Lower Division Units 81

- Rhetoric and Communication 1 or 3, or an acceptable substitute as approved by the Undergraduate Study Committee of the College of Engineering.

**Upper Division Programs**

If you have completed the requirements for the lower division program or have entered the College of Engineering with more than 84 quarter units of credit, you should follow the upper division requirements for the major you have selected from the programs that follow.

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Aeronautical Science and Engineering

Aeronautical Science and Engineering is the branch of engineering that applies scientific knowledge to the design, manufacture, and operation of aircraft. Our Bachelor of Science degree in Aeronautical Science and Engineering is designed to provide a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when combined with the required technical courses, prepare you for employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

The fundamental discipline of this branch of engineering applies to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context, aeronautical engineers are involved with automobiles, trains, ships, submarines, aircraft, rockets and missiles, sport equipment, and a variety of energy systems.

Courses in fundamental engineering principles are supplemented with courses in aircraft propulsion, aerodynamics, performance, stability and control, aircraft preliminary design, and flight mechanics.

A broad range of technical elective courses is available, allowing students to design their own course of study. The most appropriate elective is for the student who is considering graduate work. Engineering electives are credited in the sciences and engineering.

Typical aeronautical science and engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, flight mechanics, flight testing, or component and mechanism design. The student is encouraged to consult with a faculty member to select the technical course that is most appropriate for their chosen area of specialization.

Suggested technical electives:
- Aeronautical Science and Engineering 131, 137, 139
- Mechanical Engineering 172


Aeronautical Science and Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Minimum units required for major: 186

**Subject Areas and Courses**

- Electronic circuits—Engineering 101
- Electrical engineering—Engineering 102
- Fluids—Engineering 103
- Aeronautical Science and Engineering 126
- Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 129
- Measurement systems—Mechanical Engineering 176
- Controls and system analysis—Mechanical Engineering 171
- Applied mathematics—Select one course from Engineering 180; Applied Science 115 or Mathematics 128
- Aerospace structures—Aeronautical Science and Engineering 133
- Mechanical Engineering 137
- Strongly recommended: Aeronautical Science and Engineering 131, 137, 139; Mechanical Engineering 172.
Biological and Agricultural Engineering:

Commercial enterprises in plant and animal production, bioengineering, biotechnology, food processing, greenhouses and nurseries, forest production and aquaculture all need engineers with a background in biology. Concern for the environment is creating new engineering opportunities as society strives to maintain a balance within the biosphere. The combination of engineering and biology offers a challenging and socially useful career. Engineers with an understanding of living systems are in increased demand to create new resources, and systems for production and use of biological materials.

Students in the Biological Systems Engineering program may select courses from the curriculum according to their interests and future career goals. The program offers a general set of courses in mathematics, physics, chemistry, and basic engineering science that is common to other engineering disciplines. In addition, the sequence provides a basic foundation in biological sciences in preparation for the more advanced Biological Systems Engineering courses where biology and engineering are brought together in the analysis and design of biological systems. The program offers flexibility in the selection of technical electives, ranging from biochemistry to plant and animal production to advanced mechanical design courses. Given the flexibility in the program, you are strongly encouraged to consult a faculty adviser when planning your program and selecting elective courses.

AREAS OF SPECIALIZATION

Although specialization is not required, the Biological Systems Engineering program allows a student to select one of the three following areas: agricultural engineering, aquacultural engineering, or forest engineering. If you want to specialize, you may follow the same major sequence of units during the junior and senior years, one of the lists of electives that have been recommended for the three areas mentioned. By taking the set of electives for a specialization, you acquire deeper knowledge in an area of special interest. If you want to specialize in some other area, you should consult a departmental adviser.

Agricultural Engineering

The application of engineering principles to the production, processing, packaging, and use of agricultural materials. The field integrates many traditional engineering disciplines, with special attention to the interfaces between physical systems and agricultural products. Students can emphasize environmental resource management (soil, water, and air), plant production and greenhouse facilities, animal production and facilities, machinery and systems, energy resources, and process engineering.

Suggested technical electives:

- Biological Systems Engineering 114, 125, 132, 145, 175
- Engineering 102, 104B
- Civil and Environmental Engineering 141
- Mechanical Engineering 150A
- Soil Science 100
- Pomology 102
- Vegetable Crops 101

Suggested Advisers: Chancellor, Chen, Delwiche, Giles, Grimmer, Hills, Jenkis, Parlanke, J. Rumsey, Slaughter, Uppdecker, Wallender

Aquacultural Engineers are involved in the design, fabrication and management of equipment and facilities for culturing, harvesting, and handling aquatic plants and animals. Understanding the environmental requirements of cultured organisms is an essential consideration in the design and management of aquaculture operations, and strong foundations in biology and water quality are stressed in the aquacultural engineering specialization.

Suggested technical electives:

- Biological Systems Engineering 114, 125, 131, 132, 145, 175
- Applied Biological Systems Technology 161, 163
- Animal Science 118
- Civil and Environmental Engineering 141, 144L, 145 Engineering 102
- Wildlife and Fisheries Biology 121

Suggested Advisers: Friderley, Garrett, Predrulia

Forest Engineering is the application of engineering principles and silvicultural knowledge in the management of forests and forest land. Ecological, aesthetic, and recreational aspects of this renewable natural resource are integrated into systems for the production of wood products. Students study forest systems and equipment for forest management, forest residue management, reforestation, forest recreational facilities, soil and water control and conservation, forest road development, materials handling, and other phases of forestry. This specialization is administered in cooperation with the Department of Environmental Science, Policy and Management at UC Berkeley. Fall quarter of the junior year is normally spent on the Berkeley campus, following an eight-week summer field course sequence at the UC Forestry Camp near Quincy, California.

Suggested technical electives:

- Biological Systems Engineering 114, 115, 116, 125 Engineering 102, 104B
- Environmental Science, Policy and Management 129, 156, 171, 172, 173, 177, 183, 195
- Mechanical Engineering 150A
- Geography 106
- Soil Science 100
- The Forestry Summer Camp courses (Forestry 100A through 100E) are strongly recommended for students in the Forest Engineering specialization.

Suggested advisers: Friderley, Hartsough, Mies.

Environmental Science, Policy and Management courses offered at UC Berkeley.

Biological Systems Engineering Curriculum

Minimum units required for major: 186
Upper Division requirements:

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics/Statistics—Civil and Environmental Engineering</td>
<td>114</td>
</tr>
<tr>
<td>Biological Systems Engineering 120, 130, 165, 170A, 170C</td>
<td>20</td>
</tr>
<tr>
<td>Biological and Agricultural Science electives: Select at least seven units from: Animals Science 114; Biological Sciences 102; Environmental Science, Policy and Management 129, 156, 171, 172, 173, 185, 186; Geography 106; Pomology 102, 127; Soil Science 100; Vegetable Crops 101; Wildlife and Fisheries Biology 121</td>
<td>20</td>
</tr>
</tbody>
</table>

Food Engineering—Biological Systems Engineering 130, 131, 132, 170A, 170B, 170C, 175; Biological Sciences 102; Chemistry 107A (or 110A); Food Science and Technology 104, 150, 151.

Total units required for major: 186

Food Engineering—Biological Systems Engineering 130, 131, 132, 170A, 170B, 170C, 175; Biological Sciences 102; Chemistry 107A (or 110A); Food Science and Technology 104, 150, 151.

Total units required for major: 186

*Course not offered this academic year.

Science, Policy and Management 177; and at least three units from Biological Systems Engineering 115, 117, 125, 127, Civil and Environmental Engineering 141, 144L, 145 Engineering design electives—Select at least twelve units from: Biological Systems Engineering 114, 116, 125, 132, 145; Applied Biological Systems Technology 161, 183 with at least three of the twelve units from Civil and Environmental Engineering 132A, 145 or Mechanical Engineering 150A.

Humanities—Social Sciences/General units electives—Select at least twelve units from Biological Systems Engineering 115, 117, 125, 127, Civil and Environmental Engineering 141, 144L, 145 Engineering design electives—Select at least twelve units from: Biological Systems Engineering 114, 116, 125, 132, 145; Applied Biological Systems Technology 161, 183 with at least three of the twelve units from Civil and Environmental Engineering 132A, 145 or Mechanical Engineering 150A.

Total units required for major: 186

Food Engineering—Biological Systems Engineering 130, 131, 132, 170A, 170B, 170C, 175; Biological Sciences 102; Chemistry 107A (or 110A); Food Science and Technology 104, 150, 151.

Total units required for major: 186

*Course not offered this academic year.

Science, Policy and Management 177; and at least three units from Biological Systems Engineering 115, 117, 125, 127, Civil and Environmental Engineering 141, 144L, 145 Engineering design electives—Select at least twelve units from: Biological Systems Engineering 114, 116, 125, 132, 145; Applied Biological Systems Technology 161, 183 with at least three of the twelve units from Civil and Environmental Engineering 132A, 145 or Mechanical Engineering 150A.

Total units required for major: 186

Food Engineering—Biological Systems Engineering 130, 131, 132, 170A, 170B, 170C, 175; Biological Sciences 102; Chemistry 107A (or 110A); Food Science and Technology 104, 150, 151.

Total units required for major: 186

*Course not offered this academic year.
Chemical Engineering

Chemical Engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from antibiotics to zincium. Chemical engineers are concerned with chemical and engineering processes related to the environment, food and pharmaceutical production, and medicine, working in areas as diverse as integrated circuits and integrated waste management. Preparation for a career in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The Chemical Engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In your junior year, you focus your attention on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In your senior year, you draw these fundamentals together and apply them in a study of mass transfer phenomena, process design, and process dynamics and control. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 12 units of technical electives and 6 units of advanced chemistry electives that allow you to strengthen specific areas in Chemical Engineering, explore new areas, or pursue areas of specialization. Many of these are popular areas of specialization, together with lists of suggested technical electives, are identified and discussed in the following paragraphs. Please talk to the instructors of the courses listed about possible prerequisites before enrolling.

The medical and prebiomedical engineering areas of specialization have been specifically designed to prepare the student for graduate work in biomedical engineering or to meet the undergraduate requirements for entry into medical school. Because of the emphasis on the natural sciences and the application of fluid mechanics, mass transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics to problems in natural science, you are well prepared to understand problems in living systems. Many biological phenomena, such as blood flow, solute transport, and energy exchange, can be dealt with using the theoretical tools you learned as an undergraduate.

AREAS OF SPECIALIZATION:

Applied Chemistry. The Chemical Engineering curriculum includes an important core of chemistry courses. You 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 110B, 111, 115, 121, 128C, 128B, 129C, 130, 131, 150

Fiber and Polymer Science 100, 110

Applied Mathematics. The mathematics specialization is designed both to strengthen your understanding of the foundations of engineering science and to improve your ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:

Applied Mathematics 115, 116


Biochemical Engineering. This area of specialization provides a graduate work in biochemical engineering and to find employment in the biotechnology, pharmaceutical, and food industries.

Suggested technical electives:

Strongly recommended

Microbiology 102, 102L

Biological Sciences 1A, 102

Chemical Engineering 161A, 161B, 161L

Also recommended

Biological Sciences 1B, 101, 103, 104

Biological Systems Engineering 175

Chemical Engineering 170

Food Science and Technology 123, 123L

Microbiology 130A, 130B, 130C

Molecular and Cellular Biology 120L, 123, 160L, 160, 170L

Neurobiology, Physiology and Behavior 100B, 100L

Plant Science 140

Viticulture and Enology 140, 186

Computers and Automation. This specialization offers you the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, you are exposed to the theory and practice of monitoring and operating chemical processes using microprocessor-based control systems. The common ingredient in these studies is the use of computers. Development of expert systems for detecting process failures, using computer-aided design (CAD) packages to optimize product yield, solving large numbers of equations on supercomputers to assess transient behavior of processes, and implementation of plantwide control systems are all examples of chemical engineering endeavors based on the extensive use of computers. The following list of elective courses is suggested to help you obtain the necessary background in these areas.

Suggested technical electives:

Artificial Intelligence and Computer Graphics:

Computer Science 170, 175

Numerical Analysis and Optimization:

Applied Science 115, 116

Mathematics 128B-C, 168

Civil and Environmental Engineering 153

Automation and Control:

Electrical and Computer Engineering 150, 151, 157B

Mechanical Engineering 176

Food Science and Technology 156

Advanced Materials Processing. Because the manufacture of semiconductor devices and integrated circuits, magnetic memories, tapes, disks, and other devices involves the application of chemical and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces you to the analysis and design of modern circuits and devices and provides a strong background in the layout and fabrication of devices.

Suggested technical electives:

Computer Science Engineering 140

Chemical Engineering 163

Electrical and Computer Engineering 145A, 145B, 146A, 146B

Physics 140A, 140B

Energy Conversion and Fuels Processing. This specialization is designed to introduce you to energy sources, energy conversion methods, and the manufacture of fuels.

Suggested technical electives:

Biological Systems Engineering 120

Engineering 111, 162

Environmental and Resource Sciences 103

Environmental Studies 162

Mechanical Engineering 161, 162

Environmental Engineering. Many activities of chemical engineers are motivated by environmental protection. This option prepares you to deal with environmental issues by developing knowledge of fundamental chemical and transport phenomena: chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the unique chemical engineering analysis and design courses and courses on environmental topics, prepares you to seek employment with industry or government. For this specialization, six courses should be selected from the following list.

Suggested technical electives:

Air Environment

Strongly recommended

Civil and Environmental Engineering 149

Recommended

Atmospheric Science 121A, 121B, 158

Civil and Environmental Engineering 242A, 242B, 242BL, 244

Environmental Studies 110

Environmental Toxicology 101, 112A, 112B, 131

Water Environment

Strongly recommended

Chemical Engineering 161A, 161B, 161L

Civil and Environmental Engineering 140, 140L, 148A, 148B

Microbiology 102

Recommended

Biological Sciences 102, 103

Civil and Environmental Engineering 147, 240, 243A, 243B, 244, 246, 248A

Environmental Studies 110, 150A, 151

Environmental Toxicology 101, 112A, 112B

Soil Science 102, 107

Water Science 41, 104

Food Process Engineering. This area of specialization prepares you to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:

Strongly recommended

Microbiology 102

Biological Sciences 102, 103

Chemical Engineering 161A, 161B, 161L

Civil and Environmental Engineering 140, 140L, 148A, 148B

Soil Science 102, 107

Water Science 41, 104

Marketing. Specialty chemical and product manufacturers need chemical engineers who have training in market management, which involves the application of economics, psychology, and statistics in market planning and forecasting and in strategically developing and promoting new products.

Suggested technical electives:

Management 250, 251

Agricultural Economics 113, 130, 136

Psychology 193

Statistics 103

Polymer Science. Polymer materials and their applications are dependent on the use of chemical and engineering principles to process such materials to meet the end-use functional and environmental requirements. The polymer science specialization also prepares you for graduate work in the interdisciplinary field of polymer science and engineering.

Suggested technical electives:

Chemistry 108, 128C, 129B, 129C

Fiber and Polymer Science 100, 150

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 schedule necessary Biological Sciences courses into your program.

Suggested technical electives:

Four to six courses from:

Anatomy 100, Biological Sciences 1A, 1B, 1C, 1D, 10, 102, 103, 104, Molecular and Cellular Biology 140L, 141, 142, Neurobiology, Physiology and Behavior 111A, 111B, 112, 113, 114

Premedical. Inclusion of both organic and physical chemistry in the curriculum allows you to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. If you elect

*Course not offered this academic year.
the premedical (including prevetinary) area of specialization, you should verify the specific preparation requirements with the Health Sciences Advising Office before making a final decision on your electives. To ensure that you have provided room in your program for the necessary biology courses, it is important to prepare a course schedule with a Chemical Engineering adviser early in your freshman year. Suggested technical electives:

**Anatomy 100**
Chemistry 120C, 129B, 129C
Six biology or biochemistry courses, such as Biological Sciences 1A, 1B, 1C, 101, 102, 103, 104, Microbiology 102, Molecular and Cellular Biology 140L, 141, 142, 150, Neurobiology, Physiology and Behavior 110, 112, 113, 114.

**Chemical Engineering**
(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)
Minimum units required for major: 167-188.

**Units**

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry—Chemistry 110A, 110C</td>
<td>6</td>
</tr>
<tr>
<td>Quantum mechanics—Physics 9D or Chemistry 110B</td>
<td>3</td>
</tr>
<tr>
<td>Advanced chemistry electives</td>
<td>3</td>
</tr>
</tbody>
</table>


**Humanities—Social Sciences (General Education electives)** | 8 |

Total Units for Upper Division Program | 96-97 |

**Chemical Engineering/Materials Science and Engineering**
Minimum units required for major: 194-195.

**Units**

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry—Chemistry 110A, 110C</td>
<td>6</td>
</tr>
<tr>
<td>Quantum mechanics—Physics 9D or Chemistry 110B</td>
<td>3</td>
</tr>
<tr>
<td>Materials science—Materials Science and Engineering 130, 132, 134, 138, and two courses chosen from Materials Science and Engineering 140, 142, 144, 146, 147, 148, 155, and three laboratory courses chosen from Materials Science and Engineering 132L, 134L, 138L, 140L, 142L, 144L</td>
<td>21</td>
</tr>
<tr>
<td>Humanities—Social Sciences and/or General Education electives</td>
<td>8</td>
</tr>
</tbody>
</table>

Total Units for Upper Division Program | 99-100 |

**Chemical Engineering/Biochemical Engineering**
Minimum units required for major: 187.

**Units**

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemical engineering—Biological Sciences 102, Microbiology 102, Chemical Engineering 161A, 161B, 161L</td>
<td>17</td>
</tr>
<tr>
<td>Chemistry—Chemistry 110A, 110C</td>
<td>6</td>
</tr>
<tr>
<td>Biochemical engineering electives</td>
<td>10</td>
</tr>
<tr>
<td>Choose at least six units of lecture from: Biological Sciences 1B, 101, 103, 104, Biological Systems Engineering 175, Molecular and Cellular Biology 123, Microbiology 130A, Biochemistry, Physiology, and Behavior 100B, Virology and Evolution 140, 186, Chemical Engineering 170. Choose at least four units of laboratory from: Molecular and Cellular Biology 120L, 160L, Microbiology 102L, Neurobiology, Physiology and Behavior 100L. Humanities—Social Sciences electives and/or General Education electives</td>
<td>8</td>
</tr>
</tbody>
</table>

Total Units for Upper Division Program | 91 |

**Materials Science and Engineering**
Materials Science and Engineering is directed toward an understanding of the structure, properties, and behavior of materials. Society demands new and improved materials with capabilities far superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology. Both the development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and physical and chemical behavior of engineering materials. Materials engineers study phenomena found in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames, from corrosion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants; and from fabrication of steel to design of semiconductors. Materials engineers are increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes, and will play a central role in the development of new technologies based on composites and high temperature superconductivity.

The undergraduate program in Materials Science and Engineering provides the background for activities in research, processing, and the design of materials. The curriculum is designed to be broad and flexible. The student is required to complete a core of 45 units of coursework. The courses, taken during your first two years, provide a strong foundation in fundamental engineering concepts. In your third year, you will take "fundamentals" courses (Materials Science and Engineering 130, 132, 134, 138). With this background, you are then ready for the "applied" courses (Materials Science and Engineering 140, 142, 144, 146, 147, 148, 149, 155) during the fourth year.

Technical electives, selected from other engineering or physical and natural science disciplines, give you some degree of specialization at the bachelor's degree level. They also provide preparation for research in a selected area at the graduate level. Twelve technical elective units may be selected to complete the upper division Materials Science and Engineering Program. By selecting the appropriate technical electives and Humanities and Social Science/General Education electives, you may orient the program to suit your interests and career objectives: production and development, research, basic research, teaching, and/or management.

Upper division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives in Materials Science and Engineering.

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The following list of suggested areas of specialization is given to assist you and your adviser in the preparation of study lists.

Suggested technical electives:

**Aerospace Structures:** Aeronautical Science and Engineering 130, 133, 135, 137, 139

**Automatic Control and Systems Analysis:** Mechanical Engineering 171, 172, 185, 187, 188

**Electrical and Computer Engineering:** 157A, 157B, 174

**Biomedical Engineering:** Chemistry 107A, 107B, Biological Sciences 1A, 1B, Physiology 111A, 111B, 112, 113, Physical Education 101, 102

**Chemical Corrosion:** Chemistry 110A, 110B, 110C or 107A, 107B, Chemical Engineering 151, 152A, 152B


**Environmental Engineering:** Engineering 160 (only one unit of credit towards Technical Elective requirement) Atmospheric Science Biochemistry and Biophysics 101A, 101B, Water Science 41, Chemistry 8A, 8B, Civil and Environmental Engineering 149

**Heat Transfer:** Engineering 105B, Mechanical Engineering 165, Chemical Engineering 150A, 153

**Materials Design and Processing:** Aeronautical Science and Engineering 137 Engineering 104B, 106 Materials Science and Engineering 146, 148, 155 Mechanical Engineering 150A, 150B, 150L, 151, 152, 155

**Mechanical and Environmental Engineering 139**


**Materials Science and Engineering**
Minimum units required for major: 183.

**Units**

<table>
<thead>
<tr>
<th>Subject Areas and Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuits—Engineering 100</td>
<td>3</td>
</tr>
<tr>
<td>Applied mechanics—Engineering 103A, 104A</td>
<td>6</td>
</tr>
<tr>
<td>Applied thermodynamics—Engineering 105A, Materials Science and Engineering 130</td>
<td>6</td>
</tr>
<tr>
<td>Materials in design—Choose from Materials Science and Engineering 140, 148, 149, 155</td>
<td>10</td>
</tr>
<tr>
<td>Measurements and laboratory—Materials Science and Engineering 132L, 134L, 138L, 140L, Mechanical Engineering 176</td>
<td>7</td>
</tr>
</tbody>
</table>
Civil and Environmental Engineering

Civil and environmental engineering is devoted to the improvement of the human environment to make our activities productive, safe, and enjoyable, and our surroundings aesthetically pleasing. The profession contributes directly to humanity's continued health and well-being by the planning and design of systems that provide for the establishment of a potable water management and control of waste streams; land-water-air transportation; housing and other structures; flood control; and large recreational facilities.

Areas of specialization within civil and environmental engineering include (1) Civil Engineering Planning; (2) Environmental Engineering; (3) Structural Engineering, Structural Mechanics, and Geotechnical Engineering; (4) Transportation Planning and Engineering; and (5) Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives. Such specialization is not required. You are urged to consult a faculty adviser when developing your individual program.

Because of the direct concern of professional civil engineers for the quality of human life, you are encouraged to include among your technical electives courses such as Economics 125, Environmental Studies 160 and 166; Political Science 108. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

AREAS OF SPECIALIZATION:

Civil Engineering Planning. Specialization in this area is directed toward the planning of resources utilized in the development and operation of projects on a national or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, 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 coursework in the humanities and social sciences.

Suggested technical electives:
- Agricultural Economics 147, 148, 176
- Civil and Environmental Engineering 137, 146, 152, 153, 160, 161, 162
- Economics 109
- Engineering 160 (only one unit of credit towards Technical Elective requirement)
- Geography 155, 162
- Geology 134
- Political Science 100, 101, 102, 107, 108
- Water Policy 150, 154

Environmental Engineering. Specialists in this area are concerned with improving and maintaining the qualities of the air, land, and water environments that affect our health and well-being in the face of increasing population and expanding industrial activity. The program is firmly based on fundamental science and civil engineering and emphasizes the design of waterborne, solid, and airborne waste management systems; the design of potable-water supply systems; and environmental monitoring.

Suggested technical electives:
- Atmospheric Science 120, 121A, 121B
- Biological Sciences 102
- Chemical Engineering 154A, 154B, 156A, 156B, 161
- Chemistry 107A, 107B, 110A, 120A, 128B
- Civil and Environmental Engineering 140, 140L, 142L, 144, 145, 147, 148B, 150, 152
- Engineering 190
- Environmental Studies 150A, 150B, 150C, 151
- Mathematics 128A, 128B, 128C
- Mechanical Engineering 161
- Microbiology 132, 165, 130A
- Soil Science 111
- Statistics 130A, 130B

Structural Engineering, Structural Mechanics, and Geotechnical Engineering. This area is concerned with the conception, design, analysis, economics, and construction of structures such as buildings, bridges, highways, and dams. Structural Engineering encompasses structural elements such as beams, columns, reinforced-concrete, or timber. Geotechnical Engineering encompasses natural and man-made structures, such as foundations or slopes that are composed of rock or soil. Structural Engineering courses are offered in the departments of Civil and Environmental Engineering 132A, 132C, 133, 134, 145, 147, 149B, 150, 152, 162, 173 (must include one from courses 134, 145, 149B, 150, 182).

Suggested technical electives:
- Aeronautical Science and Engineering 135, 137
- Art Studio 121A
- Engineering 122, 150
- Materials Science and Engineering 136
- Mathematics 128A, 128B, 128C

Transportation Planning and Engineering. Specialists in this area are 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 law in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities in the form of an integral system. Students should also acquire an awareness of the social sciences and environmental sciences through coursework in these areas.

Suggested technical electives:
- Civil and Environmental Engineering 137, 149, 152, 153, 160, 161, 162, 163
- Engineering 160 (only one unit of credit towards Technical Electives requirement)
- Environmental Studies 167, 168A, 168B, 171, 173, 178, 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 system planning and design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis, and design engineering and operation as related to the water needs of industry, agriculture, recreation, and other activities.

Suggested technical electives:
- Agricultural Economics 146, 176
- Atmospheric Science 120, 121A, 121B
- Civil and Environmental Engineering 142L, 144, 145, 148B, 152, 153
- Electrical and Computer Engineering 150A, 150B
- Environmental Studies 128, 150A, 151
- Geography 162
- Water Science 103, 110, 150, 160

Civil Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

UNITS

Subject Areas and Courses

Applied mechanics—Engineering 103A, 104A, 104L

Applied thermodynamics—Engineering 105A or Chemistry 110A

Structures—Engineering 140B, Civil and Environmental Engineering 131A

Soil mechanics—Civil and Environmental Engineering 171T

Hydraulics and water resources—Civil and Environmental Engineering 140B, 141, 141L, 141T

Civil and Environmental Engineering 142A

Civil engineering design—Civil and Environmental Engineering 142B; plus any five courses from Civil and Environmental Engineering 132A, 132C, 134, 139, 145, 147, 149B, 150, 152, 162, 173 (must include one from Civil and Environmental Engineering 134, 145, 149B, 150, 162, 173)

Technical electives—select from Civil and Environmental Engineering 160, 161, or 163

Suggested technical electives:
- Six of these units must be selected from engineering courses.

Humanities-Social Sciences electives and/or General Education electives

Total Units for Upper Division Program

Civil Engineering/Materials Science and Engineering

Minimum units required for major: 185.

UNITS

Subject Areas and Courses

Electronic circuits—Engineering 100

Applied mechanics—Engineering 103A, 104A, 104L

Applied thermodynamics—Engineering 105A or Chemistry 110A; Materials Science Engineering 130

Structures—Engineering 140B, Civil and Environmental Engineering 131A

Soil mechanics—Civil and Environmental Engineering 171T

Hydraulics and water resources—Civil and Environmental Engineering 141, 141L, 141T

Civil engineering—Civil Engineering 141A

Engineering mathematical analysis—Applied Science Engineering 115; Civil and Environmental Engineering 114, and either Applied Science Engineering 116, Civil and Environmental Engineering 131B or 153

Transportation electives—select from Civil and Environmental Engineering 160, 161, or 163

Technical electives—select from Civil and Environmental Engineering 160, 161, or 163.

Six of these units must be selected from engineering courses.

Humanities-Social Sciences electives and/or General Education electives

Total Units for Upper Division Program

*Course not offered this academic year.
courses from Materials Science Engineering 140, 142, 144, 147 148, 155, or Civil and Environmental Engineering 133.  

Humanities—Social Sciences/General Education electives ........................................... 16  

Total Upper Division Units .................................................. 91  

1 Completion of both Computer Science Engineering 150 and 152a will satisfy the computer science theory requirement and a computer elective requirement.  

2 Completion of both Computer Science Engineering 150 and 151a will satisfy a portion of the computer software operative system requirement and a computer elective requirement.  

Electrical and Computer Engineering  

The Department of Electrical and Computer Engineering administers three curricula in the College of Engineering: (1) the Electrical Engineering curriculum, (2) the Computer Engineering curriculum, and (3) the Electrical Engineering/Materials Science curriculum. Double majors are also defined in Electrical Engineering and Computer Engineering, and in Electrical Engineering and Computer Science and Engineering. Upper division requirements for the degrees in Electrical Engineering, Computer Engineering, and Electrical Engineering/Materials Science are described below. Information on double majors can be obtained from the Electrical and Computer Engineering Department Office.  

Computing Majors  

There are three computing majors offered within the College of Engineering: (1) Electrical Engineering with a Computers Operation specialty, (2) Computer Engineering, and (3) Computer Science and Engineering. All three curricula require that 63 of the approximately 90 upper division units be divided into three areas: electronics, computer hardware, and computer software. The Electrical Engineering with a Computer Option and Computer Engineering curricula divide these 63 units almost equally between electronics, computer hardware and computer software (with the most flexibility found in the Computer Engineering curriculum). The Computer Science and Engineering curriculum divides these 63 units primarily between computer hardware and computer software.  

Because Electrical Engineering is one of the few engineering majors recognized in all fifty states for professional registration, students who wish to pursue a double major in Electrical Engineering and Computer Engineering or in Electrical Engineering and Computer Science and Engineering. Students interested in this option should check with a staff advisor since course selections must be planned very carefully. However, it is possible to obtain a double major in Electrical Engineering and Computer Engineering with only 195 units (15 more than either degree alone) in Electrical Engineering and Computer Science and Engineering with 217 units.  

Electrical Engineering Curriculum  

Electrical Engineering involves the design, analysis, and effective use of electrical systems including electronic computers. Electrical systems and computers play a central role in nearly all aspects of modern life, including communications, medicine, education, environmental protection, space exploration, defense, and home entertainment.  

The Electrical Engineering curriculum is designed to provide students with a solid background in mathematics, physical sciences, and traditional electrical engineering subjects of (1) electronic circuits and systems, (2) electronic devices and fabrication, (3) computer hardware, (4) computer software, (5) electromagnetics and optics, and (6) communications and control systems. Through the proper choice of 25 units of very flexible design and free electives, it is possible to focus on one of the three specialty areas or to distribute the 25 units of electives among these areas. Students who complete the Electrical Engineering curriculum will obtain a Bachelor of Science in Electrical Engineering, one of the engineering degrees recognized in all fifty states as eligible for registration as a Professional Engineer.  

Electrical Engineering  

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology)  

Minimum units required for major: 180  

Required Courses  

Professional responsibilities—Engineering 190 .................................................. 3  

Electrical engineering background—Electrical and Computer Engineering 100 and 180A ........................................... 10  

Mathematical methods—Computer Science Engineering 100 and Mathematics 131 or Statistics 131A ........................................... 7  

Data structures and algorithms—Computer Science Engineering 140A, 140B, and 140C ........................................... 14  

Computer science theory—Computer Science Engineering 120T or 122A ........................................... 3  

Computer hardware—Computer Science Engineering 152, 154A, 154B, and Electrical and Computer Engineering 172 ........................................... 15  

Computer software—Computer Science Engineering 140A, 140B, or 151A, and 160 ........................................... 12  

Computer electives—35 units chosen from Computer Science Engineering 120T, 122A, 122B, 140B, 142, 150T, 151A, 151B, 156, 163, 165A, 165B, 166, 170, 172, 175, or Electrical and Computer Engineering 180B, and a combined minimum of 3 units from approved Computer Science Engineering 192, 199 and Electrical and Computer Engineering 194 ........................................... 16  

1 Course not offered this academic year.
Electrical Engineering/Materials Science and Engineering

In addition to the Electrical Engineering curriculum described above, the Department of Electrical and Computer Engineering offers a combined major in Electrical Engineering/Materials Science. In the past decade, the fields of solid-state electronics, opto-electronics, magnetics, and superconductors have developed rapidly. This combined major now sets the pace for progress in these fields. Materials scientists with an electronics background are key to continued progress in these areas. The Electrical Engineering Materials Science curriculum is designed to provide such a background.

Electrical Engineering/Materials Science and Engineering

Minimum units required for major: 185

UNITs

Required Courses

Electrical engineering core—Electrical and Computer Engineering 100, 110A, 140A, 180A, 180B 23
Computer hardware—Electrical and Computer Engineering 170A, 172A 23
Computing software—Electrical and Computer Engineering 173 and Computer Science Engineering 150 or 151A 8
Data structures and algorithms—Computer Science Engineering 110, 122A 7
Mathematical methods—Computer Science Engineering 100, plus one course from: Statistics 120, 131A, or Mathematics 131 7
Theoretical Acoustics—Engineering 105A 3
Professional responsibilities—Engineering 160, 190 or Applied Science Engineering 137 3
Design electives 9
Select three courses from: Electrical and Computer Engineering 106, 110B, 111AB (111AB must be taken to count as one design elective), 114, 118, 132A, 132B, 132C, 135, 146A, 146B, 146L, 157A, 157B, 157F, 166, 174, 194ABC (194ABC together may count as one design elective), and 195AB (195AB taken together count as one design elective); Materials Science and Engineering 140, 142, 148, 155. May also include approved electrical and Computer Engineering or Materials Science and Engineering 192 or 199 courses.

Laboratory courses—Materials Science and Engineering 149, Electrical and Computer Engineering 146A 6
Advanced science electives—Geology 117A & 117B, or Physics 104A & 104B, or Physics 121 & 122A, or Chemistry 110A & 110C 12
Humanities—Social Sciences/General Education electives 12
Unrestricted electives 5

Total Upper Division Units 95

Mechanical Engineering

The mechanical engineer uses basic science in the design and application of complex engineering systems requiring the application of physical and mechanical principles to the development of machines, energy conversion systems, materials, and equipment for guidance and control. The emphasis on 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, statistics, and economics. The Mechanical Engineering curriculum is based on a core of engineering courses taken in the first two years. You spend your third year in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can either prepare for Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor’s level.

You are encouraged to select elective courses from among the areas of specialization listed below.

AREAS OF SPECIALIZATION:

Creative Design. The creation and improvement of products, processes, or systems that are mechanical in nature are the primary activities of a professional mechanical engineer. The solutions to such major social problems as environmental pollution, lack of mass transportation, and raw materials, and energy shortages, will depend heavily on the engineer’s ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of a design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives: Aeronautical Science and Engineering 130, 133, 137, 139

Biological Systems Engineering 165
Applied Science Engineering 115
Engineering 111, 122, 160 (only one unit of credit towards Technical Electives requirement)

Materials and Science Engineering 140, 142, 155
Mechanical Engineering 134, 150B, 151, 152, 161, 162, 172, 184A, 184B (both courses must be taken), 185, 187, 189


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. In these fields, the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to combustion engines, gas turbines, heat exchangers, nuclear reactors, fusion powerplants, solar energy systems, and others.

Suggested technical electives: Aeronautical Science and Engineering 138A
Engineering 160 (only one unit of credit towards Technical Electives requirement)

Mechanical Engineering 162, 186


Manufacturing. Manufacturing is the process of converting raw materials into products. A major activity of mechanical engineers is studying and working with various production methods and techniques, integrating creative design activities into actual fabricated products.

The emphasis in the manufacturing program is to provide hands-on experience with state-of-the-art and computer-integrated manufacturing methods and processes. Laboratories have been established that are equipped with conventional, computer-controlled and nonconventional manufacturing equipment. A manufacturing engineer will have a solid background in manufacturing processes and systems as well as in statistics, design, controls and applications of microprocessors.

Suggested technical electives: Electrical and Computer Engineering 160, 174
Materials Science and Engineering 140, 155
Mechanical Engineering 50, 151, 153, 172


Systems Dynamics and Control. 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 specialists are concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis...
in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for designing machines apply to social, economic, and other dynamic systems. Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electromechanical component design, and control of walking machines, electronically controlled steering, mathematical models of motorcycle dynamics, and the analysis of fuel management systems. An Automotive System Dynamics Laboratory is being developed for testing components such as engines, transmissions, brakes, and steering systems as well as testing completed test vehicles. As plans for on-campus laboratories and a test track proceed, ten experimental vehicles are housed in a rented facility, and research on vehicle components proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:
Aeronautical Science and Engineering 128, 129, 131, 139
Engineering 122
Mechanical Engineering 134, 152, 172, 184A with 184B (both courses must be taken), 187

Transportation Systems. An important aspect of Mechanical Engineering is the planning, design, and operation of transportation systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are transported. Such innovations will require competence in vehicle dynamics, propulsion and control, and an understanding of the problems caused by present-day modes of transportation.

Suggested technical electives:
Aeronautical Science and Engineering 127, 128, 129
Civil and Environmental Engineering 131A, 143, 160
Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)
Mechanical Engineering 134, 152, 172, 184A with 184B (both courses must be taken), 187

Mechanical Engineering
(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Minimum units required for major: 180

Subject Areas and Courses
Electronic circuits—Engineering 100
Applied mechanics—Engineering 102, 104A, 104B
Thermodynamics—Engineering 105A, 105B; Mechanical Engineering 165, 166
Fluid mechanics—Engineering 103A, 103B
Mechanical engineering design—Mechanical Engineering 150A, and either 150B or 172, and one course chosen from 184A with 184B (both courses must be taken), 185, 186, 187, 188

Controls and systems analysis—Mechanical Engineering 171

Measurements and laboratory—Engineering 102L, 103L, 105L, Mechanical Engineering 176

Professional responsibilities—Engineering 190

Technical electives

In order to satisfy design requirements, select two courses must be chosen from Aeronautical Science and Engineering 126, 129, 130, 137, 139, Materials Science and Engineering 140, 149, 161, 155, Mechanical Engineering 150B, 161, 172, 184A with 184B (both courses must be taken), 185, 186, 187, 188 (if these courses are not offered for the core design requirement above), 134, 151, 152, 162.

Humanities—Social Sciences electives and/or General Education electives—12

Total Units for Upper Division Program—94

Courses in Engineering (ENG)

Lower Division Courses

3. Introduction to Engineering Systems (3) I, II
The Staff

- Lecture—2 hours; laboratory—3 hours. Prerequisite: algebra and trigonometry. Introduction to the engineering profession. General view of the engineering process as obtained by participation in laboratory experiments illustrating the solution of representative, but greatly simplified, engineering problems.

4. Engineering Graphics in Design (3) I, II
Henderson, Yamazaki

- Lecture—2 hours; laboratory—3 hours. Introduction to engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems.

5. Applications of Computers (3) I, II, III
The Staff

- Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 18A or 21A. Digital computation and computer programming in FORTRAN. Algorithms and their description. Basic programming; debugging of programs; approximate computing accuracy and significance; solving simple numerical and nonnumerical problems.

11. Issues in Engineering (1) Shackelford

- Lecture—1 hour; discussion—1 hour. Prerequisite: participation in the Minority Engineering Program (MEP) or consent of instructor. Designed to broaden students' understanding of the engineering professions: its methods, principles, design, and development process; career opportunities; and professional resources.

17. Circuits I (4) I, II, III

- The Staff

- Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 9C. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions.

20. The Technological World (3) II

- The Staff

- Lecture—3 hours. Prerequisite: high school algebra. The nature of technology; computers and automation; energy systems; engineering design, analysis, and production solving; metric systems and units; technology and social change; technology assessment and technological choices. Intended primarily for students who are not engineering or science majors. Engineering or physical science students may receive only 2 units of credit. General Education credit: Nature and Environment.

25. Introduction to Physical Devices and Systems (2) II

- Henderson

- Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: lower division standing in engineering and consent of instructor. Introduction to and experience with common hardware and physical devices with the overall goal of enriching the students' understanding of physical devices and systems.

35. Statics (3) I, II, III

- The Staff (Chairperson in charge)

- Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 210 (may be taken concurrently); Physics 9A. Force systems and equilibrium conditions with emphasis on engineering problems.

36. Dynamics (3) I, II, III

- The Staff (Chairperson in charge)

- Lecture—3 hours. Prerequisite: course 26, Mathematics 210. Open to College of Engineering students only. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

45. Properties of Materials (4) I, II, III

- The Staff

- Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore standing in Engineering. Introductory course on the properties of engineering materials and their relationship to the internal structure of materials.

Upper Division Courses

100. Electronic Circuits and Systems (3) II, III

- Soderstrand, Suran

- Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 17. Introduction to analog and digital circuit and system design through hands-on laboratory design projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit.

102. Introduction to Quantum Physics (3) I, II, III

- The Staff (Chairperson in charge)

- Lecture—3 hours. Prerequisite: course 36, Mathematics 22B; open to College of Engineering students only. Topics in three-dimensional rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

102L. Dynamics Laboratory (1) I, II, III

- The Staff

- Lecture—1 hour; laboratory—1 hour. Prerequisite: course 102 (may be taken concurrently). Experimental laboratory to demonstrate fundamental principles of dynamics and their application to engineering problems. Introduction to instrumentation for dynamic motion measurement.

*Course not offered this academic year.
103A. Elementary Fluid Mechanics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: course 36 (may be taken concurrently). Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis.

103B. Elementary Fluid Mechanics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow; boundary layer flow; potential flows; compressible flows.

103L. Fluid Mechanics Laboratory (1) II, III. White Lecture—1 hour; discussion—1 hour; laboratory—1 1/2 hours (alternate weeks with course 105L). Prerequisite: course 103B (may be taken concurrently). Basic principles and devices which are common in fluid mechanics are illustrated with a series of experimental demonstrations. Experiments are concerned with flow, pressure and viscosity measurement. Not open for credit to students who have completed Civil Engineering 141L. (P/NP grading only.)

104A. Mechanics of Materials (3) I, II. The Staff
Lecture—3 hours. Prerequisite: course 35; Mathematics 22B. Open to Engineering students only. Uniaxial loading and deformation; general concepts of stress-strain-temperature relations and yield criteria; stresses in thin-walled pressure vessels; torsion of shafts; bending of symmetrical beams.

104B. Mechanics of Materials (3) I, II. The Staff
Lecture—3 hours. Prerequisite: course 104A. Open to Engineering students only. Deflections due to bending of beams, unsymmetrical bending; application of energy methods to bending problems; yielding and plastic deformation in beams, limit analysis; buckling of columns.

104L. Mechanics of Materials Laboratory (1) I, II, III. Chai Laboratory—3 hours. Prerequisite: course 104B (may be taken concurrently). Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental stress analysis.

105A. Thermodynamics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 210, 22B; open to College of Engineering students only. Fundamental concepts of thermodynamics: heat energy and work; thermodynamic systems and substances, First Law and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales; power cycles: Carnot, Rankine, Brayton; and applications of thermodynamics to engineering systems.

105B. Thermodynamics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: course 105A; open to College of Engineering students only. Irreversibility and availability, thermodynamic relations, gas and vapor mixtures, and chemical reactions.

105L. Thermodynamics Laboratory (1) I, II. Shaw Lecture—1 hour; discussion—1 hour, and laboratory—1 1/2 hours (alternate weeks with course 105L). Prerequisite: course 105B (may be taken concurrently). Demonstrations and experiments to illustrate the principles of the state, the first and second laws of thermodynamics, and thermodynamic cycles. (P/NP grading only.)

106. Engineering Economics (3) I, II. Hartsough, Slaughter
Lecture—3 hours. Prerequisite: upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Comounding, tax, capital, cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.

111. Electric Power Equipment (3) I, II. Chancellor, Delwiche, Hartsough, Lecture—2 hours; laboratory—2 hours. Prerequisite: course 17. Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics.

122. Introduction to Mechanical Vibrations (3) I. Hubbard
Lecture—3 hours. Prerequisite: course 102. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electronic analogical use of energy conservation principles.

160. Environmental Physics and Society (3) I. Jungerman, Craig
Lecture—3 hours. Prerequisite: Physics 9D, 25, or 101B; or Mathematics 160 or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) General Education credit: Contemporary Societies or Nature and Environment. (Same course as Physics 160.)

162. Advanced Energy Technology (4) I. Craig Lecture—3 hours; discussion—1 hour. Prerequisite: course 105A or consent of instructor. Technical overview of energy technologies. Emphasis on semi-quantitative understanding. About 20 percent of course is policy oriented. Designed to mesh with course 160, which is primarily policy oriented. Offered in alternate years. (P/NP grading only.)


182. Engineering Analysis in Applied Mechanics (3) III. Brewer Lecture—3 hours; laboratory—1 hour. Prerequisite: course 102 may be taken concurrently) and Mathematics 22B. Introduction to the mathematics of optimum design. The calculus of variations with applications to dynamics and design. Linearization and the solution of linear dynamic equations. Emphasis on analytical methods and computer aids.

190. Professional Responsibilities of Engineers (3) I, II. Sanders Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional and ethical issues; oral presentations on the interactions between engineering and society.

Graduate Courses

254, Manufacturing Engineering (3) I, II. Dorf Lecture—3 hours. Prerequisite: course 180, Statistics 120. Manufacturing and process engineering, productivity, planning, production and operations, inventory and facilities, quality, robots and flexible manufacturing systems.

291. Seminar in Teaching (1) I, II. The Staff Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (SP grading only.)

**Course not offered this academic year.**

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**Engineering: Applied Science**

(College of Engineering)

Neville C. Luhmann, Jr., Ph.D., Chairperson of the Department

Ann E. Orel, Ph.D., Vice Chairperson of the Depart-

Department Office, 228 Walker Hall (916-752-0360)

**Faculty**

Meera M. Blattner, Ph.D., Professor
Richard Christiansen, Ph.D., Professor
Paul P. Craig, Ph.D., Professor
Stephen P. Cramer, Ph.D., Professor
John S. De Groot, Ph.D., Professor
Roger A. Haas, Ph.D., Professor
William G. Hooper, Ph.D., Professor
David J. Iwamoto, Ph.D., Professor
Neville C. Luhmann, Jr., Ph.D., Professor
Nelson Max, Ph.D., Professor
William McCurdy, Ph.D., Professor
Ann Orel, Ph.D., Associate Professor
Garry Rodrigue, Ph.D., Professor
Rao Vemuri, Ph.D., Professor
Frederick Wooten, Ph.D., Professor
Yin Yeh, Ph.D., Professor

**Emeriti Faculty**

Benn J. Alder, Ph.D., Professor Emeritus
Stewart D. Bloom, Ph.D., Professor Emeritus
John Killeen, Ph.D., Professor Emeritus
William A. Newcomb, Ph.D., Professor Emeritus
Richard F. Post, Ph.D., Professor Emeritus
Wilson K. Talley, Ph.D., Professor Emeritus
Edward Teller, Ph.D., University Professor Emeritus

**Courses in Engineering: Applied Science**

**Davis (EAD)**

**Lower Division Courses**

90C. Research Group Conference for Lower Division Students (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: lower division standing; consent of instructor. May be repeated for credit. (P/NP grading only)

98. Directed Group Study (1-5) I, II, III. The Staff

Prerequisite: consent of instructor and lower division standing. (P/NP grading only)

99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only)

**Upper Division Courses**

115. Introduction to Numerical Methods for Engineers and Scientists (3) I, II, III. The Staff

Lecture—3 hours. Prerequisite: Engineering 5, Mathematics 22B. Introduction to numerical analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and deterministic and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

116. Computer Solution of Physical Problems (3) III. De Groot

Lecture—3 hours. Prerequisite: course 115 or consent of instructor. Application of computers to solution of physical problems. Numerical solution of elliptic, parabolic, and hyperbolic partial differential equations; eigenvalue problems, Monte Carlo methods, linear programming.

137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungerman (Physics), Craig

Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 18, 25, 9D, or 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including the nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on chain of magnitude calculations. (Same course as Physics 137.) (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) General Education credit: Contemporary Societies or Nature and Environment.)
147. Arms Race Technologies and Strategies (3) I. Craig
Lecture—2 hours; discussion—1 hour. Prerequisite: course 137/Physics 137. Technological and strategic issues in the nuclear arms race. Characteristics of nuclear weapons and weapons defense systems; responses and countermeasures. Advantages and disadvantages of alternative realizations of weapons systems.

165A. Quantum Optics (3) II. Yeh

165B. Quantum Optics II (3) II. Yeh
Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter: photoelectric counting statistics. Photon distributions in scattering processes and in nonlinear optical processes.

166A. Quantum Optics Laboratory (1) I. Yeh
Laboratory—3 hours. Prerequisite: course 165A concurrently. Hands-on experience in working with lasers, photon spectroscopy, electro-optical devices and photo-electric counting statistics.

166B. Quantum Optics Laboratory (1) III. Yeh
Laboratory—3 hours. Prerequisite: course 166B concurrently. Continuation of course 166A.

180. Introduction to Plasma Physics and Controlled Fusion (3) I. De Groot
Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma properties, plasma sources, plasma diagnostics, magnetohydrodynamics, kinetic theory, plasma stability, plasma confinement systems and approaches to controlled thermonuclear fusion.

181. Plasma Physics Laboratory (1) I. De Groot
Laboratory—3 hours. Prerequisite: course 180 concurrently. Langmuir probes, plasma sources, Landau damping of ion acoustic waves, ion acoustic shocks, ion-ion two-stream instability.

190C. Research Group Conference for Advanced Undergraduates (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in applied science. May be repeated for credit. (P/NP grading only.)

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

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

Graduate Courses
228A-228B-228C. Properties of Matter (3-3-3) I-III. Hoover
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

232A-232B-232C. Structure of Matter (3-3-3) I-III. Yeh
Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C (may be taken concurrently). Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules, and solids; quantum theory of cooperative effects.

234A-234B-234C. Electromagnetic Theory (3-3-3) I-II-III. DeGroot

271. Optical Methods in Biophysics (3) I. Yeh
Lecture—3 hours. Prerequisite: Physics 110A-110B-110C, Chemistry 110A, 110B, or the equivalent. Physics of light-matter interactions used in biophysical research. Techniques of absorption, ellipsometry, fluorescence, photo-electrochemistry, elastic and inelastic scattering, diffraction, and nonlinear optics are applied to the studies of proteins, nucleic acids, lipids, and supramolecular organizations in biological systems. Offered in alternate years.

260A-260B-260C. Plasma Physics and Controlled Fusion (3-3-3) I-II-III. De Groot
Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.

289A-J. Special Topics in Applied Science (1-5) I, II, III, The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Computational Physics; (C) Computer Science; (D) Materials Science; (E) Nuclear Science; (F) Nonlinear Optics and Plasma Physics; (G) Quantum Electronics; (H) Solid State. May be repeated up to a total of 5 units per segment.

290 Seminar (1-2) I, II, III. The Staff
Seminar—1.2 hours. (SU grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (SU grading only.)

298 Group Study (1-5) I, II, III. The Staff
(SU grading only.)

299 Research (1-12) I, II, III. The Staff
(SU grading only.)

Livermore (EAL)
Upper Division Course
199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses
201. Software Engineering (3) I. Blatter
Lecture—3 hours. Prerequisite: computer science courses 103 or the equivalent. Detailed design and organization of computer hardware and associated input and output devices. Topics include logic families, addressing methods, memory design, I/O devices, a survey of various architectural structures, and communication systems. A programming project will be performed.

203. Computer Architecture (3) I. Vemuri
Lecture—3 hours. Prerequisite: course 201A. Topics in computer architecture, programming, and assembly of computer operating systems, and advanced architectures.

204 Artificial Intelligence (3) I. Blatter
Lecture—3 hours. Prerequisite: courses 101, 106, 111. Concepts required to understand artificial intelligence. Goal representation, exploring constraints, control mechanisms, and storing common sense knowledge are introduced. LISP programming language is used. Offered in alternate years.

204B. Knowledge Representation (3) III. Blatter
Lecture—3 hours. Prerequisite: courses 204A, 211, or 212. Representation of knowledge requires some language or communication medium to describe knowledge about the world. Course explores expressive adequacy, computational efficiency, non-deductive and non-monotonic reasoning associated with some knowledge representation schemes. Offered in alternate years.

205A. Mathematical Methods (3) I. Rodriguez
Lecture—3 hours. Prerequisite: calculus. Complex variables, theory of convergence, evaluation of definite integrals, factorial function (gamma function), asymptotic expansions, contour integration, Fourier analysis.

205B. Mathematical Methods II (3) II. Rodriguez
Lecture—3 hours. Prerequisite: course 205A. Laplace transforms, Sturm-Liouville theory, solution of second order linear ODE, approximate solutions of ODE, calculus of variations, characteristics.

205C. Mathematical Methods III (3) III. Rodriguez
Lecture—3 hours. Prerequisite: course 205B. Spherical harmonics, Bessel functions, conformal mapping, hypergeometric functions, elliptic functions.

206 Programming Languages (3) III. The Staff
Lecture—3 hours. Prerequisite: course 209B. Syntax-directed translation techniques are used to implement a compiler for a block-structured, high-level programming language. Emphasis given to semantic analysis and code generation.

208A. Operating Systems I (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 108, 203B. Design of an operating system. Emphasis given to mechanisms commonly used to implement systems and the various policy options. Course stresses the Kernel design approach.

208B. Operating Systems II (3) II. The Staff
Lecture—3 hours. Prerequisite: course 208A. Concentration on operating system structure, interprocess communication, and issues of naming, error control, protection, synchronization, abstract object representation and encoding, resource management, and measurement in distributed operating systems. Course integrates design goals, problems, and mechanisms.

210A. Numerical Methods in Applied Science (3) I. The Staff
Lecture—3 hours. Prerequisite: calculus through differential equations and vector analysis. Numerical techniques used in a wide variety of applications of digital computers to problems in applied science. Emphasis placed on the common mathematical elements of the techniques developed.

210B. Numerical Methods in Applied Science (3) II. The Staff
Lecture—3 hours. Prerequisite: course 210A. Numerical methods applicable to the solution of partial differential equations. Emphasis on finite-difference, finite-element, and spectral methods for linear hyperbolic, parabolic, and elliptic systems and nonlinear hyperbolic systems.

210C. Numerical Methods in Applied Science (3) III. The Staff
Lecture—3 hours. Prerequisite: course 210B. Computational methods in various fields including: fluid mechanics, kinetic theory, solid mechanics, quantum mechanics.

212 Analysis of Algorithms (3) III. The Staff
Lecture—3 hours. Prerequisite: course 111. Investigation of time and space requirements of commonly used programming tasks, such as searching, sorting, set manipulation, and graph algorithms. NP completeness and intractability also discussed.

*Course not offered this academic year.
Engineering: Biological and Agricultural

215A. Computer Graphics (3) II. Max
Lecture—3 hours. Prerequisite: course 113. Development of algorithms for perspective line drawings of three-dimensional objects, as defined by polygons or bicubic patches.

215B. Computer Graphics (3) III. Max
Lecture—3 hours. Prerequisite: course 215A. Emphasis on algorithms to produce color-shaded raster renderings of three-dimensional models.

215A. Mathematical Methods in Computer Science (3) II. The Staff
Lecture—3 hours. Prerequisite: course 215A. Mathematical techniques common to advanced computing science and scientific computing. Examination of methods used in statistical analysis and probability theory to analyze hypotheses and form models.

215B. Mathematical Methods in Computer Science (3) III. The Staff
Lecture—3 hours. Prerequisite: course 215B. Emphasis on the mathematical methods utilized in the study of data structures and computer architecture.

216A. Special Topics in Computer Science (1-5) I, II, III.
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Artificial Intelligence Systems; (B) Language Translation; (C) Operating Systems; (D) Foundations of Computing; (E) Computational Mathematics.

217A-217B. Computational Science (3-3) I, II. The Staff
Lecture—3 hours. Prerequisite: courses 205A and 205B (may be taken concurrently). Designed for physical scientists. Topics in computer science with applications to computational science. Computer organization and architecture, data structures, algorithms and complexity, software environments for scientific visualization, symbolic computation.

218A. Signal Processing (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 185A, 121A-121B. Discrete-time and continuous-time signal processing. Fourier transforms, Laplace transforms, sampling and reconstruction, linear time-invariant systems, signal-space concepts, and probability and random processes. Offered in alternate years.

218B. Signal Processing (3) III. The Staff
Lecture—3 hours. Prerequisite: course 218A. Systems and signals, convolution, causality, and stability. Z-transform, DTFT, DFT, IIR, and FIR filters. Adaptive filters, antenna arrays, spectral estimation, and image processing. Offered in alternate years.

220. Artificial Neural Networks (3) III. Vemuri
Lecture—3 hours. Prerequisite: Mathematics 167. Introduction to artificial neural networks. Content additional to that covered in CSE 226A. Topics include: nonlinear computation, competition, and resonance. LMS and back-propagation algorithms. Comparisons of standard models including perceptrons, multilayered and Hopfield nets. Supervised and unsupervised learning. Offered in alternate years.

222. User Interfaces (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 101, 106. Design and evaluation of the interface between systems and users. Covers user interaction styles and techniques, design, aesthetics, usability, user guidance, and methodologies for designing and evaluating user interfaces. Offered in alternate years.

223. Mixed Media Interfaces (3) I. Blatter
Lecture—3 hours. Prerequisite: course 222. Examines basic paradigms of multimedia interfaces and time-varying systems, navigation through the multimedia systems, hypermedia, and an examination of some commercial systems as well as the study of interaction development, such as dialogue, gesture, video, pen-based systems, and voice input and output. Virtual reality systems are also studied. Offered in alternate years.

224. Theories of Human-Computer Interaction (3) I. Blatter
Lecture—3 hours. Prerequisite: data structures and basic statistics; a course in user interfaces is desirable. Some basic cognitive science pertaining to computer usage is introduced (such as memory, sensory limits, and problem solving) followed by mod-

els of human activity task analysis; different paradigms for computer usage, models of cooperative activity; cultural differences in human-computer interaction; users with disabilities; and adaptive interfaces. Offered in alternate years.

227. Chaos, Fractals and Nonlinear Phenomena (3) III. The Staff
Lecture—3 hours. Prerequisites: courses 205A and 205B. A computational treatment of pervasive instabilities in simulation—sensitive dependence on initial conditions, strange attractors, fractals. Connecting the second law of thermodynamics to nonlinear dynamics with "strange attractors" these are generally "fractal" objects with great aesthetic and intellectual appeal.

228A-228B. Statistical Mechanics (3-3-3) II-II, III-II.
Lecture—3 hours. Prerequisite: courses 228B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

230A-230B-230C. Quantum Mechanics (3-3-3) II-III, III-III, III-III.
The Staff
Lecture—3 hours. Prerequisite: course 230A-230B-230C. Classical and quantum mechanics of particles; quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

233A-233B-233C. Theory and Applications of Solid-State Physics (3-3-3) II-III, III-III, III-III.
The Staff
Lecture—3 hours. Prerequisite: course 233B or the equivalent. Structure and properties of crystals; theory of dielectrics, metals and alloys; magnetism, superconductivity, and semiconductors. Applications to various solid-state devices.

234A-234B-234C. Electromagnetic Theory (3-3-3) I-II, II-II, II-II.

235. Classical Mechanics (3) I. Newcomb
Lecture—3 hours. Prerequisite: consent of instructor. General principles of analytical mechanics; variational principles; Lagrange's and Hamilton's equations; kinematics; collisions.

256. Continuum Mechanics (3) II. Christensen
Lecture—3 hours. Prerequisite: course 205C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic instability; viscous hydrodynamics; boundary layer theory.

257. Magnetohydrodynamics (3) III. Newcomb
Lecture—3 hours. Prerequisite: course 234B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation; theory of stability, gyroscopic effects, finite-amplitude effects.

262A-262B-262C. Atomic and Molecular Interactions (3-3-3) I-II-
Lecture—3 hours. Prerequisite: course 230A-230B-230C or the equivalent. Atomic structure and spectra, molecular structure and spectra, classification and quantum mechanical collision theory of electron and heavy particle scattering.

265A-265B. Laser Physics (3-3) I-I. Haas

266A-266B. Laser Physics Laboratory (3-3) II.
The Staff

267. Nonlinear Optics (3) III. Haas

267L. Nonlinear Optics Laboratory (3) III. Haas
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 265A-265B. Experiments exploring the principles of nonlinear optics. Phenomena studied selected from: crystal-optics, electro-optics, acousto-optics, parametric amplification and oscillation, harmonic conversion, stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation and spectroscopy.

Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; non-linear Maxwell-Vlasov theory; fluctuations, correlations and radiation; inertial magnetic confinement systems in controlled fusion.

274A-L. Special Topics in Applied Science (1-5) I, II, III.
The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electrodynamics; (J) Solid State. May be repeated up to a total of 5 units per segment.

280. Seminar (1-2) I, II, III. The Staff (Chair in charge)
Seminar—1-2 hours. (SUU grading only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (SUU grading only.)

298. Group Study (1-5) I, II, III. The Staff (SUU grading only.)

299. Research (1-12) I, II, III. The Staff (Chair in charge)
(SUU grading only.)

Engineering: Biological and Agricultural

(College of Engineering)

David J. Hills, Ph.D., Chairperson of the Department
Department Office, 2030 Bailer Hall (916-752-0102)

Faculty
William J. Chancellor, Ph.D., Professor
Pickow (Paul) Chen, Ph.D., Professor
Michael J. Delwiche, Ph.D., Professor
Robert B. Fridey, Ph.D., Professor
Roger G. Garrett, Ph.D., Professor
D. Ken Giles, Ph.D., Associate Professor
Mark E. Grismer, Ph.D., Associate Professor
Bruce R. Hartsock, Ph.D., Associate Professor
David J. Hills, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
John M. Krohta, Ph.D., Professor
Courses in Engineering: Biological Systems (EBS)

Lower Division Courses

1. Introduction to Biological Systems Engineering (3) I. Giese
   Lecture—2 hours; laboratory—3 hours. Introduction to engineering and the design process, with examples drawn from the fields of agriculture, biological and food engineering. Emphasis on the relationship of engineering principles to biological systems. Laboratories include small group design projects and presentations.

2. Introduction to Forest Engineering (1) I. Hart-sough
   Discussion/laboratory—3 hours. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, logging, transport, milling and residue utilization. (P/NP grading only.)

75. Properties of Materials in Biological Systems (4)
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A; Physics 9C (may be taken concurrently). Properties of typical biological materials, with emphasis on the effects of physical and biochemical properties on the design of engineered systems; interactions of biological materials with typical engineering materials.

90C. Research Group Conference in Biological Systems Engineering (1) I, II, III. The Staff (Chairperson in charge)
   Discussion—1 hour. Prerequisite: lower division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.)

90X. Lower Division Seminar (1-4) I, II, III. The Staff
   Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

92. Internship in Biological Systems Engineering (1-5) I, II, III. The Staff (Hills in charge)
   Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff
   Project—1 hour. Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.)

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

Upper Division Courses

114. Principles of Field Machinery Design (3) III. The Staff
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 36, 104A. Traction and stability of vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design.

115. Forest Engineering (3) III. Hart-sough
   Lecture—3 hours. Prerequisite: Engineering 104A; Forestry and Resource Management 103, 125 (Berkeley campus). Applications of engineering principles to problems in forestry, including those in forest regeneration, harvesting and transportation.

116. Forest Engineering Field Problems (2) I. Miles
   Lecture—1 hour; three weekend field trips to Blodgett Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

120. Power Sources and Transmission (4) II. Chen
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 17, 102A, 103A, 105A. Design and performance characteristics of power units: internal combustion engines, electric motors, and hydraulic power systems. Selection and design of power transmission systems for agricultural and industrial applications.

125. Environmental Management of Biological Systems (4) I. Jenkins
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104A. Fundamentals of heat and mass transfer, psychrometrics, solar radiation, and illumination, including their measurement, and their interactions with plants and animals in controlled environments. Application of fundamental principles to the design of animal and plant production structures and other intensively managed biological systems.

130. Dynamic Modeling of Processes in Biological Systems (3) II. I. R. Ramsey
   Lecture/discussion—3 hours. Prerequisite: Engineering 5 or the equivalent. Introduction to techniques for modeling processes through mass and energy balances, rate equations and equations of state. Analytical and numerical methods for the solution of equations.

131. Fluid Mechanics in Biological Systems (3) III. M. McCarthy
   Lecture—3 hours. Prerequisite: Chemical Engineering 150A or Engineering 105A; Mathematics 13A. Introduction to fluid flow characteristics, viscoelastic behavior of foods, applications of Bernoulli’s equation and macroscopic balances (mass, momentum, mechanical energy) to practical problems in the period of internship.

132. Unit Operations in Food Engineering (4) III. Singh
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103A, 105A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials. Thermal operations related to refrigeration, freezing, evaporation and drying of foods.

145. Irrigation and Drainage Systems (4) II. Wallender, Graper, Hills
   Lecture—4 hours. Prerequisite: Engineering 103A or Water Science 142. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Hydrologic Science 115.)

165. Computer Interfacing and Control (4) I. Delwiche
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100, Engineering 5 or Computer Science Engineering 35. Structured programming in C, digital data acquisition concepts and hardware, analog input/output systems, driver software, and computer control.

170A. Engineering Design and Professional Responsibilities (3) II. Miles
   Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102A, 104A. Introduction to engineering design including professional responsibilities. Emphasis placed on project selection, data sources, specifications, human factors, biological materials, safety systems, and professionalism. Detailed design proposals will be developed for course 170B.

170B. Engineering Projects: Design (3) I, II, III. Miles
   Laboratory/discussion—three 2-hour sessions. Prerequisite: course 170A. Individual or group projects involving the design of devices, structures, or systems to solve specific problems in agriculture or forestry. Students may select their projects, subject to approval of instructor.

170C. Engineering Projects: Design Evaluation (3) I, II, III. Miles
   Laboratory—three 3-hour sessions. Prerequisite: course 170B strongly recommended. Individual or group projects involving fabrication, assembly and testing of components, devices, structures or systems designed to solve specific problems in agriculture or forestry. Projects selected by the instructor from those designed in course 170B.

175. Rheology of Biological Materials (3) II. K. McCarthy
   Lecture—3 hours. Prerequisite: Chemical Engineering 150A or Engineering 103A, and Engineering 105A or Chemical Engineering 152A. Introduction to fluid and solid rheology, viscoelastic behavior of foods and other biological materials, and application of rheological properties to food and biological systems (e.g., pipeline design, extrusion, mixing, coating).

190C. Research Group Conference in Biological Systems Engineering (1) I, II, III. The Staff (Chairperson in charge)
   Discussion—1 hour. Prerequisite: upper division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.)

190X. Upper Division Seminar (1-4) I, II, III. The Staff
   Seminar—1-4 hours. Prerequisite: consent of instructor. In-depth examination of a special topic in a small group setting.

192. Internship in Biological Systems Engineering (1-5) I, II, III. The Staff (Hills in charge)
   Internship. Prerequisite: upper division standing; approval of project by chairperson. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Hills in charge) (P/NP grading only.)

Graduate Courses

200. Research Methods in Biological Systems Engineering (2) I. Giese
   Lecture—2 hours. Prerequisite: graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Research funding. Record keeping and patents. Uncertainty analysis in experiments and computations. Graphical analysis. Oral and written presentation of research results, manuscript preparation, submission and review.

215. Soil-Machine Relations in Tillage and Traction (3) I. Chancellor
   Lecture—3 hours. Prerequisite: course 114; Civil and Environmental Engineering 171 and Soil Science 100 recommended. Mechanical interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil;
analyses of stress and strains in soil due to machine- aplicance and analytical and analytical methods for synthesizing characteristics of overall systems.


242. Hydraulics of Surface Irrigation (3) III. Wallender Lecture—3 hours. Prerequisite: course in differential and integral calculus; a course in hydraulic and fluid mechanics including some open-channel flow; a course in irrigation principles. Mathematical models of surface-irrigation systems for prediction of the ultimate disposition of water flowing 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. Management of Wastes from Biological Production Systems (3) II. Pedrazzani Lecture—3 hours. Characteristics of wastes from livestock, crop residues and food processing. Study of methods of collection, treatment, and disposal of these wastes. Offered in alternate years.


265. Design and Analysis of Engineering Experiments (4) III. Upadhyaya Lecture—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 experimental and computational facilities will be assigned.

270. Modeling and Analysis of Biological and Physical Systems (3) III. Upadhyaya, R. S. Ramasesh Lecture—3 hours. Prerequisite: course 121A. Mathematical modeling of biological systems: model development and analytical and numerical solutions. Case studies from various specializations within Agricultural Engineering. Offered in alternate years.

275. Physical Properties of Biological Materials (3) I. Chen Lecture—2 hours; laboratory—3 hours. Prerequisite: course 10. Consent of instructor. Special topics in: (A) Animal Systems Engineering; (B) Agricultural Engineering; (D) Energy Systems; (E) Environmental Quality; (F) Food Engineering; (G) Forest Engineering; (H) Irrigation and Drainage; (I) Plant Production and Harvest; (J) Postharvest Engineering; (K) Sensors and Actuators. May be repeated for credit when topic differs.

289A-K. Selected Topics in Biological Systems Engineering (1-5) I. The Staff Variable 1–5. Prerequisites: Consent of instructor. Special topics include: (A) Animal Systems Engineering; (B) Agricultural Engineering; (C) Biological Engineering; (D) Energy Systems; (E) Environmental Quality; (F) Food Engineering; (G) Forest Engineering; (H) Irrigation and Drainage; (I) Plant Production and Harvest; (J) Postharvest Engineering; (K) Sensors and Actuators. May be repeated for credit when topic differs.

290. Seminar (1) I, II, III. The Staff—1 hour. Prerequisite: course 1. Weekly seminars on recent advances and selected topics in biological systems engineering. Course theme will vary from quarter to quarter. May be repeated for credit. (SU grading only.)

290C. Graduate Research Conference (1) I, II, III. The Staff (Hills in charge) Discussion—1 hour. Prerequisite: consent of instructor. Research presentations and discussion of techniques and implementation of results. May be repeated for credit. (SU grading only.)

*Course not offered this academic year.
Courses in Engineering: Chemical (ECH)
(Courses in Chemical Engineering (ECH) are listed beneath those in Materials Science and Engineering (EMS) are listed immediately following.)

Lower Division Courses

1. The Scope of Chemical Engineering (1) I. II. The Staff (Chairperson in charge)
Lecture—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, with clarification of what chemical engineers actually do in various jobs. (P/NP grading only.)

90X. Lower Division Seminar (1) I. II. III. The Staff—1 hour. Examination of a special topic in a small setting.

98. Directed Group Study (1-5) I. II. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I. II. III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

150A. Chemical Engineering Fluid Mechanics (4)
II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, 22B, 21D, Engineering 35. Fluid statics and one-dimensional laminar flow. Kinematics of point and integral functions. The stress vector-stress tensor relation. Newton's law of viscosity and application of the Navier-Stokes equations to laminar flow and dimensional analysis. Flow of non-Newtonian fluids. Not open for credit to students who have completed Engineering 103A.

150B. Chemical Engineering Fluid Mechanics (4)
III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Turbulent flows and time averaging. Application of Bernoulli's equation and the macroscopic mass, momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and choke flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

150C. Rheology and Polymer Processing (4) III. Powell
Lecture—4 hours. Prerequisite: Course 150A. Fundamentals of rheology. Introduction to polymer processes and unit operations.

151. Molecular Balances (3) I. Whitaker
Lecture—3 hours. Prerequisite: Chemistry 110A, Chemistry 128B (may be taken concurrently). Engineering 5. Application of the principles of conservation of mass to single and multi-component systems in chemical processes; studies of batch, semi-batch, and continuous processes involving mass transfer, change of phase, and chemical reaction.

152A. Chemical Engineering Thermodynamics (3) I. II. The Staff
Lecture—3 hours. Prerequisite: course 151. Chemistry 110A. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105A.

152B. Chemical Engineering Thermodynamics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineer 105B.

153. Chemical Engineering Heat Transfer (4) I. II. III. The Staff
Lecture—4 hours. Prerequisite: course 150A. Steady and transient heat conduction. The thermal energy equation, analysis of forced and free convective heat transfer. Turbulence, macroscopic balances, and heat transfer coefficients. The photon transport equation and radiant energy exchange. The design of heat exchangers.

154A. Mass Transfer (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 153, Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

154B. Applications of Mass Transfer (3) II. The Staff
Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation, and other separation processes.

155A. Chemical Engineering Laboratory (4) I. II. The Staff
Laboratory—12 hours. Prerequisite: course 154A. Laboratory experiments in heat, mass, and momentum transfer and chemical processes.

155B. Chemical Engineering Laboratory (4) II. III. The Staff
Laboratory—12 hours. Prerequisite: courses 154B, 155A. Continuation of 155A.

156A. Chemical Engineering Kinetics (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 152B, 154A, and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

156B. Chemical Engineering Kinetics (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 156A. Laboratory experiments in control system design and analysis.

157. Process Dynamics and Control (4) I. McDonald
Lecture—3 hours. Prerequisite: course 159. Fundamentals of dynamic modelling of chemical processes. Design and analysis of classical feedback control of chemical processes.

157L. Process Control Laboratory (1) I. II. III. The Staff
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 157L. Laboratory experiments in control system design and analysis.

158A. Economics and Optimization of Chemical Processes (3) I. Palazoglu

158B. Process Equipment Design (3) III. Palazoglu
Lecture—3 hours. Prerequisite: course 158A. Design of chemical process equipment. Equipment cost estimation techniques.

158C. Chemical Plant Design (3) III. Palazoglu
Lecture—3 hours. Prerequisite: course 158B. Conceptual design of chemical processes. Costing, profitability and optimization analysis of complete chemical plants. Use of computer-aided design techniques.

159. Chemical Engineering Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: Mathematics 22B. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.

161A. Biochemical Engineering Fundamentals (3) II. McDonald
Lecture—3 hours. Prerequisite: Chemistry 128A. Mathematics 22B, Microbiology 102 (or consent of instructor). Biomolecules, bioreactor design and operation, transport phenomena in bioreactors, microbial plant, and animal cell cultures. (Not open for credit to students who have completed course 161.)

161B. Bioseparations (3) III. The Staff
Lecture—3 hours. Prerequisite: course 154A. Product recovery and purification of biochemicals. Cell disruption, mammalian cell culture, membrane separations, extraction, and chromatographic separation processes.

161L. Bioprocess Engineering Laboratory (4) III. McDonald
Laboratory—9 hours; discussion—1 hour. Prerequisite: courses 161A, 161B. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors; ion exchange chromatography; membrane filtration.

163. Chemical Engineering in Integrated Circuit Fabrication Technology (4) I. The Staff
Lecture—4 hours. Prerequisite: course 154A (concurrently); Chemistry 128B. Manufacture of semiconductor devices, integrated circuits, magnetic bubble memories, tapes and disks involving application of chemical engineering processing techniques. The chemistry and engineering of the industrial fabrication of modern circuits and devices.

166. Catalysis (3) II. Gates
Lecture—3 hours. Prerequisite: course 156A (may be taken concurrently) or consent of instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cagels (zeolites); catalysis on surfaces.

170. Introduction to Colloid and Surface Phenomena (3) III. Stroeven
Lecture—3 hours. Prerequisite: Chemistry 110A. Introduction to the behavior of surfaces and dispense systems. The fundamentals will be applied to the solution of practical problems in colloid science. The course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines.

190C. Research Group Conferences (1) I. II. III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in Chemical Engineering, consent of instructor, or research group conference. May be repeated for credit. (P/NP grading only.)

190X. Upper Division Seminar (1-5) I. II. III. The Staff—1 hour. Prerequisite: Upper division standing. In-depth examination of a special topic in a small group setting.

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

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

Graduate Courses

205. Biochemical Engineering (3) II. Ryu
Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 101, 102, Molecular and Cellular Biology 120L, 200A. Food Science and Technology 205 recommended; or consent of instructor. Interaction of chemical engineering, biochemistry, and molecular biology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agglutination, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Offered in alternate years.

226. Enzyme Engineering (3) II. Ryu
Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 102, 103, Molecular and Cellular Biology 120L, 200A; or consent of instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme reactor design and optimization, and new applications of enzymes in genetic engineering and biotechnology. Offered in alternate years.

246. Advanced Biochemical Engineering (3) II. Ryu
Lecture—2 hours. Prerequisite: course 206 or consent of instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application.

*Course not offered this academic year.
252. Statistical Thermodynamics (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B, Engineering 105B, or the equivalent. A treatment of the statistical basis of thermodynamics; introduction to statistical mechanics; discussion of the laws of thermodynamics; application of the thermodynamic relationships to phase and chemical reaction equilibria; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations.


253B. Advanced Heat Transport (4) I. The Staff Lecture—4 hours. Prerequisite: courses 153 and 259 or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Equations of conduction. Isothermal, thermoelastic and anisotropic materials solution problems using Duhamel’s principle and convolution theory. Pho-ton transport, black and gray body radiation, radiative exchange, free and forced convection.

253C. Advanced Mass Transfer (4) II. The Staff Lecture—4 hours. Prerequisites: courses 154A, 154B, and 259 (all taken concurrently) or the equivalent. Kinematics of multiphase systems. Basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat, and mass transfer. Applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.

254. Colloid and Surface Phenomena (4) III. Stroock Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in science or engineering or consent of instructor. Special topics in (A) Fluid Mechanics; (B) Nonlinear Analysis and Numerical Methods; (C) Process Control; (D) Chemistry of Catalytic Processes; (E) Bioengineering (F) Industrial Engineering; (G) Molecular Thermodynamics; (H) Membrane Separations; (I) Advanced Materials Processing; (J) Novel Experimental Methods: (K) Advanced Transport Phenomena; (L) Biologically Inspired Engineering.

258A-L. Special Topics in Chemical Engineering (1-5) I, II, III. Staff Lecture and/or Laboratory. Prerequisite: consent of instructor. Special topics in (A) Fluid Mechanics; (B) Nonlinear Analysis and Numerical Methods; (C) Process Control; (D) Chemistry of Catalytic Processes; (E) Bioengineering (F) Industrial Engineering; (G) Molecular Thermodynamics; (H) Membrane Separations; (I) Advanced Materials Processing; (J) Novel Experimental Methods: (K) Advanced Transport Phenomena; (L) Biologically Inspired Engineering.

290. Seminar (1) I, II, III. The Staff Seminar—1 hour. (SU grade only.)

290C. Graduate Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: consent of instructor. Research progress, problem and techniques in chemical engineering. May be repeated for credit. (SU grade only)

291. Seminar in Multiphase Transport Phenomena (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate or senior standing. Seminar devoted to the theoretical and practical applications of multiphase transport phenomena. Subjects will include flow in porous media, dispersion with adsorption and reaction, and heat transfer in multiphase systems with chemical reaction. (SU grade only.)

292. Seminars in Process Dynamics and Control (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate or senior standing. Theoretical and practical aspects of process control will be addressed. Topics will cover controller analysis and synthesis of linear and nonlinear systems including time delay and others as well as dynamic modeling of such processes. (SU grade only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grade only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) (SU grade only.)

Professional Course

390. Teaching of Chemical Engineering (1) I, II, III. The Staff Lecture—1 hour. Prerequisites and qualifications and acceptance as teaching assistant and/or associate in chemical engineering, participation as a teaching assistant or associate in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated twice for credit. (SU grade only.)

Courses in Materials Science and Engineering (EMS)

Upper Division Courses

130. Thermodynamics of Materials Processes (3) I. Rieh funding Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent). Upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alignment, phase stability, surface properties, semiconduction, thermoelectric power and thermionic energy conversion.

132. Structure of Engineering Materials (3) I. Howitt Lecture—3 hours. Prerequisite: Engineering 45; upper division standing. Structure of engineering materials on the atomic scale will be described by exploring the fundamentals of crystallography. The importance of this structure to materials’ properties will be emphasized. Experimental determination will be described using x-ray diffraction techniques.

132L. Structure of Materials Laboratory (1) I. Howitt Laboratory—3 hours. Prerequisite: course 132 concurrently. Experimental investigations of the structure of solid materials. Laboratory exercises emphasize methods used to study structure of solids at atomic and microstructural levels.

134. Rate Processes in Materials Science (3) III. Groza Lecture—3 hours. Prerequisite: Engineering 45 and 105A or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Application to atom transport, nucleation, solidification, precipitation, evaporation, and sintering processes.

134L. Rate Processes in Materials Laboratory (1) III. Groza Laboratory—3 hours. Prerequisite: course 134 concurrently. Laboratory experiments to illustrate fundamental principles of diffusion, solidification, recrystallization, precipitation, evaporation, sintering and phase transformations in materials.

138. Mechanical Behavior of Materials (3) II. Mukherjee Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Microscopic origins of the mechanical behavior of engineering materials are discussed with emphasis on recent developments in materials science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined.

138L. Mechanical Properties Laboratory (1) II. Mukherjee Laboratory—3 hours. Prerequisite: course 138 concurrently. Experimental investigations of mechanical behavior of materials. Laboratory exercises emphasize fundamental relationships between microstructure and mechanical properties.

140. Materials in Engineering Design (3) III. Gibling Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Quantitative treatment of materials selection for engineering applications. Discussion of the relationship of design para.

*Course not offered this academic year.
140. Materials Selection Laboratory (3) III. Gibling Laboratory—3 hours. Prerequisite: course 140 concurrently. Experimental investigations of processing and properties of materials used in structural applications. Laboratory exercises emphasize fundamental relationships between microstructure and properties. Consideration given to the role of property control in materials selection.

142. Principles of Nondestructive Testing (3) II. Shackelford Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing utilizing radiological, ultrasonic, electrical, magnetic, penetrant methods, etc., are discussed. Typical results expected from these tests and their application in material characterization, flaw detection, crystallographic information, chemical homogeneity, residual stress analysis, etc., are emphasized.

142L. Nondestructive Testing Laboratory (1) II. Shackelford Laboratory—3 hours. Prerequisite: course 142 concurrently. Laboratory experience in non-destructive testing techniques on X-ray radiography, X-ray diffraction, and ultrasonics.

144. Corrosion and Oxidation of Engineering Materials (3) III. The Staff Lecture—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and selection criteria for the prevention and control of corrosion.

144L. Corrosion Laboratory (1) I. The Staff Laboratory—3 hours. Prerequisite: course 144 concurrently. Laboratory experiments to demonstrate corrosion behavior of materials in aqueous and high temperature environments. Relationship between corrosion behavior and fundamental principles and theories emphasized.

146. Electronic and Optical Materials Processing (3) III. II. Ribaud Lecture—3 hours. Prerequisite: upper division standing in Engineering, Physics, Chemistry, or Geology. Principles of phase equilibria, thermodynamics and reaction kinetics applied to the processing of electronic and optical materials in polycrystalline, single crystal, and amorphous forms.

147. Principles of Polymer Materials Science (3) II. The Staff Lecture—3 hours. Prerequisite: chemistry through organic or Engineering 45; introductory physics sequence. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Fiber and Polymer Science 100.)

148. Failure Analysis (4) III. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 45, 104A; course 138 and Mechanical Engineering 150A recommended. Fracture mechanics and failure mechanisms in metals, ceramics, and composites. Effects of fatigue, corrosion and wear. Methodology for investigating failure including optical microscopy, scanning electron microscopy and destructive testing.

149. Materials Engineering Design Project (3) III, IV. The Staff Discussion—1 hour; laboratory—8 hours. Prerequisite: course 140 may be taken concurrently. A capstone engineering design experience involving analysis of real materials processes or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

155. Manufacturing Process Design (3) II. Groza Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 45. Mechanical Engineering 150A (may be taken concurrently). Principles of materials processing and manufacturing properties, effects of processing parameters on mechanical property relationships, and the fundamentals of manufacturing process selection are described. Case histories are used to explore recent developments in manufacturing process design.

190C. Research Group Conferences (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: consent of instructor: upper division standing. Individual and/or group conferences on progress and techniques in materials research. May be repeated for credit. (PINP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff Lecture—1-5 hours. Prerequisite: consent of instructor. Group study of selected topics. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. PINP grading only.

Graduate Courses


230L. Laboratory for Electron Microscopy (2) II. Howitt Laboratory—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Offered in alternate years.

232. Advanced Topics in Transmission Electron Microscopy (3) I. Howitt Lecture—1 hour; discussion—2 hours. Prerequisite: course 230. Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Offered in alternate years.

232L. Laboratory for Advanced Transmission Electron Microscopy (2) II. Howitt Lecture—3 hours; discussion—1 hour. Prerequisite: course 230 concurrently. Laboratory course in advanced transmission electron microscopy techniques relevant to specific material research projects in materials science. Offered in alternate years.

240. Transport Phenomena in Materials Processes (4) II. Ribaud Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in engineering; consent of instructor. Concepts in conception theory are applied to explain plasticity of crystallographic slip, glide and climb of dislocations, strain hardening, recrystallization, thermodynamics of creep, and creep deformation, with solutions, precipitates and impurity clouds are discussed. Offered in alternate years.

241. Principles and Applications of Dislocation Mechanics (4) II. Mukherjee Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in engineering; consent of instructor. Concepts in dislocation theory are applied to explain plasticity of crystallographic slip, glide and climb of dislocations, strain hardening, recrystallization, thermodynamics of creep, and creep deformation, with solutions, precipitates and impurity clouds are discussed. Offered in alternate years.

242. Advanced Mechanical Properties of Materials (4) II. Mukherjee Lecture—3 hours; discussion—1 hour. Prerequisite: course 138. 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 concept of slip, superplasticity, and cavitation. Influence of microstructure in optimizing the mechanical strength properties. Offered in alternate years.

243. Kinetics of Phase Transformation in Engineering Materials (3) II. Groza Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 130 recommended. Theory of alloying, kinetics of phase changes, heterogeneous and homogeneous transformation, transformation by shear, order-disorder reactions. Offered in alternate years.

244. Interaction of Materials and their Environment (3) I. Munir Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Offered in alternate years.

245. Advanced Topics in Structure of Materials (4) III. Shackelford Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 and graduate standing in Engineering or consent of instructor; courses 138 and 142 recommended. Nature of microstructure in engineering materials will be explored. Crystallographic and non-crystalline structures will be studied with special emphasis on grain boundary segregation in development of polycrystalline microstructure and the radial distribution function of amorphous materials. Offered in alternate years.

246. Current Topics in Electronic Materials Processing (3) III. Ribaud Lecture—3 hours. Prerequisite: course 146; graduate standing in physical sciences or engineering. Discussion of current literature and topical areas related to the processing of electronic and optical materials in polycrystalline, single crystal, and amorphous forms. Offered in alternate years.

247. Advanced Thermodynamics of Solids (3) I. Munir Lecture—3 hours. Prerequisite: course 130 or the equivalent. Thermodynamics of gas-solid reactions and solutions: criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EMF cells and application to solid-state electrolytes. Offered in alternate years.

248. Fracture of Engineering Materials (3) I. Gibling Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of mechanisms of fatigue in metals. Topics include the stress fields about elastic cracks, the Griffith-Iwan analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered in alternate years.

249. Mechanisms of Fatigue (3). Gibling Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of mechanisms of fatigue in metals. Topics include the stress fields about elastic cracks, the Griffith-Iwan analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered in alternate years.

250A-F. Special Topics in Polymer and Fiber Science (3) II. Zorzon Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Textiles and Clothing 250A-F.)

250C. Graduate Research Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on progress, problems, techniques and materials in science and engineering research. May be repeated for credit. (SU grading only.)

254. Materials Science Seminar (1) I, II, III. Shackelford, Mukherjee, Munir, Howitt, Gibling, Groza, Ribaud
Engineering: Civil and Environmental

(College of Engineering)

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Yannis F. Dafalias, Ph.D., Professor
Joannie L. Darby, Ph.D., Assistant Professor
Johannes J. DeVries, Ph.D., Lecturer
Leonard R. Hermann, Ph.D., Professor, Academic Senate Distinguished Teaching Award 1994
Davies Prize for Teaching and Scholarly Achievement 2014
I.M. Idrees, Ph.D., Professor
Roy A. Imbri, Ph.D., Adjunct Professor
Paul P. Jovanis, Ph.D., Professor
M. L. Kavass, Ph.D., Professor
Ian K. King, Ph.D., Professor
Bruce L. Kutter, Ph.D., Professor
Bruce E. Larako, Ph.D., Professor
Jay R. Lund, Ph.D., Associate Professor
Miguel A. Marfo, Ph.D., Professor (Civil and Environmental Engineering; Land, Air and Water Resources)
Patricia L. Mokhtarian, Ph.D., Assistant Professor
Otto G. Roob, Ph.D., Professor in Residence (Civil and Environmental Engineering; Laboratory for Energy-Related Health Research)
Melvin R. Ramey, Ph.D., Professor
Mark K. Rashid, Ph.D., Assistant Professor
Karl M. Romstad, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Edward D. Schroeder, Ph.D., Professor, Academic Senate Distinguished Teaching Award
S. Geoffrey Schlawog, Ph.D., Assistant Professor
Robert Smith, Ph.D., Lecturer
Daniel Sperling, Ph.D., Professor (Civil and Environmental Engineering; Environmental Studies)
Fred Stephenson, M.S., Lecturer
George Tchobanoglous, Ph.D., Professor
Emeriti Faculty

Don O. Bruen, Ph.D., Professor Emeritus
Robert H. Burgh, M.S., Professor Emeritus
James A. Cheney, Ph.D., Professor Emeritus
James R. Hutchinson, Ph.D., Professor Emeritus
Ray B. Krone, Ph.D., Professor Emeritus

206 Engineering: Civil and Environmental

Seminar—1 hour. Prerequisite: graduate student in good standing. Review and discussion of current literature and developments in materials science with presentations by individual students. (SU grading only.)

299. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

399. Research (1-12) I, II, III. The Staff (Chairperson in charge)

Professional Course

390. The Teaching of Materials Science (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated twice for credit. (SU grading only.)

Courses in Engineering: Civil and Environmental (ECI)

Lower Division Courses

1. The Civil Engineer in Society (1) I. The Staff (Chairperson in charge)

Lecture—1 hour. A description of the field of civil engineering and the functions of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/N grading only.)

10. Introduction to Surveying (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, horizontal and vertical curves; astronomical observations and calculations for latitude, longitude, azimuth, and time.

20. Engineering a Better Environment (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: intermediate algebra, and Physics 10 or Engineering 20. Introduction to fundamental concepts and methodologies of environmental engineering. Topics presented include water and air quality, environmental radiation, nuclear and radioactivity, waste management. Students will evaluate environmental issues in written essays and oral discussion. Intended for non-physical science majors. General Education credit: Nature and Environment.

92. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)

Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and lower division standing. (P/N grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; lower division standing. (P/N grading only.)

Upper Division Courses

114. Probabilistic Systems Analysis for Civil Engineers (3) I. Mohammadi

Lecture—3 hours. Prerequisite: Mathematics 31A. Probabilistic concepts and models in civil engineering. Statistical analysis of civil engineering experimental and field data. Introduction to stochastic processes models of civil engineering systems.

131A. Structural Analysis (3) I, II. Romstad

Lecture—3 hours. Prerequisite: Mathematics 21A; Engineering 104B (may be taken concurrently). Open to Engineering students only. Elastic structural analysis of determinate and indeterminate trusses, frames, beams, and frames. Calculation of displacements. Methods of virtual work, moment area, superposition, slope deflection, moment distribution.

131B. Matrix Structural Analysis and Introduction to Finite Element (3) I. Romstad

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B. Open to Engineering students only. Matrix formulation and computer analysis of statically determinate structures. Introduction to finite element methods for elasticity and bending problems.

132A. Structural Design: Metallic Elements (3) I, II. Ramey

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic beams, columns, and other members; analysis and design of bolted and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

132B. Structural Design: Concrete Elements (3) I, II, III. Ramey

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Open to Engineering students only. Elastic and ultimate strength design procedures for columns and rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond.

133. Structural Design: Timber Elements (3) III. Ramey

Lecture—3 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

134. Analysis and Design of Buildings (3) III. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131A, 132A, 132B (may be taken concurrently). Dead and live loading; earthquake and wind forces. Approximate analyses of building frames; concrete building design. Plastic analysis of metal frames.

137. Construction Principles (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in Engineering. A study of the construction industry; its form, evolution, and methods of operation; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

138. Earthquake Loads on Structures (3) I. Romstad


139. Prestressed Concrete (3) I. The Staff

Lecture—3 hours. Prerequisite: course 132B. Principles and methods, analysis and design of sections for bending, interactive computer analysis, ultimate strength of sections. Loss of prestress, shear considerations. Applications to bridges, buildings, and tanks. Special materials properties needed for effective prestressing.

140. Environmental Analysis of Aquatic Systems (3) I. Darby

Lecture—3 hours. Prerequisite: Chemistry 2B or the equivalent. Introduction to chemical principles underlying current practices in sampling and analysis of water and wastewater.

140L. Environmental Analysis of Aquatic Systems Laboratory (1) I. Darby

Laboratory—3 hours. Prerequisite: Chemistry 2B or the equivalent. Introduction to the "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis.

141. Engineering Hydrodynamics (3) III, II. Larock

Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid; flow in pipes; open channel flow; turbulence; fluid forces on objects: boundary layers, lift and drag.

141L. Engineering Hydrodynamics Laboratory (1) I, II. Larock

Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Open to Engineering students only. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.
Chapter 21: Engineering: Civil and Environmental

212A. Finite Element Procedures in Applied Mechanics (3) I. L. Vandehoef
Lecture—3 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128A-128B (128B may be taken concurrently), or consent of instructor. Approximate analysis procedures, Galerkin and stationary principle methods. Construction of appropriate solutions by the finite element method. Applications to one- and two-dimensional problems in engineering, introduction to time dependent, non-linear and three-dimensional problems, and other approximation procedures.

212B. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems (3) I. Herrmann
Lecture—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and non-linear, one-, two-, and three-dimensional problems in continuum mechanics, soil mechanics, and to plate and shell problems.

212C. Finite Elements: Application to Fluid Problems (3) III. L. Jarocki
Lecture—3 hours. Prerequisite: course 141, 212A. Application of the finite element method to two- and three-dimensional hydrodynamic problems, including incompressible and viscous flow, convection-diffusion problems, the shallow water equations, and flow through porous media. Class lectures and independent study and projects. Offered in alternate years.

213. Analysis of Structures Subjected to Dynamic Loads (3) III. R. Novotny
Lecture—3 hours. Prerequisite: courses 138, 211. Analysis of structures subjected to earthquake, wind, and blast loading. Discretization, consistent and lumped mass techniques, development of a computer program for complex structures; nonlinear response spectrum analysis; frequency and time domain analysis.

221. Theory of Plates and Introduction to Shells (3) I. Herrmann
Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of classical and refined plate theories. Application to isotropic, orthotropic, and composite plates. Solutions for rectangular and circular plates. Membrane theory for axisymmetric shells and bending of circular shells.

223. Advanced Topics in Concrete Structures (3) I. Fleury
Lecture—3 hours. Prerequisite: course 132B. Ductility of reinforced concrete, design for torsion of structural concrete; seismic requirements; two-way slabs.

233. Advanced Design of Steel Structures (3) II. Ramaswamy
Lecture—3 hours. Prerequisite: courses 132A and 131A. Design considerations for steel column and frame buckling; steel-plated girder design; steel-concrete composite design; design of connections. Design criteria follows the AISI'S, LRFD, and ASD specifications.

240. Water Quality (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 141 and 142. Quality requirements for beneficial uses of water. Hydrologic cycle of quality, hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Predictive methods, introduction to water quality modeling.

242. Air Quality (3) Y. Chang
Lecture—3 hours. Prerequisite: Engineering 105A; courses 141 and 149, or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction, introduction to dispersion modeling.

243A. Water and Waste Treatment (3) I. Schroeder
Lecture—3 hours. Prerequisite: course 248A. Characteristics of water- and airborne wastes; treatment processes and process kinetics; treatment system design.

243B. Water and Waste Treatment (3) I. Schroeder
Lecture—3 hours. Prerequisite: course 244A. Consent of instructor. Continuation of course 243A.

244. Environmental Quality Modeling (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 240 or 242A. Mathematical models of environmental water quality, with emphasis on mathematical models of quality, their structure, capabilities and limitations, sensitivity and reliability as analytical and/or predictive tools for various purposes.

245. Applied Environmental Chemistry (4) II. Darby
Lecture—4 hours. Prerequisite: Engineering 105A, courses 140 and 140L or the equivalent, Chemistry 2A, 2B, or 2T and 2T7A or 107A recommended. Chemistry of natural and polluted waters. Chemical kinetic and equilibrium principles, thermodynamics, carbonate systems, precipitation and dissolution, coordination chemistry, oxidation reduction, and interfacial phenomena.

246. Pilot Plant Laboratory (3) II. Darby
Lecture—1 hour; laboratory—6 hours. Laboratory investigation of physical, chemical, and biological processes for water and waste water treatment.

247. Airborne Particles and Scavenging Mechanisms (3) I. Raabe
Lecture—3 hours. Prerequisite: course Engineering 105A and 103A, and courses 141, 149. Generation, characterization, and behavior of particles and droplets suspended in gases, including deposition and scavenging of airborne particles in the earth's atmosphere. Former course 242B.

247L. Airborne Particles Laboratory (1) I. Raabe
Lecture—3 hours. Prerequisite: course 243A, 243B. Procedures are presented for the design of natural aquatic and soil-based systems for treatment of municipal and industrial wastewaters. Emphasis is placed on the practical application of principles developed in core courses 243A and 243B plus new information related to natural systems. Offered in alternate years.

248. Design of National Systems for Wastewater Treatment (3) III. Smith
Lecture—3 hours. Prerequisite: courses 243A, 243B. Wastewater treatment processes in the design of wastewater treatment plants; wastewater quality criteria; biological treatment processes; pollution control; and environmental impact. Offered in alternate years.

249. Civil Engineering: A Conceptual Approach (3) I. I. E. The Staff
Lecture—3 hours. Prerequisite: course 141. Sediment materials. Particle suspension by currents, waves, and winds. Modes of transport. Sediment load relations and suspended load relations. Calculation of total loads in streams. Similarity criteria for movable bed models. Stable channel design. Offered in alternate years.

250. Urban Transportation and Land Use Policy and Planning (3) III. McKehnan
Lecture—3 hours. Prerequisite: course 251. Historical and current relationships between transportation and land use. Traditionally land use models. Role of land use in urban transportation modeling. Relationship between energy consumption and urban form. Impact of telecommunications on urban form. Policies involving transportation/fund use relationships.

251. Transportation Demand Analysis (3) I. The Staff
Lecture—3 hours. Prerequisite: course 244A or the equivalent. Detailed discussions of a standard procedure used in urban passenger travel demand forecasting. Principles and assumptions of the model components (trip generation, trip distribution, and modal split). Computer exercises using empirical data to calibrate models and forecast travel demand.

253. Transportation Safety Analysis (3) I. Jovanis

254. Discrete Choice Analysis of Travel Demand (3) III. McKehnan
Lecture—3 hours. Prerequisite: course 114 or the equivalent. Behavioral and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterization of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises on large-scale data sets obtained from home interview surveys.

255. Transportation Survey Methods (3) I. McKehnan
Lecture—3 hours. Prerequisite: course 251 or consent of instructor. Descriptive and inferential survey methods commonly used in transportation demand modeling, including home-interview, travel diary, panel, attitudinal, conjoint, and stated-preference surveys. Discussion of sampling, data collection, and survey design issues. Analysis methods, including factor, discriminant, cluster, conjoint, and stated-preference analysis.

256. Urban Traffic Management and Control (3) II. Jovanis
Lecture—3 hours. Prerequisite: graduate standing. Nature of urban vehicular traffic congestion; roadway capacity; intersection design and traffic signal operations; freeway operations and management; corridor control.

257. Urban Traffic Management and Control II (3) III. Jovanis
Lecture—3 hours. Prerequisite: course 256. Microscopic and macroscopic traffic stream models; traffic signal models; queueing theory applications. Traffic surveillance and detection; traffic forecasting; applications to traffic control systems. Offered in alternate years.

258. Transportation Planning in Developing Countries (3) III. Sperling
Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation investments and policies play in the development of regions and countries. Emphasis on identifying appropriate technologies, policies, and planning methods for designing transportation systems in regions of differing socioeconomic, geographic, and institutional settings. Offered in alternate years.

259. Advanced Highway Technology and Automation (3) I. Jovanis
Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle political and guidance and telecommunications and information systems, and highway electrification. Analysis and evaluation of policy implementation issues, driver response and pricing strategies and costs, and formulation of control theory.

260. Noncohesive Sediment Transportation (3) II. The Staff
Lecture—3 hours. Prerequisite: course 141. Sediment materials. Particle suspension by currents, waves, and winds. Modes of transport. Bed load relations and suspended load relations. Calculation of total loads in streams. Similarity criteria for movable bed models. Stable channel design. Offered in alternate years.

261. Cohesive Particle Transportation (3) III. The Staff
Lecture—3 hours. Prerequisite: course 141. Cohesion; cohesive particulate materials; processes of aggregation and dispersion; aggregate properties; deposition and scour, channel and harbor design and maintenance. Offered in alternate years.

266A. Applied Stochastic Methods in Engineering (3) I. Kavassilikas
268. Applied Stochastic Methods in Engineering
(3) I. Kavvas
Lecture—3 hours. Stochastic differential equations and their applications to the solution of engineering problems. Offered in alternate years.

267. Water Resources Management (3) I, II.
Lund Lecture—3 hours. Prerequisite: basic probability (course 114 or the equivalent) and courses 141 and 142; course 153 recommended. Operation, maintenance, and modification of existing water resource systems; engineering, economic, financial, legal, and institutional considerations; decision, optimization, and multi-objective analysis.

268. Public Works Economics (3) II, III. Lund Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural Economics 148; Economics 1A. Engineering economics applied to public works planning, operations, and maintenance problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Offered in alternate years.

269. Water Supply and Hydroelectric Power Planning (3) II. The Staff
Lecture—3 hours. Prerequisite: courses 142 and 152 or the equivalent. Analysis of drought phenomena and low streamflow; water demand; risk and reliability analysis; conjunctive supply and conservation; planning alternatives. Capacity and energy determination; operations studies; planning alternatives; market requirements and load studies; analysis of system power and supply; regulatory considerations. Offered in alternate years.

270. Advanced Water Resources Management (3) III. Lund
Lecture—3 hours. Prerequisite: courses 153 and 267 or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Offered in alternate years.

271. Water Resources Planning Laboratory (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, economics and principles of plan formulation and plan evaluation in conducting a water resources planning study. Lectures provide instruction on principles and methodology used in the laboratory. Offered in alternate years.

272A. Advanced Groundwater Hydrology (3) I.
Marlo Lecture—3 hours. Prerequisite: course 114 or the equivalent; Mathematics 118A recommended. Flow in confined aquifers; leaky aquifers, hydraulic conductivity of pumping and recharge wells. Identification of aquifer parameters. Groundwater quality problems.

272B. Advanced Groundwater Hydrology (3) III.

273. Water Resources Systems Engineering (3) I.
Marlo Lecture—3 hours. Prerequisite: courses 114 and 153 or the equivalent. Planning, design, and management of water resource systems. Application of deterministic and stochastic optimization techniques. Water allocation, flood control, and design and operation of reservoir systems. Surface water and groundwater management. Offered in alternate years.

274. Hydraulics of Pipe Lines (3) I. Larock
Lecture—3 hours. Prerequisite: course 141; Engineer- ing 124 or equivalent. Operation and flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Manifold flow. Offered in alternate years.

275. Hydrologic Time-Series Analysis (3) I. Kavvas
Lecture—3 hours. Prerequisite: Engineering 118 and course 142 or the equivalent. Application of statistical methods for analysis of hydrologic events. Statistical simulation and prediction of hydrologic sequences using time series methodology. Offered in alternate years.

276. Watershed Hydrology (3) I, II, III.
Larock Lecture—3 hours. Prerequisite: course 142 or the equivalent. Analysis and mathematical modeling of hydrolologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and the kinematic wave approximation. Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope.

277. Unsteady Flow in Surface Waters (3) I. King

278. Hydrodynamics (3) I. Larock
Lecture—3 hours. Prerequisite: course 141. Equations for conservation of mass, momentum, energy, vorticity, circulation; stream function; estimation of wave potentials; flows by superposition and conformal mapping; free streamline analysis, gravity effects; introduction to wave motion. Offered in alternate years.

279. Advanced Mathematics of Fluids (4) I.
Larock Lecture—4 hours. Prerequisite: course 141. Rotational flows; Navier-Stokes equations and solutions for laminar flow; boundary layer equations and similarity techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Offered in alternate years.

280A. Advanced Soil Mechanics (3) I. Idriss
Lecture—3 hours. Prerequisite: course 271. Consolidation and secondary compression. Seepage and seepage pressure. Shear strength; friction, cohesion, dilatancy, and critical states.

280B. Advanced Soil Mechanics (3) I.
Kutter Lecture—3 hours. Prerequisite: course 271A. Site investigation methods; CPT, SPT, pressuremeter, vane; seismic investigation, electrical properties. Slope stability, including seepage pressures and earth-fracture effects. Centrifuge modeling.

280C. Physicochemical Influences and Site Evaluation of Soil Behavior (3) I. Arulandian
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange. Soil-water-electrolyte characteristics and soil structure. Laboratory includes methods of characterization of soils, quantification of soil structure, and rotating cylinder tests to evaluate soil erosion.

280D. Theoretical Soil Mechanics (3) I.

285A. Soil Modification (3) I.
Idris Lecture—3 hours. Prerequisite: course 171. Purposes, principles, and methods of soil modification for various geotechnical applications. Offered in alternate years.

285B. Pavement Systems Design (2) I.
Arulandian Lecture—2 hours. Prerequisite: course 171. Principles and methods of pavement design for highways and airfields. Offered in alternate years.

286. Advanced Foundation Design (3) I.
Idris Lecture—3 hours. Prerequisite: course 173. Design and analysis of foundations; new excavation; tie-back systems; cohesive dams; loads on buried conduits; lateral soil loading capacity; pile foundations; and other related topics.

287. Geotechnical Earthquake Engineering (3) I.
Idris Lecture—3 hours. Prerequisite: course 138, 281A. Characteristics of earthquake ground motions; empirical and deterministic techniques for estimating these motions; local site response; liquefaction potential; residual strength and stability consideration; generation and dissipation of pore water pressures; settlement.

288. Earth and Rockfill Dams (3) I.
Idris Lecture—3 hours. Prerequisite: course 281A, 281B. Site selection; preliminary design considerations; layout; seismic effects including considerations of fault movements; construction instrumentation; maintenance.

288A-I. Selected Topics in Civil Engineering (1-5)
I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of special sections with separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Trauton Junior (PhD) Resources Engineering. May be repeated for credit.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion of current and future research trends and group projects on recent advances. Oral presentation of individual studies. Course required for graduate degree candidates. (SU grading only.)

290C. Graduate Research Group Conference (1) I, II, III. Chairperson in charge.
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (SU grading only.)

295. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

295. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

Professional Course

300. The Teaching of Civil Engineering (1) I, II, III.
The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant or associate-in-a designated engineering course. Methods of leading discussion groups or laboratory sections, written and grading requirements, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (SU grading only.)

Engineering: Computer Science

(College of Engineering)

Peter Linz, Ph.D., Acting Chairperson of the Department
Department Office, 2063 Engineering II
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Faculty
Sergio Alvarado, Ph.D., Assistant Professor
Matthew Bishop, Ph.D., Assistant Professor
Matthew K. Farns, Ph.D., Assistant Professor
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Kenneth J. Joy, Ph.D., Associate Professor
Karl Levitt, Ph.D., Professor
Peter Linz, Ph.D., Professor
Charles U. Martel, Ph.D., Professor
Norman S. Mattoff, Ph.D., Professor
Biswaanath Mukherjee, Ph.D., Associate Professor
Ronda A. Olsson, Ph.D., Associate Professor
Arvin Park, Ph.D., Assistant Professor
Armred E. Priedl, Ph.D., Assistant Professor
Courses in Engineering: Computer Science (ECS)

Lower Division Courses

10. Basic Concepts of Computing (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Not intended for students in physical sciences, engineering, or mathematics. Offered open to credit to students who have completed course 30 or 35, Engineering 5, or former course 30H.

15. Introduction to Computers (4) I, III, IV. Walters
Lecture—3 hours; laboratory—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, other applications, elementary programming concepts, overview of current/projected computer uses. Intended for students in the College of Letters and Science and other non-computer science majors. Not open for credit to students who have completed course 30, 35, Engineering 5 or former course 30H. General Education: Natural Environment.

30. Introduction to Programming and Problem Solving (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to computers and computer programming, algorithm design, running, debugging and testing of well-structured programs. Programming language Pascal will be used to solve problems. Not open for credit to students who have completed course 10, 30, or former course 30H. Only two units of credit allowed for students who have completed Engineering 5.

35. Structure and Interpretation of Computer Programs (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science or Electrical Engineering major, Mathematics 16A or 21A (may be taken concurrently), knowledge of Pascal or C. Mathematical foundations of computer science. Procedural and data abstraction. Design and analysis of algorithms. The Scheme programming language is used. Not open for credit to students who have completed course 10, 30, Engineering 5, or former course 30H. Intended for students who have been introduced to a high-level programming language in high school.

40. Introduction to Software Development (4) I, II, III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or 35. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Application of dynamic data structures. Introduction to programming language C.

50. Computer Organization and Machine-Dependent Programming (4) II, IV. Farrars, Mattof, Park
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Comparative study of different hardware architectures via programming in the assembly language of the central machine. Role of system software in producing an abstract machine. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 70.

89A. Special Topics in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

90X. Lower Division Seminar (2) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: lower division standing. Examination of a special topic in a small group setting.

92. Internship in Computer Science (1-5) I, II, III. The Staff
Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. P/NP grading only.

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

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

Upper Division Courses

100. Discrete Structures (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 21C. Discrete structures and applications to various areas of computer science; mathematical models and mathematical reasoning, sets, relations, functions, methods of counting.


120. Automata Theory and Formal Languages (3) I, II, Linz
Lecture—3 hours. Prerequisite: course 100. Theory of computation; abstract models of digital computers; finite automata, pushdown automata, Turing machines and other models of computation. Formal languages and their relation to programming languages; regular and context-free grammars; parsing and ambiguity.

122A. Algorithm Design and Analysis (3) III, I. Martel, Gusfield
Lecture—3 hours. Prerequisite: courses 100, 110. Complexity of algorithms, bounds on complexity, algorithms for searching, sorting, pattern matching, graph manipulation, combinatorial problems, introduction to NP-complete problems. Not open for credit to students who have taken Computer Science Engineering 122.

122B. Algorithm Design and Analysis (3) I. Gusfield, Martel
Lecture—3 hours. Prerequisite course 122A. Theory and practice of hard problems, and problems with complex algorithmic solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Students do theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms.

140A. Programming Languages (4) I, II. Olsson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Syntax and semantics of programming languages. Introduction to programming language features including variables, data types, data abstraction, scoping, parameter disciplines, exception handling. Comparison of study of several high-level languages. Not open for credit to students who have taken Computer Science Engineering 140.

140B. Programming Languages (4) II. Olsson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel) computing; key implementation issues for those paradigms; and programming language semantics.

142. Compiler III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 120 and 140A; course 160 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of compilers.

150. Operating Systems and System Programming (4) I, II. Levitt, Mattol, Olsson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40, and course 154A or Electrical and Computer Engineering 70; course 154B or Electrical and Computer Engineering 170 strongly recommended. Basic concepts of operating systems and system programming. Processes and interprocess communications: synchronization, virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system.

151A. Operating System Design (4) II. Ruscithka
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 154A or Electrical and Computer Engineering 170. Architectural support of operating system concepts. Systems programming. Major components of an operating system, their functions, and their interactions. Lecture material is closely coupled with a project that involves a machine simulator and the implementation of a matching multi-programming system. Not open to students who have taken Electrical and Computer Engineering 152A.

151B. Operating System Design (4) III. Ruscithka
Lecture—3 hours. Prerequisite: course 151A and an introductory probability course. Contemporary architectures: virtual memory and operating system support functions. Concurrency: processes and the problems of determinacy, mutual exclusion, deadlock, and synchronization. Management of physical and virtual resources. Protection mechanisms. User interface and ease-of-use considerations. Not open to students who have taken Electrical and Computer Engineering 182B.

152. Introduction to Computer Networks (3) I, III. Mattol, Mukherjee

154A. Computer Architecture (4) I, II. Farrars, Mattol, Mukherjee, Park
Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70, and course 110. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for virtual memory system software. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 170.

154B. Computer Architecture (4) I, II. Farrars, Mattol, Park
Lecture—3 hours; discussion—1 hour. Prerequisite: course 154A or Electrical and Computer Engineering 170, and course 110. Hardwired and microprogrammed CPU design. Memory hierarchies. Unpipelined performance analysis. Datapath and program mixes. Introduction to pipelining and multiprocessors.

158. Programming on Parallel Architectures (3) III. Mattol, Farrars, Park
Lecture—3 hours. Prerequisite: course 154B or Electrical and Computer Engineering 170; and course 150 or 151A. Techniques for software development on shared-memory and message-passing architectures. Overview of interconnect architectures, and hardware for memory-access atomics. Load balancing. Efficient use of interconnects and memory.

160. Introduction to Software Engineering (4) I, II. Levitt
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110 and 140A. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming.

*Course not offered this academic year.
165. User/Computer Interfaces (4) III. Joy Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100, 116. Study of the principles of user/computer interaction. User interface management systems including semantics of input devices; transition network and event-based systems; models of interaction, graphical interfaces; implementations; and performance issues and tradeoffs.

165A. Database Systems (4) II. Walters Lecture—3 hours; laboratory—2 hours. Prerequisite: course 165A. Continuation of basic principles of databases, distributed systems; transaction processing; knowledge representation; new database models, including object-oriented; performance evaluation; optimization.

167. Databases in Humanities and Sciences (4) III. Walters Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15 or the equivalent. Introduction for nonmajors to basic principles of databases and management systems; overview of typical commercial database packages; use of database systems in various fields in humanities and sciences; design and implementation of database applications. Not open for credit to College of Engineering students. General Education credit: Nature and Environment.

166. Information Systems (3) I. Walters Lecture—3 hours. Prerequisite: course 40 or the equivalent, upper division standing. Design, creation, implementation, and case study evaluation of information systems. Project-oriented, self-paced implementation of actual information involving survey collection of data, input design, and development of components to exit, sort, and retrieve data. Case study of typical information systems problems. Offered in alternate years.


172. Natural Language Processing (4) I. Alvarado Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 149A recommended. Introduction to computational linguistics. Study of language structures and processes required for computer comprehension of human language. Conceptual analysis based on Conceptual Dependency Theory; scripts, goals, and plans. Theories and implementation of natural language parsers and generating grammars.

175. Computer Graphics (4) I, II, Joy Lecture—3 hours; discussion—1 hour. Prerequisite: course 110, Mathematics 22A. Principles of computer graphics. Current hardware and software, including algorithms in two- and three-dimensional space, transformational geometry, clipping, graphics system design, standard graphics systems. Individual projects.

189A-L. Special Topics in Computer Science (1-5) I, II, III, The Staff (Chairperson in charge) Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Other. May be repeated for credit when the topic is different.

190C. Research Group Conferences in Computer Science (1) I, II, III, The Staff Discussion—1 hour. Prerequisite: upper division standing. Open to students in Computer Science, consent of instructor. Research-group conference. May be repeated for credit. (P/NP grading only.)

203. Senior Seminar (2) I, II, III, The Staff (Chairperson in charge) Seminar—2 hours. Prerequisite: senior standing. Examination of a special topic in a small group setting.

197T. Internship in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge) Internship. Prerequisite: completion of a minimum of 64 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Computer Science (2-3) I, II, III. Walters Discussion—1 hour; laboratory—3-4 hours. Prerequisite: upper-division standing and consent of instructor. Tutoring in computer science courses, especially introductory computing. For upper division undergraduates who will provide tutorial assistance. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

205. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

220. Theory of Computation (3) III. Linz Lecture—3 hours. Prerequisite: courses 120 and 122A. Theory of computation: the notion of effective procedures, computability, Turing machines. Post-symbol manipulation systems, models similar to digital computers, computational complexity and intractable problems.

221. Formal Language Theory (3) III. Linz Lecture—3 hours. Prerequisite: course 220. Definition and properties of formal languages, deterministic context-free languages, context-sensitive languages, abstract families of languages, special topics of current interest.

222A. Design and Analysis of Algorithms (3) I. Gusfield, Marlet Lecture—3 hours. Prerequisite: course 122A; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures, counting and estimating, searching techniques, graph algorithms.

222B. Advanced Design and Analysis of Algorithms (3) III. Gusfield, Marlet Lecture—3 hours. Prerequisite: course 222A. Advanced topics in computational theory. Problem classification. The classes P, NP, PSPACE, NL, co-NP, NC, AC. Searching and network flow algorithms, matrix multiplication, approximation algorithms. Selected advanced topics. (Not open for credit to students who have completed former Electrical Engineering 277B.)

223. Parallel Algorithms (3) II, III. Marlet Lecture—3 hours. Prerequisite: course 222A. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems are studied as well as general techniques for their design and analysis. Lower bounds on parallel computation are proved as well as efficient algorithms.

225. Graph Theory (3) L. Roditty Lecture—3 hours. Prerequisite: graduate standing in electrical engineering or computer science or consent of instructor. Fundamental concepts, vector spaces and graphs, Planar graphs: Whitney's and Kuratowski's theorems, Topological parameterizations, packings and coverings. Connectivity: Menger's theorem. Hamiltonian graphs: Posa's and Chvatal's theorems. Graph factorization: Tutte's theorem. Graph coloring: Brooks' and Vizing's theorems.

226. Computational Algorithms in VLSI (3) I. The Staff Lecture—3 hours. Prerequisite: course 122A, Electrical and Computer Engineering 160A. Application and implementation of VLSI to compute computational algorithms, design and analysis of algorithms for the design of VLSI circuits, VLSI test generation and simulation.

240. Programming Languages (3) III. The Staff Lecture—3 hours. Prerequisite: courses 140A, 142. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and practical programming, introduction to the lambda calculus. Additional topics may include language design principles, alternative programming language paradigms, or in-depth semantic theory.

241. Translation of Programming Languages (3) III. The Staff Lecture—3 hours. Prerequisite: course 240. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation, LR and LALR grammars, Compiler-compiler. (Not open for credit to students who have completed former Electrical and Computer Engineering 276B.)

243. Code Generation and Optimization (3) I. The Staff Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code movement, loop optimization, common subexpression elimination, and peephole optimization. Optimization by program transformation. (Not open for credit to students who have completed former Electrical and Computer Engineering 278C.)

244. Principles of Concurrent Programming (3) I. Olson Lecture—3 hours. Prerequisite: course 100; and course 150 or 151B. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

247. Parallel Languages (3) II. The Staff Lecture—3 hours. Prerequisite: course 240. Language constructs for parallel computation in functional programming, logic-programming, and related languages. Representation and implementation of task spawning and synchronization. Forms of parallelism including explicit vs implicit, AND vs OR, and All-Solutions vs Completeness Choice. Techniques of data flow, suspensions, graph reduction, backtracking, difference lists, etc. Mapping to architectures.

250A. Advanced Computer Architecture (3) I. Matloff Lecture—3 hours. Prerequisite: course 1540B or Electrical and Computer Engineering 170; course 150 or 151A. Introduction to modern research topics and methods in computer architecture. Design implications of memory latency and bandwidth limitations. Performance enhancement techniques, inter-processor and between-processor parallelism. Time project involving student-proposed extension/modifications of work in the research literature.

250B. High-Performance Uniprocessors (3) II. Farrens Lecture—3 hours. Prerequisite: course 250A. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs.

250C. Parallel Processing (3) III. Park Lecture—3 hours. Prerequisite: course 250A. Using parallelism to increase computational speed. Interconnection topologies, parallel programming paradigms, architecture-specific algorithms, synchronization, parallel operating systems.

251. Operating System Models (3) III. Ruschitzka Lecture—3 hours. Prerequisite: course 151B. Introduction to operating system design and verification. A survey of formal models that are used in the study of operating systems. Modeling of parallel processes and their synchronization in terms of practical operating systems and Petri nets. Deterministic and probabilistic models for the evaluation of system performance, and measured performance of operating systems.

252. Local Area Networks (3) II. Mukherjee Lecture—3 hours. Prerequisite: course 152. Local area networks and their protocols, and services. Protocols emphasized on performance modeling. Analysis of multiprocessor, multi-core, co-processors, and random access networks. Also discussed are standards, example products, and recent directions in research.
272. Cognitive Modeling (3) Alvarado
Lecture—3 hours. Prerequisite: courses 172 and 270. Current issues in artificial intelligence emphasizing the modeling and simulation of human performance. Discussion and implementation of current methods, such as knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

273. Automated Deduction (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 172, 175, 265, 271, and 272. Advanced topics in automated deduction. Use of automated deduction systems in the design of computer programs. Offered in alternate years.

275. Advanced Raster Graphics (3) III. Joy
Lecture—3 hours. Prerequisite: course 175. Advanced topics in raster graphics. Hidden surface algorithms, models, and rendering of surfaces, ray tracing models, advanced modeling techniques, anti-aliasing, and animation. Offered in alternate years.

276. Computer-Aided Geometric Design (3) III. Joy
Lecture—3 hours. Prerequisite: course 175; Applied Science Engineering 115 or Mathematics 125. Computer-aided geometric design. Techniques for the design and manipulation of curves, surfaces, and shapes. Symbolic execution techniques suited to iterative programming, methods from denotational semantics, category theory, dynamic logic and proofs of concurrent programs.

278. Formal Specification (3) II. The Staff
Lecture—3 hours. Prerequisite: course 261. Formal specification of modules, and their relationship to top-down programming development and verification. Abstract data types, with methods for specifying data types, implementation, and test procedures for modules. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Offered in alternate years.

281. Database Systems (3) III. Walters
Lecture—3 hours. Prerequisite: course 165A. Data structures and relational databases, data models, query languages, and their implementation, data base security and integrity, and distributed systems.

289L Special Topics in Computer Science (1-5)

290. Seminar in Computer Science (1) I, II, III. The Staff
Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (SU grading only.)

290C Graduate Research Group Conference (1)
I, II. The Staff (Chairperson in charge)
Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (SU grading only.)

288. Group Study (1-5) I, II, III. The Staff
Lecture, laboratory, or combination. Prerequisite: consent of instructor. (SU grading only.)

289. Research (1-12) I, II, III. The Staff
(SU grading only.)

Professional Courses

315. Teaching Computer Science (3) II. Walters
Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: course 110. Fundamentals of instructional methodology applied to teaching computer science, especially at the introductory level. Behavioral objectives, testing methods, course design, evaluation, technology in instruction.

320. The Teaching of Computer Science (1)
I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Computer Science. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, grading laboratory reports. May be repeated for credit. (SU grading only.)
114. Analog Integrated Circuits (3) I, Hurst, Spencer, Current, Lewis. Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110B, 111B, 140B. Analysis and design of analog integrated circuits. Emphasis is on bipolar transistor circuits, single-stage amplifiers, cascaded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers. (Former course 114A.)

118. Digital Integrated Circuits (3) III, Hurst, Current, Okebode. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B, 111B, 140B. Analysis and design of digital integrated circuits. Emphasis is on MOS logic circuit fundamentals, digital systems, functional and electrical characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs. (Former course 145B.)


130B. Introductory Electronics II (4) II, III. Dienes, Fink, Hargitai, Knoesen. Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Plane wave propagation in lossy media; reflections, guided waves, simple modulated waves and dispersion, and basic antennae.


131B. Electromagnetic Fields and Waves (3). Fink, Dienes. Lecture—3 hours. Prerequisite: course 131A or the equivalent. Fiber optics. Helix and slow-wave structures. Wave propagation in media with anisotropic permittivity and permeability, and on plasmas. Traveling wave amplifiers.

131C. Electromagnetic Fields and Waves (3). Fink, Dienes. Lecture—3 hours. Prerequisite: course 131B or the equivalent. Resonant cavities; microwave networks and components, antennae.

132A. High-Frequency Systems, Circuits and Devices (4) I. Fink, Dienes. Lecture—3 hours; discussion—1 hour. Prerequisite: course 132B. Analysis of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

132B. High-Frequency Systems, Circuits and Devices (5) II. Fink, Dienes. Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132A. Passive high-frequency device analysis, design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistors, tunnel diode amplifiers.

132C. RF Amplifiers, Oscillators, Mixers and Antennas (5) III. Fink. Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132B. Amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Analysis and design of linear, loop, waveguide and horns, radiators.


140B. Principles of Device Physics II (4) II, III. Bower, Churchill, Hailey, Hunt, Smith. Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Electrical properties, design, and models of bipolar and MOS field effect transistors.

145A. Solid-State Electronics (3) III. Bower, Churchill, Hailey, Hunt. Lecture—3 hours. Prerequisite: course 140B. Semiconductor device physics, the principal techniques employed in creating device structures, materials for thin film devices, and heterostructure devices.

145B. Solid-State Electronics (3). Fink, Hailey. Lecture—3 hours. Prerequisite: course 140A. Magnetism and superconductivity. Design of devices and their associated circuits utilizing the magnetic and superconducting properties of solids. Magnetic devices studied include masers and magnetic media: disk, tape and bubbles. Superconducting devices studied include Josephson junctions, SQUIDS, and SC microcircuits.

146A. Integrated Circuits Fabrication (3) I, II. Bower, Hunt. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. Basic fabrication processes for metal oxide semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization work together in producing metal-gate transistor circuits which will undergo parametric and functional testing. (Former course 115A.)

146B. Advanced Integrated Circuits Fabrication (3) III, IV. Bower. Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146A. Fabrication processes for CMOS VLSI. Lab projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epitaxial growth, thin gate oxidation, and rapid thermal annealing. (Former course 115B.)

148. Superconductivity (3) III. Fink. Lecture—3 hours. Prerequisite: course 130A and 140A. Fundamental properties of superconductors of the first and second kind, London and Ginzburg-Landau theories, Josephson effects, applications and devices.

150A. Introduction to Signals and Systems I (4) II, III. Abdel-Ghaffar, Ford, Cheng, Levy. Lecture—4 hours. Prerequisite: Engineering 17. Characterization and analysis of continuous-time linear systems. Fourier series and transform, application to communications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems. (Not open to students who have taken Electrical and Computer Engineering 112.)


157A. Control Systems (6) I, II. Dorf, Bundes, Mayne, Wang. Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150A. Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering
174. Microprocessor-Based Instrumentation Systems (4) III. Soderstram
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50, and course 100A or 100B. Typical uses of microprocessors within instrumentation systems are presented and examined in the laboratory. Application of design techniques common to modern instrumentation systems including; transducers, dynamic response, signal conditioning, A/D conversion, data transmission, hardware interfacing, software development, noise and safety. (Not open to students who have taken Electrical and Computer Engineering 150.)

180A. Digital Systems I (5) III, IV. Oklobdzija, Redinbo, Wilken, Akella
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 100 or Engineering 100. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and arithmetic state machine design; computer-aided design (CAD) methodologies and tools. (Not open to students who have taken Electrical and Computer Engineering 176.)

180B. Digital Systems II (5) III, IV. Oklobdzija, Redinbo, Wilken, Akella
Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 10A and 10B. Multi-input/output sequential digital systems: TTL, CMOS, ECL logic elements; analog switch; sample/hold; A-D and D-A converter design; system noise: grounding, shielding, cross-talk, reflection; memory systems; CAD with PL/DPA, CAD with Xilinx FPGA. (Not open to S-PAL students who have taken Electrical and Computer Engineering 177.)

180U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science; (B) Programming Systems; (C) Digital Systems; (D) Communications; (E) Signal Transmission; (F) Digital Communication Utilization and Control Systems; (G) Robotics; (J) Signal Processing; (K) Image Processing; (L) High-Frequency Phenomena and Devices; (L) Solid-State Devices and Electronic Microscopics; (M) Systems Theory; (N) Active and Passive Circuits; (O) Integrated Circuits; (P) Computer Software; (Q) Computer Engineering; (R) Microprocessing; (S) Electronics; (T) Electromagnetics; (U) Opto-Electronics. May be repeated for credit when topic is different.

190C. Research Problems in Electrical and Computer Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: upper division standing in Electrical and Computer Engineering; consent of instructor. Research. May be repeated for credit. (P/NP grading only.)

192. Internship in Electrical and Computer Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Internship—3-15 hours. Prerequisite: completion of a minimum of 80 units; project approval prior to period of internship. Supervised work experience in electrical and computer engineering. May be repeated for credit. (P/NP grading only.)

194A-194B-194C. Micromouse Design Project (2-1-1) I-II-III. Soderstram
Laboratory—3 hours; discussion—1 hour (194A only). Prerequisite: course 70 or Computer Science Engineering 50, and course 100A or Engineering 100 (may be taken concurrently); course 180A (may be taken concurrently). Design of a robotic mouse for the IEEE Micromouse competition. Course offering subject to student demand and availability of resources. May be repeated once for credit. (P/NP grading only. Deferred grading only, pending completion of three-course sequence.)

195A-195B. Student Design Project (2-2) I-II. The Staff
Laboratory—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Design projects and/or contests sponsored by industry. Topics vary; check with department for availability. Course offering subject to student demand/availability of resources. May be repeated once for credit. Limited enrollment. (P/NP grading only. Deferred grading only, pending completion of sequence.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

201. Digital Processing of Signals (4) II. Alagizio, Friedlander, Fore
Lecture—4 hours. Prerequisite: course 150B. Theory and applications of digital processing of signals. Z-transform analysis of discrete-time systems, filter design techniques, structures for discrete-time systems, discrete Fourier transform, and Hilbert transforms.

205. Introduction to Optical Information Processing (3) II. Knoesen
Lecture—3 hours. Prerequisite: courses 220 and 250 recommended. Review of the scalar theory of diffraction and of two-dimensional Fourier transforms, from which the foundations of the frequency analysis of imaging systems will be developed. Image processing will be limited to systems for optical imaging and applications of holography. Introduction to optical computing. Offered in alternate years.

206. Digital Image Processing (4) II. Alagizio, Levy, Reed
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering and restoration, image analysis, and image processing systems.

207. Pattern Recognition and Classification (3) III. Ford, Reed
Lecture—3 hours. Prerequisite: Statistics 120. Topics in statistical pattern recognition and classification: linear decision functions and minimum distance classification, Bayes decision theory, clustering algorithms, the generalized perceptron, multi-layer neural networks, and feature extraction.

208. Image Analysis and Computer Vision (3) III. Alagizio, Levy

209. Image Sequence Processing (3) III. Reed
Lecture—3 hours. Prerequisite: course 106. Basic video concepts and image sequences as spatiotemporal data; three dimensional linear systems; perception of visual motion; enhancement of image sequences; image sequence representation; resolution issues; the computation of motion; image sequence compression.

210. Analog Circuit Design (3) I. Spencer, Current, Hurst, Lewis
Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B, and 140B. Analysis and design of amplifiers, bias circuits, voltage references and other analog circuits. Feedback and compensation of linear amplifiers. Computer-aided analysis is used extensively.

211. Advanced Analog Circuit Design (3) II. Spencer, Current, Hurst
Lecture—3 hours. Prerequisite: course 210; Statistics 131A or the equivalent recommended. Noise in electronic circuits and systems. Distortion analysis; the translinear principle and its application to circuit analysis and synthesis; phase-locked loops and their applications.

212. Analog MOS IC Design (3) II. Hurst, Lewis
Lecture—3 hours. Prerequisite: course 210. Analysis and design of analog MOS integrated circuits. Passed
sive components, single-ended and fully differential op amps, sampled-data and continuous-time filters.

213. Data-Conversion Techniques and Circuits (3) II. Lewis, Current, Hunt, Spencer

Lecture—3 hours. Prerequisite: course 210. Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits.

*214A. Computer-Aided Circuit Analysis and Design (3) I. Haley, Current

Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B; knowledge of FORTRAN or C. Network equation formulation, solution of linear dc and linear ac circuit analysis. Calculation of dc and ac network sensitivities. Extensive computer project.

*214B. Computer-Aided Circuit Analysis and Design (3) II. Current, Haley

Lecture—3 hours. Prerequisite: course 214A. Transient (time-domain) analysis; harmonic analysis; steady-state analysis; time-domain network sensitivities, ac, dc, transient gradient calculations, design optimization. Extensive computer project.

215A. Introduction to VLSI Design (3) I. Current, Hunt. Oklobdzija, Spencer

Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design. All students to undertake a VLSI design example.

216B. Multiprocessor Chip Design (3) I. Current, Hunt. Oklobdzija, Spencer

Laboratory—3 hours. Prerequisite: course 216A. CMOS and NMOS, multiprocessor chip layout projects of present and older projects in course 216B, and 218 and 219 are assembled and submitted to the DARPA/NSF MOSIS program for fabrication.


Laboratory—3 hours. Prerequisite: course 216A and 216B. Chips submitted in course 216B are tested and evaluated. Issues involving design of ICs for testability are discussed.

219. Advanced Digital Circuit Design (3) III. Hust, Current, Spencer

Lecture—3 hours. Prerequisite: course 118 or 216A. Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic.

*221. Passive Filter Design (3) I. Soderstrand

Lecture—3 hours. Prerequisite: courses 100 and 102A, Introduction to passive filter design. Design of passive filters with lumped and distributed elements. Filter specification and design process, approximation theory, modern doubly terminated reactance, two-port synthesis, passive filters with R, C, and R, C elements, crystal and ceramic filters, mechanical filters.

*222. Active Filter Design (3) II. Soderstrand, Current, Haley

Lecture—3 hours. Prerequisite: course 221 recommended. Introduction to the design of active filters with lumped elements and switches. Active filters with lumped RC elements, active-R networks, and switched capacitor filters.

226. Lasers (3) II. Dienes, Heritage

Lecture—3 hours. Prerequisite: course 130B or the equivalent, and course 231. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiconducting oscillator model and rate equations. Description and design of real laser systems. Offered in alternate years.

*228B. Advanced Lasers (3) II. Dienes, Heritage


*227A. Microwave Electronics (3) I. The Staff

Lecture—3 hours. Prerequisite: courses 130B and 140B. Theory of microwaves, waveguides and cavities. Interaction between electromagnetic fields and the conducting boundary of a waveguide. Leaky waves and propagation in waveguides. Loss mechanisms and design of resonators. Comparison between conventional and microwave tubes and other new types of microwave oscillators and amplifiers. Offered in alternate years.

*227B. Microwave Electronics (3) II. The Staff

Lecture—3 hours. Prerequisite: course 227A or the equivalent. Theory of interaction between electromagnetic fields and the electronic charge, with applications to electron beam and space-charge wave propagation in microstructures, density, velocity and density modulation, space charge wave propagation in klystrons. Parametric amplifiers, tunnel and IMPATT diodes, Gunn oscillators. Offered in alternate years.

228. Advanced Microwave and Antenna Design Techniques (3) II. Banner

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 132B or 131B. Design, fabrication, analysis of advanced microwave devices, antennas. Includes FET amplifiers, broadband microstrip and stripline filters, hybrids, beamformers, tapered networks. Yole's broadband matching theory applied to microwave design. Microwave passive device design, analysis of horns, microstrip, log periodic, arrays, spirals and reflectors. Offered in alternate years.

230. Electromagnetics (3) I. Dienes, Fink

Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, waveguides, waves in anisotropic media, propagation in dispersive media, laser beams and resonators.

231. Photonics (3) I. Dienes, Fink, Kooszen

Lecture—3 hours. Prerequisite: course 130B or the equivalent; course 230 recommended. Introduction to opto-electronics, including ray optics, wave optics, beam optics, resonators, couplers, pulse propagation in dispersive media, electro-optical modulation and detection. Offered in alternate years.

*232A. Advanced Applied Electromagnetics I (3) II. Banner

Lecture—3 hours. Prerequisite: course 131B or 132B. The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Offered in alternate years.

*232B. Advanced Applied Electromagnetics II (4) III. Brannoe

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 131B or 132B. Advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Offered in alternate years.

233. Nonlinear Optical Applications (3) III. Kooszen, Dienes, Herbert

Lecture—3 hours. Prerequisite: course 130B or the equivalent; course 230 recommended. Nonlinear optical interactions have important applications in optical information processing, telecommunications and integrated optics. The basic concepts underlying optical nonlinear interactions in materials and in guided media are presented. Offered in alternate years.

240. Semiconductor Devices (3) I. Churchill, Bower, Hunt

Lecture—3 hours. Prerequisite: course 140B. Physical principles, characteristics and models of various semiconductor devices, including P-N junction and metal-insulator semiconductor diodes, junction and insulated gated field effect transistors. Not open for credit to students who have completed former course 220.

245A. Applied Solid-State Physics (3) II. Fink, Churchill, Haley, Hunt

Lecture—3 hours. Prerequisite: course 140B, Physics 115A. Physics of solids relevant to solid-state applications. Topics include atomic structure of solids, quantum theory of electronic and vibrational states in crystals, electron dynamics, and transport theory. Offered in alternate years.

245B. Applied Solid-State Physics (3) III. Churchill, Hunt, Haley

Lecture—3 hours. Prerequisite: course 245A. Theory and application of magnetism and superconductivity. Topics in magnetism include paramagnetism, ferromagnetism, magnetic resonance, and superconductivity. Properties of magnetic elements. Topics in superconductivity include basic superconducting phenomena, Ginsburg-Landau theory, Josephson junctions, SQUIDS, and SC microcircuits.

*245C. Applied Solid-State Physics (3) III. Haley

Lecture—3 hours. Prerequisite: course 245A. The physics of solids and quantum-confined systems relevant to applications of fundamental optical physics. Topics include elementary excitations, radiative and non-radiative recombination, high-density excitation, stimulated emission, and excitonic effects in bulk material as well as quantum wells, wires, and boxes. Offered in alternate years.

246. Advanced Projects in IC Fabrication (3) I. Current, Hunt, Spencer, Smith

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. (Former course 215.)

247. Advanced Semiconductor Devices (3) I. Churchill, Bower, Hunt

Lecture—3 hours. Prerequisite: course 245B. Physics of some semiconductor devices, including metal-oxide-semiconductor field-effect transistors (MOSFETs), IMPATT and related transit-time diodes, transferred-electron devices, light-emitting diodes, semiconductor laser diodes, phototransistors, and solar cells. Offered in alternate years.

*248. Microsensor Design and Fabrication (3) III. Smith, Bower

Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and manufacture of microsensors and microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microsensors, and design of microsensor systems, including packaging. Offered in alternate years.

249. Microfabrication (3) III. Hunt

Lecture—3 hours. Prerequisite: graduate standing in Engineering. Theory and practices of several major technologies of microfabrication, used for producing integrated circuits, sensors, and microstructures. Major topics include sputtering, chemical vapor deposition, plasma processing, micromachining, and ion implantation. Offered in alternate years.

250. Linear Systems and Signals (4) I. Wang, Chang, Levy


251. Nonlinear Systems (3) III. Gundersen

Lecture—3 hours. Prerequisite: course 250. Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques.

252. Multivariable Control System Design (3) III. Mayne, Wang


253. Adaptive Systems (3) I. Hsia

Lecture—3 hours. Prerequisite: course 150B; course 250 (may be taken concurrently.) Theory and practice of adaptive systems. Concepts of learning and adaptation. Structure of adaptive filters and the related parameter adaptive algorithms. Applications to system identification, adaptive signal processing and adaptive control.

255. Robotic Systems (3) I. Hsia, Wang

Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design.

*Course not offered this academic year.
Gundes
Lecture—3 hours. Prerequisite: course 250. Analysis and synthesis of feedback control systems using a factorization approach. Q-parametrization, all stabilizing controllers, all achievable input-output maps. Robustness analysis. Tracking and disturbance rejection. Offered alternate years.

257. Topics in Optimization (3) Ill. Chang, Mayne
Lecture—3 hours. Prerequisite: graduate standing. Advanced topics in the theoretical foundations of optimization, including linear and non-linear programming, convex analysis, duality theory, conjugate gradient methods, and interior point methods. Applications to engineering and economics. Offered alternate years.

258A. Optimization I (3) Ill. Chang, Mayne
Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C. Modeling optimization problems existing in engineering design and other applications, optimization conditions, linearity and unconstrained optimization (gradient, Newton, conjugate directions and minimax algorithms), convergence and rate of convergence, selected topics. (Same course as Mathematics 258A.)

258B. Optimization II (3) Ill. Chang, Mayne
Lecture—3 hours. Prerequisite: course 258A. Modeling constrained optimization problems existing in engineering design and other applications, optimality conditions, duality and Lagrangean multipliers, sequential quadratic programming, selected topics. (Same course as Mathematics 258B.)

259. Optimal Control, Theory and Algorithms (3) Ill. Chang, Mayne
Lecture—3 hours. Prerequisite: graduate standing. Optimal control and calculus of variations; existence of solutions to optimal control problems; necessary conditions of optimality; Pontryagin maximum principle, Euler equation; sufficient conditions of optimality. Hamilton-Jacobi-Bellman equation, linear quadratic regulator problem, algorithms for unconstrained and constrained optimal control problems. (Same course as Mathematics 259.)

260. Random Signals and Noise (4) II. Gardner
Lecture—3 hours; discussion—1 hour. Prerequisite: Statics 120, course 150A; course 250 recommended. Probability, probability distributions as probability densities for signals and noise. Review of probability, random variables, and expectations. Study of correlation function and spectral density, ergodicity and duality between time averaging and ensemble averaging. Examples of expected values, filters and dynamical systems. Applications.

262. Spectral Analysis (4) II. Gardner

263. Optimal and Adaptive Filtering (3) Ill. Friedlander, Gardner, Levy


265. Information Theory and Coding (3) II. Alagapi, Abdel-Ghaffar
Lecture—3 hours. Prerequisite: Statistics 120. Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, error correction.

266. Cellular Digital Mobile Communications (3) I. Feher

267. Digital Modulation Techniques (3) I. Feher
Lecture—3 hours. Prerequisite: course 267. MODEM (modulator-demodulator) signal processing and complete radio transmitter/receiver analysis and design for digital cellular mobile radio satellite, microwave, and cable systems. Study of advanced modulation techniques, including QPSK, GMSK, coded QAM, and spread spectrum/CDMA. Computer-aided and hardware design of advanced communications and synchronization systems.

268. Error Correcting Codes (3) II. Abdel-Ghaffar
Lecture—3 hours. Prerequisite: Mathematics 22A. Introduction to coding theory, finite fields, linear codes, cyclic codes, BCH codes, RS codes and their decoding algorithms, convolutional codes.

270. Computer Architecture (3) II. Redinbo, Oklobzija, Wilken
Lecture—3 hours. Prerequisite: course 170, 180A. Emphasis on quantitative analysis of design trade-offs, optimization of resource usage, formal descriptive models, and interactions between architecture and software.

271. Advanced Digital System Design (4) II. Oklobzija
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 170, 180B. Topics in advanced design of arithmetic processors, high-speed addition, multiplication, and division. Floating point processors. Pipeline processors. Laboratory involving design and construction of several example systems.

273. Bit-Slice Microprogramming CISC and RISC Systems (4) II. Oklobzija
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 172, 180B, 270. Microprogramming technique for the design of control unit of CPU for CISC (Complex Instruction Set Computer) and RISC (Reduced Instruction Set Computer) based systems; hardware simulation of RISC-based systems. Offered in alternate years.

274. Parallel Computer Architectures (3) II. Oklobzija, Redinbo
Lecture—3 hours. Prerequisite: course 270. Use of parallelism to achieve high performance levels. Within-CPU parallelism, through pipelining, Multiple-CPU parallelism, through array processors and multiprocessors. Offered in alternate years.

275A. Introduction to Fault-Tolerant Computing (3) II. Wilken
Lecture—3 hours. Prerequisite: course 170, 180A. Introduces fault-tolerant computing and testing. Covers recent and classic fault-tolerance techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability analysis, and example fault-tolerant architectures.

276B. Introduction to Digital Fault Diagnosis (3) II. Redinbo
Lecture—3 hours. Prerequisite: course 180A. Statistics 120 or 131A. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, ED testing and analysis of the effects of intermittent faults. Offered in alternate years.

277. Real-Time Multiprocessor/Multitasking System Design (5) III. Oklobzija
Lecture/discussion—2 hours, laboratory—9 hours. Prerequisite: course 170, 180B. Computer Science Engineering 150. Real-time system design using multiple 16-bit microprocessors. System development and simulation through IBM/AT driven STD-Bus system, and Intel's RIMX286 development system. Bus arbitration, design of bus masters executive, and system design with RIMX289 real-time multitasking operating system. Offered in alternate years.

278. Computer Arithmetic for Digital Implementation (3) II. Redinbo
Lecture—3 hours. Prerequisite: course 170, 180A. The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Offered in alternate years.

279. Artificial Neurons and Applications (4) I.
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: courses 108, 207. Biological neuron, artificial neuron modelling and implementation, adaptive learning algorithms, applications to pattern recognition. Offered in alternate years.

280. Advanced Logic Design (3) I. Oklobzija
Lecture—3 hours. Prerequisite: course 180B. Logic design of complex and high-performance systems. Timing, clock generation and distribution. High-performance latch design. Pipelining, pipeline operations and hazard resolution. Complex control unit design. Use of FPGAs. Design methodology and CAD tools.

288U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

290. Seminar (1) I. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion and presentation of current research and development. (SU grading only.)

290C. Graduate Research Group Conference in Electrical and Computer Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. (SU grading only.)

291. Solid-State Circuit Research Laboratory Seminar (1) III. The Staff (Spencer in charge)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state circuits and system design by various visiting experts in the field. (SU grading only.)

292. Seminar in Solid-State Technology (1) III. The Staff (Churchill in charge)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state devices and circuit design by various visiting experts in the field. (SU grading only.)

294. Image, Video, and Computer Vision Research Seminar (1) III. Alagapi
Seminar—1 hour. Prerequisite: graduate standing. Lectures, tutorials, and seminars on image processing, video engineering, and computer vision. (SU grading only.)

*Course not offered this academic year.
Engineering: Mechanical and Aeronautical

(Graduate Program)

Allan A. McIlhagga, Ph. D., Chairman of the Department
Ronald A. Hess, Ph.D., Vice Chairperson of the Department

Department Office, 2132 Bailer Hall (916-752-6680)

Faculty

Ralph C. Aldredge III, Ph.D., Assistant Professor
James W. Baughn, Ph.D., Professor (Aeronautical Science and Engineering)
Harry Brandt, Ph.D., Professor
John W. Brewer, Ph.D., Professor
Vincent R. Capeo, Ph.D., Assistant Professor
Jean-Jacques Chott, Ph.D., Professor
Harry H. Cheng, Ph.D., Assistant Professor
Harry A. Dwyer, Ph.D., Professor (Aeronautical Science and Engineering)
Fidelio O. Elle, Ph.D., Assistant Professor
Andrew A. Frank, Ph.D., Professor
Mohamed M. Haife, Ph.D., Professor (Aeronautical Science and Engineering)
Jerald M. Henderson, Engr., Professor (Food Science and Technology)
Ronald A. Hess, Ph.D., Professor (Aeronautical Science and Engineering)
Myron A. Hoffman, Prof., Professor
Mont Hubbard, Ph.D., Professor (Aeronautical Science and Engineering)
Maury L. Hull, Ph.D., Professor
Dean C. Kamopp, Ph.D., Professor
Ian M. Kennedy, Ph.D., Professor
Wolfgang Kollmann, D-Ing., Professor (Aeronautical Science and Engineering)
Ronald L. Margolis, Ph.D., Professor
Alban A. McIlhagga, Ph.D., Professor
Bahram Ravani, Ph.D., Professor
Lawrence W. Reithief, Ph.D., Professor (Aeronautical Science and Engineering)
Nesrin Sarigul-Klin, Ph.D., Associate Professor (Aeronautical Science and Engineering)
Benjamin D. Shaw, Ph.D., Assistant Professor
S. Antony Snell, Ph.D., Assistant Professor (Aeronautical Science and Engineering)

Courses in Engineering: Mechanical (EEM)

(Courses in Mechanical Engineering (EEM) are listed below; courses in Aeronautical Science and Engineering (EAE) are listed immediately following.)

Lower Division Courses

1. Mechanical Engineering (1-10) I, II, III. The Staff (Chairperson in charge)
   Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications. Focus on the practice with respect to engineering principles, ethics and responsibilities. (P/NP grading only.)

   The Staff
   Discussion—2 hours; laboratory—3 hours. Restricted to Mechanical, Aeronautical, and Materials Science Engineering majors. Introduction to modern manufacturing methods and computer-aided manufacturing and their roles in engineering design and development process.

29. Internship in Mechanical Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
   Internship. Prerequisite: lower division standing. Approval of project in progress prior to period of internship. Supervised work experience in engineering. May be repeated for credit. (P/NP grading only.)

30. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
   Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

134. Vehicle Stability (4) III. Margolis
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102, 103B (may be taken concurrently). Restricted to Mechanical and Aeronautical, and Materials Science majors and Majors in Biomedical and Bioengineering majors. The principles of engineering mechanics applied to fundamental aspects of mechanical design. Theories of statics and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware.

150. Mechanical Design (3) I, II. Frank, Velinsky
   Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Mechanical and Aeronautical Engineering majors. Principles of mechanical design. Failure theories and fatigue theory applied to design and selection of mechanical components. Design projects which concentrate on design, engineering analysis, methods of manufacture, material selection and cost. Introduction to computer-aided design.

151. Statistical Methods in Design and Manufacturing (3) I. Ravani
   Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing quality control. Applications include product evaluation and decision making, probabilistic design, methods of sampling inspections and control charts.

152. Computer-Aided Mechanism Design (3) I. Chang
   Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5 or the equivalent or Engineering 36. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms.

153. Introduction to Machining of Material (3) II. Yamazaki
   Lecture—3 hours. Prerequisites: Engineering 36, 45, 104B, and course 50. Material removal characteristics, kinematics and dynamics of material removal processes such as metal cutting, grinding, non-traditional machining such as EDM and laser cutting, and quality in machining. The lecture is accompanied by live demonstration of the technology.

161. Combustion and the Environment (4) I. Kennedy
   Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Introduction to combustion kinetistics; the theory of premixed flames and diffusion flames; turbulent combustion; formation of air pollutants in combustion systems; examples of combustion devices which include internal combustion engines, gas turbines, furnaces and waste incinerators; alternative fuel sources.

162. Modern Power Systems (4) I. Hoffman
   Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different powerplant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific powerplants.

165. Fundamentals of Heat Transfer (4) I, II.
   Dwyer, McIlhagga
   Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B. Introduction to thermal analysis; the theory of premixed flames and diffusion flames; turbulent combustion; formation of air pollutants in combustion systems; examples of combustion devices which include internal combustion engines, gas turbines, furnaces and waste incinerators; alternative fuel sources.

171. Analysis, Simulation and Design of Dynamic Systems (4) I, II. Kamopp, Snell
Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control system design using time and frequency domain methods. State space techniques.

Lecture—3 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 36; restricted to Aeronautical and Mechanical Engineering and Materials Science students. Theory of measurements; measurement tools for mechanical systems; transducers; data manipulation and processing; data digitization.

184A. Mechanical Engineering Design Project (2) II, III. The Staff
Laboratory—6 hours. Prerequisite: senior standing in Mechanical Engineering, consent of instructor (enrollment preference to students who have not taken any of course series, 184-188). Performance of a major design project which includes design and possible development and evaluation of mechanical engineering system.

184B. Mechanical Engineering Design Project (2) II, III. The Staff
Laboratory—6 hours. Prerequisite: course 184A in a previous quarter from the same instructor, consent of instructor. Performance of projects which include design and possible development and evaluation of a mechanical engineering system.

185. Mechanical Systems Design Projects (4) III. Henderson
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-186). Design of mechanical systems. Engineering case studies will help to illustrate the engineering design process and its use in design of engineering systems. Grading based on individual contributions to projects. Limited enrollment.

186. Thermal Systems Design Project (4) III. Aldridge
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165; senior standing in Mechanical Engineering or Physics (enrollment preference to students who have not taken any of course series, 184-186). Design of a thermal system such as a power plant or engine, including consideration of engineering and economic factors. Students will design and simulate individual contributions to projects. Limited enrollment.

187. Control Systems Design Project (4) III. Frank
Lecture—3 hours; discussion—1 hour. Prerequisite: course 172; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of dynamic engineering systems. Formulation of goals, mathematical modeling of plant, consideration of passive, open loop, and closed loop control solutions. Hard work and performance considerations. Grading based on individual contributions to projects.

188. Vehicle Systems Design Project (4) III. Frank
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of vehicular systems, including components, and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

192. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)
Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/N grading only.)

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

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

Graduate Courses

205. Thermal Radiation (3) II. Brandt
Lecture—3 hours. Prerequisite: one 165 or consent of instructor. Transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems. Offered in alternate years.

206. Experimental Methods in the Thermal Sciences (3) I. Baughn
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Course design, statistics uncertainty analysis. Steady-state and transient temperature measurement; steady-state flow and pressure measurements. Offered in alternate years.

208B. Experimental Methods in Fluid Mechanics and Combustion (3) III. Kennedy
Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: courses 165 and 103B. Application of shadow, schlieren and other flow visualization methods. Introduction to optics and lasers. Measurement of velocity and concentration in reacting and non-reacting flows with laser diagnostic techniques including LDV, Rayleigh, Raman and fluorescence scattering and CARS. Offered in alternate years.

210A. Advanced Fluid Mechanics and Heat Transfer (4) I. Hoffmann
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, course 165. Development of differential equations governing convection, momentum, mass, and energy with emphasis on laminar flow for exact cases, low and high Reynolds numbers and turbulency theory. Dynamics of inviscid flow.

210B. Advanced Fluid Mechanics and Heat Transfer (4) II. Kollmann
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A. Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer.

211. Fluid Flow and Heat Transfer Design (4) II. Hoffmann
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A (may be taken concurrently) or consent of instructor. Design aspects of selected topics such as heat conduction, thermal stress, fire, heat transport in ducts, boundary layers and separated flows; impingement and film cooling; heat exchangers; flow in diffusers, flow over airfoils and blades. Offered in alternate years.

212. Advanced Heat Transfer with Phase Change (4) III. Hoffman
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210B. Study of complex phenomena occurring in two-phase flow, boiling and condensation. Development of fundamental relations. Use of these relations with experimental data to develop semi-empirical working relations; application to various energy systems and power plant problems. Offered in alternate years.

213. Advanced Turbulence Modeling (4) III. Kollmann
Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbulence; kinematics and dynamics of homogeneous turbulence; Reynolds stress and heat-flux equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Offered in alternate years.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A and Aeronautical Science Engineering 233, or consent of instructor. Application of numerical algorithms to fluid flows involving heat and mass transfer for mechanical and aeronautical applications. Applications to pipe flows; high Peclét number heat transfer; laminar and turbulent combustion; and solution of Navier-Stokes equations. Offered in alternate years.

216. Advanced Thermodynamics (4) I. Kennedy
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105B. Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics and quantum statistical theory of non-equilibrium, non-reacting, chemically reacting gases, gas mixtures, and other substances. Offered in alternate years.

217. Combustion (4) II. Aldridge
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Review of chemical thermodynamics and chemical kinetics. Discussions of reacting flows, their governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, or the equivalent. Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall powerplant performance for one advanced concept such as a fusion, magneto-hydrodymic, or solar electric powerplant. Offered in alternate years.

220A-220B. Mechanical Vibrations (3-3) II-III. Kannop
Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibration.

222. Advanced Dynamics (3) I. Kannop
Lecture—3 hours. Prerequisite: Engineering 102. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

223A. Multibody Dynamics (4) II. Hubbard
Lecture—3 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructor. Dynamics of coupled rigid bodies; multibody kinematics; multibody kinetics; extraction of information from dynamical equations; linearization stability of motion; numerical methods in dynamics; computer simulations.

223B. Multibody Dynamics II (4) II. Hubbard
Lecture—3 hours; discussion—1 hour. Prerequisite: course 223A. Advanced topics on the dynamics of coupled rigid bodies; multibody kinematics; multibody kinetics; extraction of information from dynamical equations; linearization stability of motion; numerical methods in dynamics; computer simulations.

224. Kinematic Design of Mechanisms (3) II. Dwyer
Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Beezer'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-point curves. Graphical and computer methods for kinematic design. Offered in alternate years.

225. Spatial Kinematics and Robotics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 222. Spatial kinematics: point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: solving for kinematic equations; differential relationships; motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in alternate years.

226. Acoustics and Noise Control (3) I. Margolis
Lecture—3 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound propagation in enclosed spaces; sound transmission through barriers; applications in design of mufflers, acoustic enclosures, room acoustics, design of quiet machinery. Offered in alternate years.
227. Research Techniques in Biomechanics (4 I) Williams, Hawkins; Lecture—2 hours; laboratory—4 hours; term paper/course project—1 hour. Prerequisite: consent of instructor; Physical Education 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data collection and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227/Physical Education 227.)

231. Musculo-Skeletal System Biomechanics (3) III, Hui; Lecture—3 hours. Prerequisite: course 176 and Engineering 102. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. Offered in alternate years. (Same course as Biomedical Engineering 231.)

232. Skeletal Tissue Mechanics (3) III, Marin; Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disease. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Biomedical Engineering 232.)

243. Design and Dynamics of Road Vehicles (3) II, Hull; Lecture—2 hours; discussion—1 hour, laboratory—3 hours. Prerequisite: course 172. Studies of techniques required for designing the electromechanical system which consists of the mechanism and the electronics-based sophisticated control. Methodologies for designing the microprocessor applied control hardware and dedicated software, applying electric and dedicated software, and applying electric actuator and sensors with its theoretical background.

250. Computer-Aided Design and Manufacturing (3) III, Raji; Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 160 and course 150B. Proficiency in a high-level programming language such as FORTRAN, Pascal, APL. Skills of computational and computer graphic techniques in design and manufacturing. Use of nonnumerical and non-numerical computations and geometric tools in design and manufacturing.

270. Modeling and Simulation of Engineering Systems (3) I, Margolis; Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Multisport models of mechanical, electrical, hydraulic and thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; formulation for analog and digital simulation; identification; instrumentation, approximate models of distributed systems.

271. Design of Multivariable Control Systems (3) II, Margolis; Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Modern methods of state variable feedback applied to control system design. Introduction to observers and equivalent dynamic feedback. Stress on practical application of theory to engineering systems in various energy domains.


274. Analysis and Design of Digital Control Systems (4) III, Hess; Lecture—3 hours; discussion—1 hour. Prerequisite: course 172. Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effects.

276A. Digital Data Acquisition and Analysis (3) I, Gibling; Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Application of microcomputers and mini-computers to data acquisition and control. Topics include computer organization, hardware for laboratory applications, control fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, and basic data analysis.

276B. Digital Data Acquisition and Analysis (3) III, Hull; Lecture—3 hours. Prerequisite: basic course in probability and statistics. Engineering 180 or the equivalent, and either course 176 or 172. Theory and application of modern techniques in digital data analysis. Topics include statistical description of data, convolution and correlation, and frequency analysis using the discrete Fourier transform. Emphasis on applying these techniques in the experimental characterization of linear dynamic systems. Offered in alternate years.

277. Computer-Aided Design of Nonlinear Dynamic Systems (3) III; The Staff; Lecture—2 hours; discussion—1 hour. Prerequisite: courses 270, 271. Application of bond graph modeling and control system design principles. The bond graph processor programs ENPORT and CAMP are used with advanced continuous system control programs to simulate the dynamic response of engineering systems.

280. Advanced Engineering Analysis (3) I, Brandt; Lecture—3 hours. Prerequisite: Engineering 180 or equivalent. Applications in mechanics engineering of advanced analytical and numerical techniques. Topics include stability analysis, classification of differential equations, and advanced numerical methods.

290C. Graduate Research Conference (1) I, II, III; The Staff (Chairperson in charge); Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in mechanical engineering research. May be repeated for credit. (SU grading only.)

295. Design Seminar (1) I, III; The Staff; Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current mechanical engineering design literature and projects with presentations by students and faculty. (SU grading only.)

296. Fluid and Thermal Sciences Seminar (1) I, II, III; The Staff; Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. (SU grading only.)

297. Dynamic Systems and Control Theory Seminar (1) I, II, III; The Staff; Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in system theory and automatic control with presentations by individual students. (SU grading only.)

298. Group Study (1-3) I, II, III; The Staff (Chairperson in charge); Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III; The Staff (Chairperson in charge); Prerequisite: consent of instructor. (SU grading only.)

Professional Course

300. The Teaching of Mechanical Engineering (1) I, II, III; The Staff (Chairperson in charge); Seminar—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion, groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (SU grading only.)

Courses in Aeronautical Science and Engineering (EAE)

Lower Division Course


98. Special Study for Undergraduates (1-5) I, II, III; The Staff (Chairperson in charge); Prerequisite: consent of instructor and lower division standing. (FPN grading only.)

Upper Division Courses

126. Theoretical and Computational Aerodynamics (4) I, Hafez; Lecture—3 hours; discussion—1 hour. Prerequisite: course 25; Engineering 103B; Engineering 180 or Applied Science Engineering 115 or Mathematics 129C. Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design.


130. Aircraft Preliminary Design (4) III, van Dam; Lecture—2 hours; discussion—1 hour, laboratory—3 hours. Prerequisites: courses 126 and 129. Aircraft preliminary design including estimation of weight/ volume, aerodynamics, performance, stability and control. Design iteration and trade-off studies.
131. Aircraft Flight Performance Laboratory (3) III.
Baughn
Lecture—1 hour; discussion—1 hour; laboratory—3 hours.
Prerequisite: courses 25 and 128. Measurements and analysis of aircraft characteristics and performance, in flight and in flight simulator.

133. Introduction to Aircraft Structures (3) III.
Sargulski
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104B. Open to Engineering students only. Introduction to the aerospace structural design process. History of aircraft materials. Details of aircraft structural components. Thin-walled structural members. Matrix methods of aerospace structural analysis. Application of finite element methods to aircraft and space frame structures.

135. Aerospace Structures (3) III. Reifelder
Lecture—3 hours; discussion—1 hour. Prerequisite: course 133. Analysis and design methods used in aircraft structures. Shear flow in open, closed, and multi-cell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling.

137. Structural Composites (4) II. Reifelder
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of materials and technology for creating structures from fiber-reinforced resin matrix composite systems. Matrix design analysis and case studies emphasizing aeronautical applications.

138A. Aircraft Propulsion (4) II. Capace
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103B, 105B. Analysis and design of modern aircraft gas turbine engines. Development and application of cycle performance prediction techniques for important engine configurations. Introduction to the operation and design of inlets, compressors, burners, turbines, and nozzles. Cycle design studies for specific applications.

139. Introduction to Aerelasticity (4) III. Sargulski
Klijn

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

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

Graduate Courses

230. Advanced Aerodynamics-Inviscid Flow (4) II. Hafez
Lecture—4 hours. Prerequisite: courses 126, 127.
Inviscid theory. Nonlinear effects in subsonic and supersonic flows. Transonic aerodynamics. Offered in alternate years.

232. Advanced Aerodynamics-Viscous Flow (4) I. Dever
Lecture—4 hours. Prerequisite: Engineering 103B. Discussion of boundary-layer theory, laminar and turbulent boundary layers, laminar boundary-layer instability and transition, separation, viscous/inviscid interaction, three-dimensional flows and computational methods and their application. Offered in alternate years.

233. Introduction to Computational Aerodynamics and Fluid Dynamics (4) I. Chatt}

234. Computational Aerodynamics (4) II. Hafez

235. Computational Fluid Dynamics, Euler and Navier-Stokes Equations (4) III. Chatt}
Lecture—4 hours; discussion—1 hour. Prerequisite: course 233 or consent of instructor. Euler and Navier-Stokes equations, conservation form, numerical methods for systems of convection and convection-diffusion equations. Application of compressible Euler and Navier-Stokes equations, generalized coordinates, grid generation, applications.

236. Aerodynamics in Nature and Technology (4) III. White
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, wind effects on man-made objects, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing, extra-terrestrial aerodynamics. Offered in alternate years.

237. Analysis and Design of Composite Structures (4) III. Reifelder
Lecture—3 hours; discussion—1 hour. Prerequisite: course 137. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes.

238. Advanced Aerodynamic Design and Optimization (4) III. Van Dam
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Application of aerodynamic theory to obtain optimum aerodynamic shapes. Both analytic solutions and solutions obtained with numerical optimization techniques will be examined. Includes introduction to the calculus of variations and numerical optimization techniques. Offered in alternate years.

239. Advanced Topics in Thermo-Structural Analysis and Thermo-Structural Dynamics (4) II. Sargulski
Klijn
Lecture—4 hours; discussion—1 hour. Prerequisite: Engineering 180 or Applied Science Engineering 115 or Mathematics 128C. Thermal structures. Introduction to structural synthesis. Transient response of structures. Variational and energy methods. Finite and boundary elements. Special finite element formulations (transfinite elements, transition elements, etc.). Coupled heat transfer and structural analysis. Applications to mechanical, civil, and structural systems. Offered in alternate years.

240. Computational Methods in Nonlinear Mechanics (4) II. Sargulski
Lecture—4 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128C. Deformation of solids and the motion of fluids are treated within the framework of the state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; vector computers with special applications to nonlinear mechanics. Offered in alternate years.

261. Gas Dynamics (4) III. Capace
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B or the equivalent. Flow of compressible fluids. Isentropic flow. Flow with friction, heat transfer, chemically reacting gas and particle mixtures. Normal and oblique shock waves, combustion, blast and explosion; grid method of characteristics. Steady compressible boundary layer flow. Offered in alternate years.

275. Advanced Topics in Aircraft Stability and Control (4) I. Hess
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 172. Development of aircraft equations of motion; response to control actuation; response to random inputs—time history. Stability augmentation system design; pilotvehicle analysis; handling qualities. Offered in alternate years.

290C. Graduate Research Conference (1) I, II, III.
The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress and techniques in mechanical engineering research. May be repeated for credit. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. (SU grading only.)

Professional Course

390. The Teaching of Aeronautical Science and Engineering (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in-Aeronautical Science and Engineering. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading by tutor reports. May be repeated for credit. (SU grading only.)

English

(Course of Letters and Science)
Karl F. Zender, Ph.D., Acting Chairperson of the Department
Department Office, 114 Sprout Hall, (916-752-2257)

Faculty
William E. Baker, Ph.D., Professor
Max Byrd, Ph.D., Professor
Caron A. Cloff, Ph.D., Assistant Professor
Peter A. Dale, Ph.D., Professor
Sandra M. Gilbert, Ph.D., Professor
John O. Hayden, Ph.D., Professor
L. Hays, Ph.D., Professor
W. Jack Hicks, Ph.D., Associate Professor
Michael J. Hoffman, Ph.D., Professor
Michael J. Kramer, Ph.D., Associate Professor
Richard A. Levin, Ph.D., Associate Professor, Academic Senate Distinguished Teaching Award
Kari E. Lokie, Ph.D., Associate Professor
Clarence Major, Ph.D., Professor
Arthur E. McGuiness, Ph.D., Professor
Sandra J. McNichol, B.A., Professor
Patricia L. Moran, Ph.D., Assistant Professor
Linda A. Morris, Ph.D., Senior Lecturer
Marjorie Osborn, Ph.D., Associate Professor
Mark A. Reid, Ph.D., Assistant Professor
David A. Robertson, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Winfried Schiele, Ph.D., Professor
Gary Snyder, B.A., Professor
Margi K. Stange, Ph.D., Assistant Professor
Elizabeth Tallent, B.A., Professor
David Van Leer, Ph.D., Associate Professor
Raymond B. Waddington, Ph.D., Professor
Aran B. Williamson, Ph.D., Professor
Karl F. Zender, Ph.D., Professor

Emeriti Faculty
Evertt Carter, Ph.D., Professor Emeritus
Thomas A. Hanzo, Ph.D., Professor Emeritus
Wayne Harsh, Ph.D., Professor Emeritus
Robert H. Hopkins, Ph.D., Professor Emeritus
James M. Murphy, Ph.D., Professor Emeritus
Gwendolyn Schewe, M.A., Senior Lecturer Emerita
Karl J. Shapiro, Professor Emeritus
Daniele Silva, Ph.D., Professor Emeritus
Brom Weber, Ph.D., Professor of American Literature Emeritus
James L. Woodress, Ph.D., Professor Emeritus
Celeste T. Wright, Ph.D., Professor Emerita

*Course not offered this academic year.
The Major Program
The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect.

The Program. The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a teaching emphasis, a creative writing emphasis, or a general literature emphasis. This teaching emphasis focuses on the study of composition and of language. The writing emphasis focuses on fiction, poetry, and article writing. Creative writing majors have an opportunity to work with distinguished professional writers of fiction and poetry. The general literature emphasis focuses on a series of related courses in various historical periods of English and American literature. A Senior Honors Program is available to an invited group of English majors, who prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. Graduate courses lead to the M.A. and Ph.D. degrees.

Career Alternatives. Graduates have found the major excellent preparation for graduate study in English, as well as for careers in teaching, law, medicine, and library work. Many graduates are employed in journalism, publishing, advertising, and public information. Others have worked in local, state, and federal government agencies, as well as in industry and agriculture. Some have even established their own businesses.

A.B. Degree Requirements:

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<th>UNITS</th>
<th>Preparatory Subject Matter</th>
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<td>English 44</td>
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<td>English 46, 46B, 46C</td>
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Depth Subject Matter (for each emphasis, see below)   34

Core requirement for all emphases   24

| A. Shakespeare, English 117A, 117B, or 117C   | 4 |
| B. British literature—two courses in periods prior to 1800: English 111, 113A, 113B, 115, 122, 123, or suitable sections of 150, 155, or 177   | 8 |
| C. American literature—two courses, one preCivil War (English 142, 143, or appropriate sections of 158 or 177); one post-Civil War (English 144, 146, or suitable sections of 168, 171, 177, 178, 179, 181, 185A, or 189B)   | 8 |
| D. Senior Seminar: One course selected from English 187, 188, 189, 194H   | 4 |

Area of Emphasis (choose one)   20

| General English | Five upper division English electives   | 20 |
| Creative Writing Emphasis | Three sections of English 100F, 100P, and/or 100NF   | 12 |
| Two upper division English electives   | 8 |

Teaching Emphasis

| English 103   | 4 |
| English 105A or 105B   | 4 |
| One course selected from English 178, 179, 181 or an ethnic literature course from outside the English department   | 4 |

Two upper division English electives   8

| Total Units for the Major | 64 |

English Majors

Up to four upper division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

Minor Program Requirements:

| UNITS | Five upper division courses, at least four of which will be literature courses   | 19-20 |

Campus Writing Center, The Campus Writing Center, an affiliate of the English Department, is a program designed to provide writing instruction across the curriculum. Of special interest to students are its adjunct writing classes, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course all relate to the subject matter of the companion course. These are credit-bearing courses offered in conjunction with both lower and upper division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should contact the Campus Writing Center, telephone 916-752-8024, for the current schedule date.

Subject A. Students must have the Subject A requirement before taking any course in English.

Prerequisites. English 1 or 3 is required for admission into courses 20, 30A, 30B, 45, 46A, 46B, 46C, and all upper division courses, unless otherwise stated in the course listings. Course 45 is recommended as preparation for the 46 series. Students taking GE-certified upper division courses in English may substitute Comparative 1, 2, 3, or 4 for English 1 or 3.

Meeting for Majors. All new and prospective English majors are invited to attend a general meeting for majors at the beginning of each year; all English majors must see their advisers, individually, in the spring quarters of their sophomore and junior years.

Undergraduate Adviser. Contact department.


Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees, and should consult with their advisers. A minimum of three terms in a foreign language is required.

Honors and Honors Program. The honors program consists of four units of 194H and four units of 195H, normally taken during the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Office, 114 Sproul Hall. Refer to the Academic Information section and the College section for Dean’s Honors List information.

Teaching Credential Subject Representative. R.A. Levin. See also Under Teacher Education Program.

Graduate Study. The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

The department’s affiliation with the Critical Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in the humanities and social sciences).

Graduate Adviser. Contact department.

Courses in English (ENL)

Lower Division Courses

A. Language Skills (2) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Introductory course to help students gain writing proficiency required for success in University-level work. Focus on critical thinking, reading, and writing; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for a higher grade. Minimum passing grade is a C; students receiving an F must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

R. Communications Skills Workshop (0) I. The Staff (Chairperson in charge)

Lecture—4 hours: workshop—2 hours; reading laboratory—1 hour. Workshop in language skills for students from non-standard English backgrounds who need to strengthen basic skills before taking English 57 (offered by Sacremento City College). Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

1. Expository Writing (4) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made.

3. Introduction to Literature (4) I, II, III. The Staff (Chairperson in charge)

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Introductory study of several genres of English literature, emphasizing basic analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. General Education credit: Civilization and Culture.

4. Critical Inquiry and Literature: Freshman Seminar (4) I. The Staff (Chairperson in charge)

Seminar—4 hours. Prerequisite: completion of Subject A requirement and consent of instructor; enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, classroom dialogue, and the writing of several papers or a longer seminar paper. General Education credit: Civilization and Culture.

5. Introduction to Creative Writing: Fiction (4) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

5P. Introduction to Creative Writing: Poetry (4) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

20. Intermediate Composition (4) I, II, III. The Staff (Chairperson in charge)

Lecture/discussion—4 hours. Prerequisite: course 1 or 3. Emphasis on the grammatical patterns of standard English, sentence revision techniques, development of coherent paragraphs, and the formal properties of the expository essay.

30A. Survey of American Literature (4) I. The Staff: II. Van Leer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from the seventeenth century to 1865. General Education credit: Civilization and Culture.

30B. Survey of American Literature (4) I, II. The Staff: III. Robertson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1865 to the present. General Education credit: Civilization and Culture.
45. Close Reading of Poetry (4) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—3 hours. Prerequisite: course 1 or 3. Close reading of selections from English and American poetry. Frequent written exercises.

46A. Masterpieces of English Literature (4) II. Osborn; III. Schleiner Lecture—discussion—3 hours. Prerequisite: course 1 or 3. Selected works of principal writers from 760 to 1840. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

46B. Masterpieces of English Literature (4) I. The Staff; II. Byrd Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1640 to 1832. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

46C. Masterpieces of English Literature (4) I. The Staff; III. Moran Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1832 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) Internship—3 to 36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/N grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: course 1 or 3. (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 material, and conferences with individual students. Prerequisite: course 5F or 5F, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.

100NF. Creative Writing: Non-Fiction (4) III. Hicks Discussion—4 hours; development and evaluation of written material, and conferences with individual students. Prerequisite: course 1 or 3, or consent of instructor; priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination.

100P. Creative Writing: Poetry (4) I, II, III. The Staff (Chairperson in charge) Discussion—4 hours; development and evaluation of written material, and conferences with individual students. Prerequisite: course 5P or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

102. Adjunct Writing (3) I, II, III. The Staff (Chairperson in charge) Discussion—3 hours. Prerequisite: course 1 or 3; concurrent enrollment in a specified course in a subject-matter discipline. Instruction in the elements of expository writing, with special emphasis on their application to writing projects in a specified academic discipline. May be repeated once for credit if taken in conjunction with a different subject-matter course.

103A-F. Advanced Composition (4) I, II, III. The Staff (Chairperson in charge) Lecture—discourse—3 hours; individual evaluations and conferences. Prerequisite: course 1 or 3; course 20 recommended. Instruction and practice in a variety of modes of composition. Frequent written assignments. One area required of teaching credential candidates (section “F” strongly recommended). Study areas are: (A) General; (B) Legal Writing; (C) Article Writing; (D) Report Writing; (E) Technical Writing; (F) Composition for Elementary and Secondary Teachers. May be repeated once for credit in different area of emphasis.

104. Scientific Writing (3) I, II, III. The Staff (Chairperson in charge) Lecture—3 hours; conference—1 hour. Prerequisite: upper division enrollment in a science curriculum. Analysis and practice of scientific writing; research methods, organization, proper style and format, oral presentation of scientific papers. Lecture and work-shop-discussions by English and science department staff. (P/N grading only.)

*105A. Language (4) I, II. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Present-day English grammar and pronunciation according to the perspectives of traditional grammatical and contemporary linguistic. Preparation for stylistic analyses and historical study of English language and literature. Required of teaching credential candidates.

105B. Language (4) II, III. Schleiner Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of the English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of teaching credential candidates.

*110A. Introduction to Principles of Criticism (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Essentials of literary criticism and its history from the 16th century to the modern era, with emphasis on the major critics.

110B. Introduction to Principles of Criticism (4) II. Hoffman Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. History of literary criticism in the modern era, with emphasis on the relationship between the special and the general problems presented by modern literary theory.

111. Medieval Literature (4) I. Osborn Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused intensive examination of topics in medieval literature. May be repeated for credit when content differs.

113A. Chaucer: Troilus and the "Minor" Poems (4) II. Ciofi Lecture—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's artistry and the evolution of the poet's ideas from his first work to his culminating masterpiece, Troilus and Criseyde. Courses 113A and 113B may not be taken in sequence.

113B. Chaucer: The Canterbury Tales (4) III. Ciofi Lecture—3 hours; term paper. Prerequisite: course 1 or 3. The Canterbury Tales complete as a work of art. Country love, literary form, medieval science and astrology, and the dogma as they influence the reading of Chaucer. Courses 113A and 113B need not be taken in sequence.

115. Renaissance Literature (4) I. Levin, Schleiner Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of the Renaissance. May be repeated for credit when content differs.

117A. Shakespeare: The Early Works (4) W. Waddington Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's early period, up to 1604. Courses 117A-117B-117C need not be taken in sequence.

117B. Shakespeare: The Middle Period (4) II. Levin, III. Zenker Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's middle period, up to 1604. Courses 117A-117B-117C need not be taken in sequence.

117C. Shakespeare: The Later Works (4) I. Schleiner, III. Levin Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's later period. Courses 117A-117B-117C need not be taken in sequence.

118. Shakespeare (4) I. Waddington Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works by Shakespeare. Recommended for non-majors. May not be applied toward the English major. General Education credit: Civilization and Culture.

122. Milton (4) II. Waddington Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works, including Paradise Lost.

123. 18th-Century British Literature (4) I. Byrd Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of 18th-century English literature. May be repeated for credit when content differs.

130. British Romantic Literature (4) I. Løkke Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of Romantic English literature. May be repeated for credit when content differs.

133. 19th-Century British Literature (4) III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 19th-century English literature. May be repeated for credit when content differs.

137. 20th-Century British Literature (4) I. Moran; III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 20th-century English literature. Authorship might be taught by Conrad, Joyce, Eliot, Woolf, Larkin. May be repeated for credit when content differs.

142. Early American Literature (4) III. Van Leer Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of American literature from the 17th and 18th centuries. May be repeated for credit when content differs.

143. 19th-Century American Literature to the Civil War (4) I. The Staff, change; III. Van Leer Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 19th-century American literature. May be repeated for credit when content differs.

144. Post-Civil-War American Literature (4) I, II. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of works of 20th-century American literature. May be repeated for credit when content differs.

*149. Topics in Literature (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Intensive examination of literature considered in topical texts, not necessarily historically. May be repeated for credit when topic differs.

150. British Drama (4) III. Ciofi Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of English drama. May be repeated for credit when topic differs.

152. American Drama (4) I. Hays Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of American dramatic literature. Either a historical survey from 18th-century beginnings to the present or an in-depth analysis of several playwrights, such as O'Neill, Miller, Williams. May be repeated for credit when topic differs.

153. Topics in Drama (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of drama. May be repeated for credit when topic differs.

155. British Novel (4) I. Baker; II. Moran Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused study of the British novel.
examination of the British novel. May be repeated for credit when topic differs.

156. *The Short Story* (4) I. The Staff; III. Moran Lecture/discussion—15 hours; term paper. Prerequisite: course 1 or 3. The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. General Education credit: Civilization and Culture.

158. *American Novel* (4) I. Hoffman; III. Stange Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historically or thematically focused intensive study of major American novels. May be repeated for credit when topic differs.

159. *Topics in the Novel* (4) I. Williamson/Tallent Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Examination of major novels arranged thematically. Topics might include Bildungsroman, stream-of-consciousness novel, Gothic novel, historical novel.

160. *Film As Narrative* (4) III. Reid Discussion—2 hours; lecture and film study—3 hours. Prerequisite: course 1 or 3. Study of modern film (1930 to the present) as a storytelling medium.

*162. Film Theory and Criticism* (4) Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 1 or 3. Film theory and criticism, with a study of ten major works of international film critics. Offered in alternate years. General Education credit: Civilization and Culture.

165. *Topics in Poetry* (4) II. Williamson; III. McPherson Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 and course 45. Intensive examination of various topics expressed in poetry from all periods of English and American literature. May be repeated for credit when topic covers different poets and poems.

*171A. The Bible as Literature: The Old Testament* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. Offered in alternate years. General Education credit: Civilization and Culture.


*173. The Literature of Science Fiction* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literary modes and methods of science fiction. The course will analyze representative novels and short stories which exemplify major themes and styles in this genre—e.g., time travel, alternate universes, utopian, anthropological, sociological science fiction.

*175. American Literary Humor* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Above freshmen level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; localolorists; journalistic gadflies; anti-provencialists; modernist poets and prose writers; black humor.

177. Study of an Individual Author (4) II. Morris; III. Hays Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Survey of the works of an individual author other than Chaucer, Shakespeare, or Milton. May be repeated for credit when a different author is studied.

*178. Special Topics in Ethnic Literature* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Intensive study of a topic drawn from multilethnic literature. Course may focus on particular ethnic groups, historical periods, writers, genres, and/or themes. May be repeated once for credit when subject differs.

179. *Multi-Ethnic Literature* (4) I. II. The Staff Lecture/discussion—3 hours; papers. Prerequisite: course 1 or 3, or standing above freshman level. Fiction, poetry, and other writings by Americans of ethnic mixtures and background (Native, Black, Hispanic, Jew, Asian, etc.) which reveal their immigrant experience, cultural diversity, and contributions to American literature.

*180. Children's Literature* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, and social function.

181A. *African American Literature to the Harlem Renaissance* (4) II. Reed, Morris Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. African American literature from the slavery period to the end of the 1930s. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition. Offered in alternate years.

181B. *African American Literature from the Harlem Renaissance to the 1960s* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. Major African American writers in the context of cultural history from 1940 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paul Marshall, Toni Morrison, Alice Walker, Clarence Major. Offered in alternate years.

*182. Literature of California* (4) Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3 or the equivalent. California literature in the context of California's social, political, and intellectual history. Reading of poetry, fiction, and essays. Emphasis on nineteenth- and twentieth-century naturalists, turn of the century novelists, the Beats, and writers of the last two decades. Offered in alternate years. General Education credit: Civilization and Culture.

184. *Literature of the Wilderness* (4) II. Robertson Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the theme of wilderness primarily in American literature, with some consideration of Biblical and European antecedents. Major attention given to Thoreau, Muir, London, Austin, Faulkner, Snyder, and Abbey. Offered in alternate years. General Education credit: Civilization and Culture.

185A. *Literature by Women I* (4) I. Stange Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from women from Brontës and Bahn to the Brontës, Eliot, and Dickinson. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

185B. *Literature by Women II* (4) II. Gilbert Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 3; course 185A recommended. English language literature by women from Chopin and Woolf to Plath, Rich, and Morrison. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

187. *Literature and the Other Arts* (4) III. Stange Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of the relationship between the forms of literature and the forms of the other arts, with detailed study of one of the crucial periods of artistic development in western culture.

188. *Special Topic in Studies* (4) I, II, III. The Staff (Chairperson in charge) Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of a special topic drawn from English or American literature. Course will be offered only in sections according to the topic studied, and papers will be assigned. Limited enrollment.

*Course not offered this academic year.*

199. *Seminar in a Major Writer* (4) I, II. The Staff (Chairperson in charge) Seminar—3 hours; term paper. Prerequisite: junior or senior standing; a major in English or consent of instructor. One major writer's artistic development with attention to intellectual and literary milieu. Limited enrollment.

199H. *Intensive in English* (1-12) I, II. The Staff (Chairperson in charge) Intensive—3 to 36 hours. Prerequisite: course 1 or 3. Intensivates in fields where students can practice their skills at a maximum of 4 units allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.)

194H. *Special Study for Honors Students* (4) I. The Staff (Chairperson in charge) Seminar—3 hours; term paper. Prerequisite: admission to English Department Senior Honors Program. Study of a special literary topic or of the works of a major writer, and preparation for writing an honors thesis. May be repeated for credit. Offered fall 1994.

195H. *Honors Thesis* (4) II. The Staff (Chairperson in charge) Independent study—12 hours. Prerequisite: course 194H or 194I. Preparation of a thesis, under the supervision of an instructor. Students satisfy requirement in the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction.

197T. *Tutoring in English* (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—1 to 5 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)

197CC. *Community Tutoring in English* (1-4) I, II, III. The Staff (Chairperson in charge) Tutoring—1 to 4 hours. Prerequisite: upper division standing and a major in English; consent of Chairperson. Field experience, with individuals or in classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)

198. *Directed Group Study* (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: one course from courses 1, 3, 5, 7, 5P. (P/NP grading only.)

199P. *Special Study for Advanced Undergraduates* (1-10) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. *Techniques of Literary Scholarship* (4) II. Waddington Discussion—3 hours; term paper. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

*201. Literary Criticism* (4) Discussion—3 hours; term paper. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

205. *Anglo-Saxon Language and Culture* (4) I. Osborn Lecture—3 hours; conference and term paper. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry. Offered in alternate years.

206. *Beowulf* (4) II. Osborn Discussion—3 hours; oral and written reports; conferences with students. Prerequisite: course 205 or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Offered in alternate years.

207. *Middle English* (4) Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicicon between 1100 and 1500 with investigation of the regional dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts.
209. Present-Day English Linguistics (4) Discussion—3 hours; term paper. Theory and methods of linguistic and transformational grammar as applied to the analysis of English. Emphasis will be on recent linguistic techniques, particularly as these relate to the teaching of language, literature, and composition.

210. Readings in English and American Literature (4) III. Hoffman Seminar—3 hours; conference—1 hour. Prerequisite: upper division English course in area to be studied. Offered in multiple sections each quarter. Content varies according to specialty of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

215. Middle English Romance (4) Seminar—3 hours; conference. Sources of the Medieval Romance genre. Continental and English literary treatment; significant change of attitudes in post-Medieval literature.

225. Topics in Irish Literature (4) Seminar—3 hours; conference—1 hour. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the nineteenth-century novel, contemporary Irish poetry, rise of the drama, study of Irish literature, and author.

230. Study of a Major Writer (4) Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

232. Problems in English Literature (4) II. Schleiner Seminar—3 hours; conferences with individual students—1 hour. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit when different period or topic is studied.

233. Problems in American Literature (4) II. Reid Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics for intensive investigation. May be repeated for credit when different period or topic is studied.

234. Dramatic Literature (4) I. Hays Seminar—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

235. Theory of Fiction (4) I. Hicks Seminar—3 hours; preparation and evaluation of papers. Seminar—3 hours; preparation and evaluation of papers. Theories of fiction as they relate to the professional writer’s practice of the craft. Designed for students in the creative writing program.

236. Poetics (4) II. McPherson Seminar—3 hours; conference—1 hour. Structure, process, and evaluation of British and American poetry; a variable approach—sustained through an intensive study of a single writer, sometimes historically or theoretically—related to the instructor’s discretion. Preparation and evaluation of research papers. Directed toward Creative Writing major’s degree students.

237. Modern Critical Theory (4) Seminar—3 hours; conference—1 hour. Examination of problems in the theory underlying the practice of literary criticism from I.A. Richards and T.S. Eliot to the present.

238. Special Topics in Literary Theory (4) Seminar—3 hours; term paper. Prerequisite: course 237 or the equivalent. Advanced topics in literary theory or related fields. Preparation and evaluation of research papers. May be repeated for credit when topic and/or reading list differs. Offered in alternate years.

240. Medieval Literature (4) Seminar—3 hours; conference—1 hour. Studies of Medieval literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

242. Sixteenth-Century Literature (4) Seminar—3 hours; conference—1 hour. Studies in sixteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

244. Shakespeare (4) Wellington Seminar—3 hours; conference—1 hour. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

246. Seventeenth-Century Literature (4) Seminar—3 hours; conference—1 hour. Studies in seventeenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

248. Eighteenth-Century Literature (4) Seminar—3 hours; conference—1 hour. Studies in eighteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

250. Romantic Literature (4) III. Lokke Seminar—3 hours; conference—1 hour. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

252. Victorian Literature (4) II. Dale Seminar—3 hours; conference—1 hour. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

254. Twentieth-Century British Literature (4) III. Williamson Seminar—3 hours; conference—1 hour. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

256. Early American Literature (4) Seminar—3 hours; conference—1 hour. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

258. American Literature: 1800 to the Civil War (4) I. Van Leer Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

260. American Literature: Civil War to 1914 (4) Seminar—3 hours; conference—1 hour. Studies in American literature from Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

262. American Literature after 1914 (4) II. Gilbert Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

264. Studies in Modern British and American Literature (4) Seminar—3 hours; conference—1 hour. Studies in modem 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.

265. Literature by Women (4) I. Moran Seminar—3 hours; conference—1 hour. Studies in literature by women and the theoretical approaches to literature by women. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when topic and/or reading list differs.

290F. Seminar in Creative Writing of Fiction (4) I. Talentt, II. Balestier Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master’s program in Creative Writing. Writing of prose. Evaluation of written materials and individual student conferences. May be repeated for credit.

290NF. Seminar in Creative Writing of Non-Fiction (4) Seminar—3 hours; term paper. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in the Master’s Program in English (Creative Writing). A workshop in the writing of non-fiction, with emphasis—according to staff and student interest—on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives.

290P. Seminar in Creative Writing of Poetry (4) I. Williamson, II. Gilbert, III. Snyder 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. Poetry of writing. 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.)

298C. Colloquium on Literary Scholarship (1-4) I, II, III. The Staff (Chairperson in charge) Oral presentation and critique of research papers. (SU grading only.)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

299D. 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) Lecture—3 hours. Prerequisite: graduate standing. An English teaching major or minor. This course should be completed in conjunction with practice teaching. Course is accepted in partial satisfaction of the requirement for certification in the general secondary credential.

300. Teaching English at the College Level (4) I. 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.)

392. Teaching Internship in English (4) I, II. (Director of Composition in charge) Supervised internship—3 hours. Prerequisite; graduate standing. In-class internship with English department faculty member. (SU grading only.)

393. Problems in Teaching College Composition (3) I. (Director of Composition in charge) Discussion—2 hours. Prerequisite: open to graduate students teaching composition in a variety of University courses including English A, 1, 3, 5, 20, 102, and 103. Designed for the relatively experienced student teacher who would profit from developing skills in specific areas. (SU grading only.)

Entomology

(College of Agricultural and Environmental Sciences)

Michael P. Parrella, Ph.D., Chairperson of the Department
Department Office, 367 Briggs Hall (916-752-0475)

Faculty

James R. Carey, Ph.D., Professor
Hugh Dingle, Ph.D., Professor
Sean S. Duffey, Ph.D., Professor
Lester E. Ehler, Ph.D., Professor
Bruce F. Eldridge, Ph.D., Professor
Mary L. Flint, Ph.D., Lecturer

*Course not offered this academic year.*
Breadth Subject Matter ........................................... 6-24
Satisfaction of General Education requirement ............... 6-24
Depth Subject Matter ........................................... 32-36
Cell or microbiology (Microbiology 102, Plant Biology 118, 119, Plant Pathology 120, Veterinary Microbiology and Immunology 132) ............... 4-5
Biological Sciences 101 ........................................... 4
Ecology (Environmental Studies 100 or Evolution and Ecology 101) ............... 4
Evolution (Evolution and Ecology 100) ......................... 3-4
Physiological chemistry (Biological Sciences 102 and 103) ............... 6
Entomology 100, 100L ........................................... 5
At least 7 units from Entomology 101, 102, 103, 104, 107, 109, or 198 ............... 7
Restricted Electives ........................................... 32-60
Upper division entomology courses ........................ 14
Upper division electives related to student’s interest with approval of adviser ............... 20
Note: No more than a total of 6 units from Entomology 192, 197 and 199 may count toward fulfilling depth subject matter or restricted elective units.
Unrestricted Electives ........................................... 32-60
Total Units for the Major ...................................... 180

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.

Entomology ................................................................
Units
Entomology 100, 100L ........................................... 5
At least two courses from Entomology 101, 102, 103, 104, 107 ........................................... 7-8
At least two additional upper division entomology courses (except courses 102, 192, 196, 198) ........................................... 6-11

Agricultural Entomology ........................................... 18
At least two courses from Entomology 100, 100L, 110, 119L, 130, 156, 158, 197, 198 ........................................... 14
At least four additional upper division entomology units ........................................... 4

Agronomy ........................................... 3
At least one course from Agronomy 120, Plant Science 102, Plant Pathology 102 ........................................... 5-8

B.S. Major Requirements:
(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable and may be critical for the attainment of some career goals. Courses shown without parentheses are required.)

English Composition Requirement ......................... 8-9
See College Requirement

Preparatory Subject Matter ........................................... 46-47
Biology (Biological Sciences 1A, 1B, 1C, 15) Chemistry (Chemistry 2A, 2B, 4A, 4B) Mathematics 16A ........................................... 3
Physics (Physics 1A, 1B) ........................................... 6
Statistics (Statistics 13, 32, or Agricultural Systems and Environment 150) ........................................... 3

*Course not offered this academic year.

Courses in Entomology (ENT)

Lower Division Courses
10. Natural History of Insects (3) II. Kay/Torres Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 100, but students who have taken this course may take course 100 for credit. An introduction to the insects detailing their general anatomy, life cycles, functions and habitats, and their significance in relation to plants and animals including man.

17. Natural Selection and Sociobiology (4) I. The Staff Lecture—3 hours; discussion—1 hour. Introduction to the theory of natural selection, using evaluations and applications of behavioral adaptations, ranging from insects to humans. General Education Credit: Nature and Environment.

59. Special Study for Undergraduates (1-5) I, II. The Staff (Chairsperson in charge) (P/N grading only.

Upper Division Courses
100. General Entomology (3) I. Granett in charge Lecture—3 hours. Prerequisite: Biological Sciences 1B. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare.

100L. General Entomology Laboratory (2) I. Granett in charge Laboratory—2 hours. Prerequisite: course 100. May be taken concurrently. General Education Credit: Biology.

101. Functional Insect Morphology (3) II. Peng Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of the basic internal and external structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology, and fine structures of important organs and tissues will be discussed.

102. Insect Physiology (4) I. Duffy, Hamrock Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 and course in physiology or vertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Emphasis on analysis of methodology, fact, and theory.

103. Insect Systematics (3) III. Ward Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in zoology or entomology. Principles and methods of systematics with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships.


*107. California Insect Diversity (5) III. Thorp, Kinsey Lecture—1 hour; laboratory—6 hours; fieldwork—6 hours. Prerequisite: an introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. Offered in alternate years.

109. Field Taxonomy and Ecology (7) Extra-Session summer. Ward Lecture—2 hours; laboratory—36 hours; field course. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in alternate years.

110. Economic Entomology (3) I. Parrella Lecture—3 hours. Prerequisite: Biological Sciences 1B. Identification, biology, and control of insects and...
mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage and ornamental plant problems.

110. Arthropod Pest Management Laboratory (2) II. Parrella Laboratory—6 hours. Prerequisite: course 110 (may be taken concurrently) and Biological Sciences 1B. Identifies, biology, control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage, and ornamental plant problems.

111. Insects and Human Affairs (4) II, III. McClelland Lecture—2 hours; discussion—1 hour; film/demonstration—1 hour; one required evening meeting. Prerequisite: Biological Sciences 10 recommended. Diversity, structure and function of insects. Their role as benefactors, competitors, and destroyers of human resources and health. Their contribution to human culture and scientific knowledge. Approaches to insect pest control and its environmental, social and political correlates. General Education credit: Nature and Environment.

116. Biology of Aquatic Insects (3-5) III. The Staff Laboratory—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of all insects associated with streams, ponds, and lakes.

119. Apiculture (3) III. Peng Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C recommended. Biology and behavior of honey bees; communication, orientation, social organization, foraging activities, honey production, pollination activities. General Education credit: Nature and Environment.

119L. Apiculture Laboratory (2) III. Peng Lecture—1 hour; laboratory—3 hours; Prerequisite: course 119. Biology and behavior of honey bees; fundamentals of culture, management, and use of colonies for agricultural, recreational, teaching, and research purposes.

135. Introduction to Biological Control (4) III. Ehler, Kaya Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of biological control of arthropods, insects, and pathogens. Entomopathogenic nematodes, parasitoids, and predators. Implementation in classical and augmentative biological control. Role of biological control in pest management.

147. Evolution of Life on Earth (4) I. Kinsey Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 10 or Biological Sciences 10. Relationships between physical changes in the continents and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years. General Education credit: Nature and Environment.

153. Medical Entomology (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne human diseases and principles of their control. General Education credit: Nature and Environment.

156. Biology of Parasitism (3) II. Washino in charge. Thes (Medical Microbiology). Gardner Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Lectures on the biological and economical aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna.

156L. Biology of Parasitism Laboratory (1) II. Washino in charge. Thes (Medical Microbiology) Lecture—3 hours. Prerequisite: course 156 (concurrently) or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoon organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course.

192. Internship (1-12) I, II, III, extra session. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (PNP grading only.)

197T. Tutoring in Entomology (1-3) I, II, III. McClelland Discussion—1-3 hours. Leading small discussion groups. Preassign assignments and prepare guidelines for discussion. (PNP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge) (PNP grading only.)

Graduate Courses

200A. Conceptual Basis of Entomology: Basic Biology (4) I. The Staff Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with an emphasis on theoretical and fundamental aspects of natural selection, behavior, ecology, physiology, and biochemistry as related to the regulation of insect populations. Provides the theoretical framework for course 200B.

200B. Conceptual Basis of Entomology: Application (4) III. The Staff Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with emphasis on the application of theoretical/conceptual outcomes from course 200A to epidemiology, biotechnology, biological control and integrated pest management for pursuing current insect pest problems concerning food, fiber, and health.

206. Ecology of Insect Parasitoids (4) II. Rosenheim Lecture—3 hours; seminar—1 hour. Prerequisite: introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address current topics in behavior, population, and evolutionary ecology. Theory will be synthesized with empirical and critical empirical tests of ecological hypotheses emphasized. Offered in alternate years. (Same course as Population Biology 206.)


219. Advanced Topics in Medical Entomology Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119L. Current topics in bee biology with special consideration of morphology, caste determination, queen rearing, nutrition, physiology, pathology, and products of honey bees. Offered in alternate years.

220. Chemical Ecology of Plant-Insect Interactions (4) II. Duffey Lecture—3 hours; discussion—1 hour. Prerequisite: introductory biology of insects and plant ecology. Investigation of the interface between plants, herbivorous insects and their natural enemies from a mechanistic point of view, stressing principles of chemistry, physiology, and toxicology rather than mass-action ecology. Major emphasis is placed on plant natural products.

225. Terrestrial Field Ecology (4) III. Karban Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Ecology 225.)

230. Advanced Biological Control (3) I. Ehler Lecture—2 hours; discussion—1 hour. Prerequisite: course 135. Advanced treatment of current topics in biological control of arthropods and weeds. Offered in alternate years.

253. Advanced Medical Entomology (3) III. The Staff Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 153) and one course in microbiology; course 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Offered in alternate years.

290. Special Topics in Entomology (1-4) I, II, III. The Staff (Chairperson in charge) Seminar—1-4 hours. Prerequisite: consent of instructor.

291. Seminar in Medical Entomology (2) I. McClelland, Washino, Eldridge Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals.

292. Seminar in Insect Physiology (2) I. Duffey, Hammock, Maeda Seminar—2 hours. Prerequisite: course 102. Critical examination of areas of current interest to insect physiology and biochemistry.

293. Seminar in Systematic Entomology (2) III. Ward, Thorp, Kinsey Seminar—2 hours. Prerequisite: course 103. Selected topics in systematic and evolutionary entomology and discussed. Some topics may be illustrated by laboratory sessions.

294. Seminar in Insect Ecology (2) III. Carey, Ehler, Karban Seminar—2 hours. Prerequisite: a general ecology course. Discussions of advanced topics in ecology with emphasis on analysis of factors influencing the distribution and abundance of insects. Includes consideration of applications of basic theory as in biological control and related approaches.

295. Seminar in Agricultural Entomology (2) II. Granett, Parrella, Rosenheim Seminar—2 hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of best insect population management.

296. Seminar in Bee Biology (2) I. Thorp, Page, Peng Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of behavior, ecology, management, and general biology of bees (Apoidea) with emphasis on the honeybee.

297. Seminar in Insect Behavior (2) III. Dingle Seminar—2 hours. Prerequisite: a course in animal behavior. Review of ethological and experimental advances in insect behavior, especially interpretation and description of observations, physiological mechanisms, functional kinds of behavior, and the application of general behavior to the problem of the laboratory and field.

299. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

399. Research (1-12) I, II, III, summer. The Staff (Chairperson in charge) (SU grading only.)

Professional Course

404. Grantmanship (3) II. Granett, Duffey Lecture—1 hour: 15-20 page research proposal required. Prerequisite: graduate standing; research
Environmental and 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 environmental and resource sciences major is a program for study of the physical, chemical and biological features of environmental resources, and the economical and social considerations associated with their use, conservation, protection, and management. Students who choose this major include those with an interest in careers associated with environmental resource utilization and management, as well as those pursuing post baccalaureate, academic, or professional training.

The Program. The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. At the same time, certain courses are required in the basic physical and biological sciences areas. An upper division general environmental resource sciences course, a resource economics course, and a specified course in resource-oriented courses are required for all students in the major. Resource-oriented courses shall be selected in consultation with and approval of the student's advisor. Considerable care should be taken to ensure effective utilization of the flexibility of the major, and to meet individual academic and career objectives.

Areas of specialization are achieved through selection of one of the options within the major.

Internships and Career Alternatives. Positions now held by graduates in environmental and resource sciences are quite varied, but many are employed as resource analysts and planners as well as technical and environmental specialists with government agencies, municipalities, and private firms. A significant proportion of graduates undertake further studies leading to advanced degrees in resources, the environment, and related fields.

B.S. Major Requirements:

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

UNITS

Written/oral Expression 11-12

See college requirement

Statistics (Statistics 13) 4

Students are encouraged to take the advanced series—consult with your advisor.

Breadth/General Education 24-27

Satisfaction of General Education requirements, including units in social sciences and humanities to total 24 units

Depth Subject Matter 24-27

Written expression (in addition to college requirement), English 103D, 103E, 104 3-4

Agricultural Economics 147 or 148 3-4

Soil Science 100 4

Hydrologic Sciences 101 4

Social-political awareness (Environmental Studies 161, 179; Environmental Toxicology 138, Geography 161, Geography 134, Geography 135) 3

Plant or animal ecology (Botany 117, Entomology 104, Environmental Studies 100, Plant Science 101, Zoology 125) 3-4

Areas of Specialization (one)

Air Resource Option 34

Directed towards a general understanding of the atmosphere as a finite resource and of environmental problems currently faced by humanity. The options provide for the study of the physical and chemical properties of the atmosphere, the impacts of air pollution and climate change. Employment opportunities include positions in federal, state, and county agencies concerned with environmental quality and with private companies. (Preparatory physics options Physics 5A-5B required.)

Atmospheric Science 30, 60, 110, 124, 133 17

Environmental Science 110 4

Environmental and Resource Science 131-3 4

Geography 116 4


Unrestricted electives (to total 180) 19-34

Environmental Resources 39-43

For the general 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. For those who plan careers associated with resource utilization and management, and those pursuing post baccalaureate, academic, or professional training.

Statistics (Agricultural Systems and Environment 120, Environmental Studies 123) 3-4

Environmental and Resource Science upper division breadth courses (choose from the following areas) 9-12

Agricultural economics, agronomy and range science, soil science, botany, agricultural engineering, civil and environmental engineering, economics, environmental horticulture, environmental studies, environmental toxicology, geography, geology, plant science, range management, environmental and resource science, soil science, water science, wildlife and fisheries biology, and zoology.

Unrestricted electives (to total 180) 10-39

Energy Systems Option 28

Provides a general, semi-technical appreciation of the role and importance of energy systems to industrial societies and the associated environmental (physical-biological) impacts of existing technologies.

Appropriate preparation for careers with utilities, monitoring and environmental engineering.

Environmental Studies 1, 126, 167, 169 (select three courses) 12

Atmospheric Science 131 4

Environmental and Resource Science 3 3

Environmental and Resource Science 103 3

Environmental and Resource Science 192 (Internship) 3

Unrestricted Electives 25-40

Land and Water Management Option 24-28

A broad background in management of soil and water resources in both natural and agricultural ecosystems. Emphasis on analysis of soils and plants for estimating crop nutrient requirements and principles of irrigation and drainage of agricultural land. Appropriate for those seeking employment with state and federal agencies or with agriculture.

Soil Science 108, 118 7

Hydrologic Science 103, 104 8

Soil Science 192 or Hydrologic Science 192 (Internship) 3

Additional Soil Science or Hydrologic Science courses selected with advisor's approval 1-10

Unrestricted Electives 25-44

Hydrobiology Option 32-35

Training in the biological aspects of water resources focusing on the understanding and protection of polluted and unpolluted water systems; the structure, function, and principles of aquatic ecosystems. Graduates may seek employment with state and federal agencies such as Water Resources Control Board, Department of Fish and Game, Department of Water Resources, or consulting firms concerned with environmental impacts.

Hydrologic Science 122, 123 5

Botany 118, 150 3-5

Entomology 116 5

Wildlife and Fisheries Biology 120, 120L 4

Water Science 193 5

Water Science 192 (Internship) 3

Additional electives (Environmental Studies 123, 151 and 151L, Environmental Toxicology 101, Hydrologic Science 41, 141, 150, Wildlife and Fisheries Biology 153) 6-10

Unrestricted Electives (to total 180) 18-36

Total Units for the Major 180

Related Courses. For courses that are related to this major, see course listings for Agricultural Economics, Agricultural Systems and Environment, Animal Science, Entomology, Environmental Biology and Management, Environmental Studies, Environmental Toxicology, Evolution, Ecology, Geology, Plant Biology, Range Management, Soil Science, Water Science, Wildlife and Fisheries Biology.

Major Advisor. J. Stasulat (201 South Hall).

Advising Center for the major is located in 122 Hoagland Hall (916-752-1869).

Courses in Environmental and Resource Sciences (ERS)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (916-752-1869).

Lower Division Courses

2. Concepts in Forestry (3) J. Zasowski Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Chemistry 10. Introduction to the physical, biological and ecological factors that give the forest its character and interaction of social and economic factors governing forest management. General Education credit: Nature and Environment.

3. Energy and the Environment (3) J. McBean Lecture, 3 hours. Prerequisite: Biological Sciences 10, Chemistry 10, Physics 10 or one equivalent
Environmental Biology and Management

(Majors of Agricultural and Environmental Sciences)

Faculty
See under the Division of Environmental Studies.

The Major Program

The environmental biology and management major offers an education in the basic natural sciences, especially ecology, together with a set of management and public policy analysis courses. Students completing the program will understand the scientific basis for environmental decision making, and the legal, economic, and political issues involved in management of the environment in the United States and worldwide.

The Program. Courses in chemistry, physics, mathematics, biology, and earth sciences form the foundation of the curriculum; these are then tied together by courses in ecology. Computing, statistics, and other methods courses give the student basic quantitative research skills. Economics, political science, and techniques of quantitative management decision-making dominate the management and public policy requirements. A moderate degree of specialization is permitted in two upper division courses in the Conservation Biology and Management option takes courses in conservation biology, genetics, evolution and biogeography, resource economics, environmental policy making, quantitative analysis and scientific specialties, as well as qualitative analysis. Students in the Environmental Management option take courses in recreation, resource economics, planning, and public policy, and, especially, quantitative management techniques. This option emphasizes the management of public lands and natural resources in urban and rural areas. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative approaches should examine the Environmental Policy Analysis and Planning major.

Career Alternatives. The major prepares students to enter careers in management of natural resources and public lands, as well as basic ecological research. Students interested in professional schools, e.g., medicine, should consult an adviser early to plan for their special requirements, even as an organic chemistry. Graduates who choose the Environmental Biology option are prepared for graduate or professional training and, eventually, careers working for public agencies and private firms specializing in environmental quality, natural resources, and ecological research. Graduates with the Environmental Management option are prepared for jobs in public agencies at the federal, state, or local levels.

B.S. Major Requirements:

(The usual courses taken to satisfy requirements are shown in parentheses. Equal or more comprehensive courses may be taken with the advisor's written approval. Courses shown without parentheses are required.) Students will be required to plan their course selection with their advisor.

ENGLISH COMPOSITION REQUIREMENT

6-15

See College requirement... 0-8

ADDITIONAL ENGLISH (English 102 concurrently with Environmental 3)

3

Oral expression (Rhetoric and Communication 1 or Dramatic Art 10)...

3-4

PREPARATORY SUBJECT MATTER

49-54

Biological sciences (Biological Sciences 1A, 1B, 1C)...

16-15

Chemistry (Chemistry 2A-2B or 2AH-2BH)...

10

Computer science (Computer Science and Management 21, or Computer Science Engineering 10, 15, or 50)...

3-4

Environmental analysis (Environmental Studies 1 or 30; choose Environmental Studies 1 if Environmental Management option is selected)...

3-4

Policy analysis (Political Science 1, or Economics 1A; choose Economics 1A if Environmental Management option is selected)...

4-5

Mathematics (Mathematics 4A, 16A-16B or 21A-21B)...

6-6

Physics (Physics 5A-5B or 9A-9B)...

8

Breadth/General Education...

12-24

Satisfaction of General Education requirement to include 12 units of humanities and/or Civilization and Culture...

12-24

DEPTH SUBJECT MATTER...

25-32

(These units must be taken for a letter grade at an overall grade-point average of 2.0 or higher.)

Ecology (Select one of Botany 117, Environmental Studies 100, Wildlife and Fisheries Biology 151, Zoology 125)...

3-4

Survey of environment, Environmental Studies 110...

4

Physical processes in the environment (Select two courses from: Atmospheric Science 120, Environmental Studies 120A, Environmental and Resource Sciences 131, Geography 134, 153, 154, Soil Science 100, Water Science 100, 141)...

6-6

Environmental Policy (Select one course from: Environmental Studies 161, 162, 163, 166, 171, 179; Agricultural Economics 147, 147S, 175, 176)...

3-4

(Choose Agricultural Economics if Environmental Management option is selected.)

Management of Public Lands, Environmental Studies 172...

4

Mathematics and/or Statistics (Select one course from: Mathematics 16C, 21C, 22A, 22B, Agricultural Science and Management 150, Statistics 102 OR upper division mathematics, computing or statistics Environmental Management students should enroll in Agricultural Science and Management 150 or Statistics 102)...

3-4

Research methods (Environmental Studies 123, 128, 178, Wildlife and Fisheries Biology 100. Management students should enroll in Environmental Studies 178)...

3-5

AERIALS OF SPECIALIZATION...

25-38

Conservation Biology and Management Option

Conservation biology, Wildlife and Fisheries Biology 104...

4

Genetics, Biological Sciences 103...

4

Evolution and biogeography. Choose one course from: Entomology 147, Evolution and Ecology 100, 102, 138, 144, 147, 149, Geography 173, Geology 173...

3-4

Resource economics, Agricultural Economics 167 or Environmental Studies 175...

3

(Students must select a course which was not taken in "Depth Subject Matter")
Environmental Horticulture 229

Programs of Study. See the majors in Design and Landscape Architecture.

Related Courses. See Design and Landscape Architecture course lists.

Environmental Science

Environmenal Geology

(College of Letters and Science)
The minor in Environmental Geology examines the multidisciplinary aspects of geology and related earth science fields, and planning and resources oriented programs.

Students in the minor are encouraged to participate in internship programs that assist them in satisficing the Environmental Geology minor with their Geology major or other major field areas that include geologic components.

The minor is sponsored by the Department of Geology, 174 Physics/Geology.

Minor Program Requirements:

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Geology 130, 134, and 152 or Geography 106

Soil Science 118

Hydrologic Science 141 or Civil and Environmental Engineering 142

Two courses chosen from:

Environmental Studies 160, 171, 179; Geology 135, 254 or Geography 150; Environmental and Resource Sciences 100; Hydrologic Science 145

Minor Adviser: Robert Twiss, Department of Geography, 397 Physics/Geology, 752-0179.

Environmental Design

(College of Agricultural and Environmental Sciences)

Robert Sommer, Ph.D., Chairperson of the Department

JoAnn Stabb, M.A., Associate Chair, Design

Robert L. Thayer, Jr., M.A., Associate Chair, Landscape Architecture

Department Office, 142 Walker Hall (916-752-6223)

Faculty

Richard Bertaux, B.Arch., M.S., Associate Professor

Frances Butler, M.A., Professor

Kerry J. Dawson, M.L.A., Professor

Mark Francis, M.L.A., Professor

Dolph Gotelli, M.A., Professor

Patricia Harrison, M.Arch., Assistant Professor

Janet L. Hethorn, Ph.D., Assistant Professor

Gevorg Elyak, M.A., Professor

E. Byron McCullough, B.S.L.A., Lecturer

Edward S. McNiel, M.L.A., Lecturer

Helge B. Olson, M.L.A.

Patry E. Owens, M.L.A., Assistant Professor

Susan Palmer, M.L.A.

Victoria Z. Rivers, M.A.C.T., S.C.T., Professor

Barbara Shaw, M.A., Associate Professor

Heath Schenkel, M.A., Assistant Professor

Robert Sommer, Ph.D., Professor

Kathryn Stava, M.F.A., Lecturer

JoAnn C. Staub, M.A., Senior Lecturer

Robert L. Thayer, Jr., M.A., Professor

Emeriti Faculty

Katherine W. Luesch, M.A., Professor Emerita

Programs of Study

Dr. J. F. Quinn (Environmental Studies).

Environmental Horticulture

Required Courses:
The faculty for Environmental Biology and Management offers a minor in Recreation for students in Landscape Architecture desiring to specialize in recreation area design; Physical Education, Psychology, Sociology, Human Development, and Applied Behavioral Sciences students wishing to work in educational and therapeutic recreation; Environmental Policy Analysis and Planning students seeking careers in public recreation policy analysis and management; Agricultural and Managerial Economics students wishing to go into the administration of commercial recreation enterprises; and those students in Plant Science interested in park landscape construction and maintenance.

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<th>UNITS</th>
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<td>18-20</td>
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Resource economics, (Agricultural Economics 147, 176, Economics 129)

Urban recreation programs, (Environmental Planning and Management 134, Physical Education 150)

Recreation policy analysis, Environmental Studies 162

Recreation administration, (Agricultural Economics 112, Applied Behavioral Science 163, 170, Political Science 153, 189)

Internship in Recreation Management, Environmental Studies 192

Minor Adviser: R. A. Johnston (Environmental Studies).

Courses in Environmental Biology and Management

Questions pertaining to courses in Environmental Biology and Management should be directed to the Environmental Biology and Management advising office, 2134 Wickson Hall. See also Environmental Policy and Management listing following Environmental Horticulture.

Environmental Management

Option

Resource policy evaluation, Environmental Studies 162

Microeconomics, Economics 100 or 104 or Agricultural Economics 100A

Bureaucratic decision making, Environmental Studies 156, or Political Science 182

Environmental management, Environmental Studies 179

Statistical analysis, Agricultural Economics 105 or Sociology 190, or Statistics 106

Management of a natural resource, two courses from one of the following three groups:

Animal Resources: Range Science 130, or Wildlife and Fisheries Biology 110, 111, 120, 122, 151, 154, or Environmental and Resource Science 101, or Environmental Studies 123.

Forest and Rangeland Resources: Environmental and Resource Science 2, or Range Science 133, 134.

Air, Water, and Soil Resources: Environmental and Resource Science 131, or Water Science 41, 103, 122, 141, or Geology 162, or Soil Science 118, or Environmental Studies 151 and 151L, 155, and 155L.

Unrestricted Electives 20-62

Total Units for the Degree 180

Major Adviser: Dr. J. F. Quinn (Environmental Studies).

*Most of these courses require one or two additional chemistry or basic physiology courses as prerequisites. Plan a sequence in consultation with adviser.

*Course not offered this academic year.
Environmental Horticulure

John H. Madison, Jr., Ph.D., Professor Emeritus
Jack L. Paul, Ph.D., Professor Emeritus

The Program. Students of Environmental Horticulure learn how plants improve the environment and the quality of our lives. Plants are used to revegetate and restore disturbed landscapes, control erosion, and reduce energy and water consumption. The ornamental and horticultural aspects of the landscape contribute to the aesthetic quality of urban and rural landscapes, recreational areas, and commercial sites. This is an important aspect of the study of environmental horticulure.

Students interested in Environmental Horticulure obtain a B.S. degree in Plant Science with a specialization in Landscape Management or Landscape Horticulture (see listings under Plant Science). Students can develop an individual major with the help of an Environmental Horticulure faculty advisor and approval of the College’s Individual Major Committee. A minor in Environmental Horticulure is available to students in other majors.

Career Alternatives. Opportunities in this field include growing and/or managing plants in a variety of settings, as an urban horticulturist, greenhouse owner, or public agency or private landscape firm/corporation, park management and landscape contracting. Opportunities are also available to develop internships off-campus, and to pursue careers in the classroom and laboratory.

Related Undergraduate Programs and Graduate Studies. Students can work towards graduate majors in Agricultural Systems and Environment, Environmental Biology and Management, and Plant Science; and for graduate study, refer to the Graduate Studies section.

Related Courses. See Plant Science.

Minor Program Requirements:

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<th>Course Code</th>
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<tr>
<td>Environmental Horticulure</td>
<td>32-34</td>
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<tr>
<td>Environmental Horticulure 8</td>
<td>3</td>
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<tr>
<td>Plant Science 108</td>
<td>4</td>
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<tr>
<td>Select one of the following three courses:</td>
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<tr>
<td>Environmental Horticulure 105</td>
<td>4</td>
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<tr>
<td>Environmental Horticulure 107</td>
<td>4</td>
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<td>Select two of the following three courses:</td>
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<td>Environmental Horticulure 125</td>
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<td>Environmental Horticulure 130</td>
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<tr>
<td>Environmental Horticulure 133</td>
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<td>Select one of the following two courses:</td>
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<tr>
<td>Environmental Planning and Management 110</td>
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<td>Environmental Planning and Management 134</td>
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Minor Advisors: J.A. Harding or D.W. Burger.

Courses in Environmental Horticulure (ENH)

Lower Division Courses

1. Introduction to Environmental Horticulure/Urban Forestry (3). Weiss

Lecture—3 hours. Introductions to the use of plants to enhance the physical, visual, and social environment. The use of ecological principles in developing sustainable, low maintenance landscape systems will be presented. Career opportunities will be discussed.

2. Introduction to Environmental Plants (3). I. Barry

Lecture—1 hour; discussion—1 hour, laboratory—3 hours. Introduction to the classification, nomenclature, and variation of environmental plants. The use of floral and botanical basics and the identification of unknown plants, characteristics of plant groups and the development and maintenance of cultivars. Identification of 150 common landscape plants.

3. Landscape Horticulture for the Home and Community (3). M. Burger

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growth of turf, flowers, and herbaceous and woody plants in the landscape.

4. Internship (1-12). I, II, III. The Staff (Department Chairperson in charge)

Internship—3 to 36 hours. Prerequisite: lower division standing, Biological Sciences 1C or Plant Science 2 or 10, and consent of instructor. Work experience off and on campuses in lower division and upper division courses, field excursions, and park management. Internships supervised by a member of the faculty. (F&P grade only.)

5. Special Study for Lower Division Students (1-5). I, II, III. The Staff (Chairperson in charge) (F&P grade only.)

Upper Division Courses

100. Urban Forestry (3). I. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C, Agricultural Systems and Environment 2. Principles and practices of planning and managing urban vegetation. The basics of tree appraisal, natural resource inventory, and development of long-term urban forest management plans will be covered.

102. Physiological Principles in Environmental Horticulture (4). I. Sachs

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C. Physiological principles and processes essential to floriculture, nursery crop production, cultivation and landscape horticulture. Emphasis on understanding and manipulating the development for a broad species range in greenhouse and extensive landscape environments.


Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2 or Biological Sciences 1C. Classification and identification of exotic and native species used in the western landscape. Emphasis on plant adaptations to environmental variation, patterns of morphological diversity and phylogenetic relationships of plants that are important factors in the human environment.

107. Herbaceous Environmental Plants (4). I. Harding

Lecture—2 hours; discussion—1 hour, laboratory—3 hours. Prerequisite: introductory course in environmental plants (course 5) or in plant taxonomy (Botany 108). Evolutionary relationships, hybridization, selection and cultural use of herbaceous, ornamental plant materials with emphasis on factors controlling adaptation and propagation for landscape and turfgrass systems.

125. Ground Cover and Nursery Crop Production (5). I. Napoli, Lieth

Lecture—3 hours; discussion—1 hour, laboratory—3 hours. Prerequisite: Plant Science 2. Principles and techniques necessary for the greenhouse and nursery production of ornamental crops.

130. Turfgrass and Amenity Grassland Utilization and Management (4). I. Wu

Lecture—2 hours; discussion—1 hour, laboratory—2 hours. Prerequisite: Biological Sciences 10 or Plant Science 2. Utilization and management of amenity and landscape grassland systems. Emphasis on biology of grass species, ecology and culture practice of sports turf, landscape, and turfgrass grassland systems, social and environmental benefits, environmental impact, and integrated management systems.

133. Woody Plants in the Landscape: Growth, Ecology and Management (4). I. Berry

Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C or the equivalent preparation in plant biology. Principles and practices of managing trees and shrubs in the urban landscape. Systems include woody plant form; growth response and adaptation; tree management in relation to soil, moisture, climate, plant problems.

192. Internship (1-12). I, II, III. The Staff (Department Chairperson in charge)

Internship—3 to 36 hours. Prerequisite: completion of 84 units, two upper-division courses in Environmental Horticulture appropriate for the internship, and consent of instructor. Work experience off and on campuses in lower division and upper division courses, field excursions, and park management. Internships supervised by a member of the faculty. (F&P grade only.)

197T. Tutoring in Environmental Horticulture (1-4). I, II, III. The Staff (Chairperson in charge)

Tutoring—4 to 8 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course with a grade of C or better; consent of instructor. Leading discussion sections, conducting laboratory exercises, and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conference on subject matter and instructional techniques.

*Course not offered this academic year.
Courses in Environmental Planning and Management (ENP)

Questions pertaining to the following courses should be directed to the instructor.

Upper Division Courses

110. Urban and Regional Planning (4) II. Gold (Environmental Horticulture)
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: upper division standing. The history, nature, scope, and significance of planning in America with emphasis on basic definitions and concepts, the planning process and comprehensive plan, significant problems and potentials, design alternatives, the future, innovation, and the profession.

134. Recreation Planning (4) III. Gold
Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: courses 110, 116. Description of basic concepts, principles, techniques and methods used to prepare park, recreation, and open space plans for urban environments.

Environmental Planning and Management
See Environmental Biology and Management; and Environmental Horticulture

Environmental Policy Analysis and Planning

(Collage of Agricultural and Environmental Sciences)

The Major Program

The major in environmental policy analysis and planning develops an understanding of governmental policy-making and skills for analyzing policy in fields related to environmental quality.

Students interested in this major should apply to the Expository Program. Applications to the major are accepted from Exploratory students on a continuing basis.

The Program. This major provides students with a general background in the natural sciences relevant to environmental policy. It also provides sufficient training in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options. A strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation is included. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water pollution control, or energy.

Career Alternatives. Environmental policy analysis and planning graduates are prepared for employment in public agencies, consulting firms, and businesses concerned with environmental affairs. The major is also excellent preparation for students who want to go on to graduate work in law, planning, public policy, or management.

B.S. Major Requirements:
(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser. Courses shown without parentheses are required.)

Units

English Composition Requirement—10-11 See College requirement—0-8
Additional English (English 102 concurrently with Environmental Studies 1)—3
Preparatory Subject Matter—51-58
Biological sciences (100, 101, 102) Biology (100, 101, 102) 1-10 4-5
Chemistry (Chemistry 2, 2A, 2B) 10
Computer science (Agricultural Systems and Environment 21, Engineering 5, Computer Science 15, 10, 10) 3-4
Economic principles (Economics 1, 1B, 3) 10
Environmental science (Agricultural Systems and Environment 11, Biological Sciences 15, 15B, Geography 1, Geology 1, Hydrologic Science 11, 15, 104, Plant Science 10, Soil Science 1) 3-5
Environmental studies (20) 4
Mathematics (Mathematics 16A, 16B, or 21A, 21B) 8-9
Physics (Physics 1A, 1B, 2A) 3
Political science (Political Science 1) 4
Statistics (Statistics 13, 32) 3-4

Breadth/General Education Requirement—6-24
Satisfaction of General Education requirement—6-24

Depth Subject Matter—37-40
(Students must take these units on a letter grade basis, and must attain an average grade-point average of 2.00 or higher in the Depth Subject Matter courses.)

Core Courses

Environmental Studies 160 4
Environmental Studies 161, 162, 163, 164 3-4
Environmental Studies 165 4
Environmental Studies 166 5
Environmental Studies 167, 168 3-4
Environmental Studies 167, 168 3-4
Environmental Studies 169 4

Research Methods

Environmental studies 178, or Sociology 103, 104 4
Sociology 106 or Agricultural Economics 106 or Statistics 13 3-4

Economic Analysis

Economics 100, 101, 102, or Agricultural Economics 100A 4-5
Agricultural Economics 176 3

Areas of Specialization (choose one) 17-23

Advanced Policy Analysis Option

Political institutions (Political Science 102, 105, 105, 165, Environmental Studies 165) 2-3
Policy behavior (Political Science 164, 165, 170) 4
Science policy (Environmental Studies 165) 4
Policy evaluation research (Environmental Studies 165) 4
Policy evaluation (Civil and Environmental Engineering 153, 160, Agricultural Economics 1) 3

City and Regional Planning Option

Urban design (Art History 166, Environmental Biology and Management 110, Landscape Architecture 40 recommended) 3-4
Urban geography, 156 4
Transportation planning (Civil Engineering 160) 3

Environmental Impact assessment (Soil Science 118, Environmental Studies 179) 3-4
Urban economics (Economics 120) 3-4
Urban politics (Political Science 162, 163) 4
(Enroll for Environmental Studies 173 for law requirement under Depth Subject Matter above.)

Energy Policy Option

Energy policy (Environmental Studies 167) 4

Environmental Science Option

Students choosing the Environmental Science area of specialization must consult with a faculty advisor to identify an emphasis within this specialization and to select suitable courses. Possible areas of emphasis are: biological conservation, pollutants in the environment, hydrology, and environmental planning. In the presence of environmental hazards. If you are considering this area of specialization, please contact the major adviser as soon as possible.

Recreation Policy Option

Internship in Recreation Management, Environmental Studies 192 4
Public Land Management, Environmental Studies 172 4
Urban recreation (Environmental Planning and Management 134, Physical Education 150) 3-4

Endowment policy (Environmental Studies 167, Engineering 163) 4

Air quality (Environmental and Resource Sciences 131) 3

Energy and environmental aspects of transportation (Environmental Studies 163) 3

Water Quality Option

Water resource management (Environmental Studies 126, Environmental Toxicology 101, Geography 162) 4
Water pollution (Hydrologic Science 121, Soil Science 110) 2-3
Freshwater systems (Hydrologic Science 122, Environmental Studies 161) 3-4

Field and laboratory methods (Hydrologic Science 122, Environmental Studies 151) 2-3

Water chemistry (Hydrologic Science 123, 124) 3-4

Hydrology (Hydrologic Science 141) 3

(Enroll in Hydrologic Science 150 for law requirement under Depth Subject Matter above.)

Unrestricted Electives 24-59

Total Units for the Degree 180

Major Adviser. B. H. Schwartz (Environmental Studies).
Minor Program Requirements

The faculty for environmental policy analysis and planning offers the following two minors. The Energy Policy minor is for students from any major seeking basic training in energy. Energy Policy, Impacts and Policy analysis methods applied to energy systems. The second minor is intended for natural and social science students desiring basic training in policy analysis theory and methods.

Energy Policy
Preparation: Economics 1A: basic course in political science.
Environmental and Resource Sciences 3 or Environmental Studies 126 or Environmental Toxicology 101
Environmental and Resource Sciences 103 or Environmental Studies 115
Environmental Studies 169
Environmental Studies 167 or Political Science 171

Energy Policy Analysis
Preparation: Economics 1A: basic course in political science.
Environmental Studies 110, 160, 161, 166, 168A
Environmental Studies 171 or 179

Minor Adviser, S.J. Schwartz (Environmental Studies)

Environmental Studies

(Intercollege Division)

Alan M. Hastings, Ph.D., Chairperson of the Division
Division Office, 2123 Wickson Hall (914-752-3026)

Faculty
Theodore C. Foin, Jr., Ph.D., Professor
Charles R. Godman, Ph.D., Professor
Susan P. Harrison, Ph.D., Assistant Professor
Alan M. Hastings, Ph.D., Professor
Robert A. Johnston, M.S., Professor
Benjamin S. Orlove, Ph.D., Professor
James F. Quinn, Ph.D., Associate Professor
Eliska Rejnakova, Ph.D., Assistant Professor
Peter J. Richardson, Ph.D., Professor
Paul A. Sahalier, Ph.D., Professor
Thomas W. Schoener, Ph.D., Professor (Evolution and Ecology)
Christine Schonewald-Cox, Ph.D., Assistant Adjunct Professor
Seamus I. Schwartz, Ph.D., Professor
Daniel Sperling, Ph.D., Professor (Environmental Studies, Civil and Environmental Engineering)
Geoffrey A. Wandsford-Smith, Ph.D., Associate Professor (Environmental Studies, Political Science)
James W. Wilen, Ph.D., Professor (Environmental Studies, Agricultural Economics)

Emeritus Faculty
William J. Hamilton, III, Ph.D., Professor Emeritus

The Program of Study

The intercollege Division of Environmental Studies is a teaching and research unit offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The Division offers Bachelor of Science degrees in Environmental Biology and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Studies also support 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 College regarding individual majors in the College of Agricultural and Environmental Sciences (see Individual Major in the Programs and Courses section).

Current Information
Through its continuing 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.

Graduate Study
The faculty of the Division offers graduate instruction through the M.S. and Ph.D. degree programs of the Graduate Group in Ecology, as well as through the graduate programs of the disciplines with which they are associated, such as agricultural economics, zoology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecology should be obtained from the Chairperson of the Graduate Group in Ecology.

Graduate Adviser, T.C. Foin (Ecology)

Courses in Environmental Studies (EST)

Lower Division Courses

1. Environmental Analysis (4) II. Quinn, Moyle Lecture—3 hours; discussion—1 hour. Prerequisite: English 1 or 101. Credit, 3 hours. Environmental science 1A, 1B, Biological Sciences 1A, and Political Science 1 recommended. Analysis of the physical, social, and political interactions which constitute environmental problems, including production of energy and development and conservation, pollution, and the conservation of natural resources. Emphasis on analysis of problems and the consequences of proposed solutions.

2. Introduction to Environmental Studies (4) I. Wandsford-Smith Lecture—3 hours; discussion—1 hour. Prerequisite: environmental science recommended. Survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered in integrative case studies, and features individual reading in environmental problems. Not open for credit to those who have had credit from General Education credit: Contemporary Societies.

30. The Global Ecosystem (3) III Richerson Lecture—3 hours; one day field trip. Prerequisite: Biological Sciences 10 or Geography 1 or Anthropology 2. The interaction of climate and biotic adaptations and the production and functioning of ecological systems. The limits and opportunities for human use of different natural environments, and human utilization of the earth's biotic resources. General Education credit with concurrent enrollment in course 30G. Nature and Environment.

30G. The Global Ecosystem: Laboratory/Discussion (2) III Richerson Laboratory/discussion—3 hours. Prerequisite: course 30 concurrently. Presents natural history skills in plants and animal identification, soils, and geology. Emphasis on the diverse organisms and habitats of Northern California. General Education credit with concurrent enrollment in course 30G. Nature and Environment.

92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off campus in any subject area of interest offered in the College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. For lower division students. (P/NP grading only.)

Upper Division Courses

100. General Ecology (4) I. Harrison Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements), elementary calculus. Ecological principles of biotic systems, emphasizing conditions and ecosystems. Principles of growth, regulation, distribution, structure, energetics, and mineral cycles related to the evolution of biotic systems and applications to selected human-ecological problems.

101. Human Ecology (4) II. Richerson, Mulder Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 30. Anthropology 1, 2, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101; General Education credit: Contemporary Societies.

(a) Environmental Science

110. Principles of Environmental Science (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 5A, Mathematics 16A or 16B, and Biological Sciences 1A. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.

115. Bioenvironmental Consequences of Nuclear Technology (3) III. Raabe Lecture—3 hours; field trip to nuclear power station. Prerequisite: a course in biology. Biophysical implications of radiological and mechanical effects generated by nuclear technology. Hazards evaluation based on predictions of the most sensitive physiological response. Offered in alternate years.

116. The Oceans (3) I. Spero, II. Cowen Lecture—3 hours. Introductory survey of the marine environment; oceanic physical phenomena, chemical constituents, geological history, the sea's biota, and utilization of marine resources. Same course as Geology 116. General Education credit with concurrent enrollment in course 116G. Nature and Environment.

116G. The Oceans: Discussion (2) I. Spero, II. Cowen Discussion—2 hours. Prerequisite: course 116. Geology 116 concurrently. Scientific method applied to the discovery of the processes, biota, and history of the oceans. Group discussion and preparation of papers on related topics. General Education credit with concurrent enrollment in course 116; Nature and Environment. (Same course as Geology 116G.)

(b) Ecological Analysis

121. Population Ecology (4) I. Hastings Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B, 1C, Mathematics 16A-16B. Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and solving them by teaching students to make predictions and solve problems. Offered in alternate years.

123. Introduction to Field and Laboratory Methods in Ecology (4) II. The Staff 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 of study used by population ecologists and community ecologists are included and emphasis will be placed on experimental design, scientific writing, and data analysis.

*Course not offered this academic year.
124. Marine and Coastal Field Ecology (10) Extra session summer. Chow Lecture—6 hours; discussion—4 hours; seminar—1 hour; laboratory—18 hours (Summer Session I). Prerequisite: Biological Sciences 1A; Statistics 13 course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current ecological theory and problems with emphasis on marine populations. Emphasis on laboratory techniques and evaluation of qualitative field research.

126. Environmental and Occupational Epidemiology (4). I. Beaumont Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in statistics and upper division standing. Methods and contemporary issues in environmental and occupational epidemiology. Effects of carcinogens, reproductive hazards, lifestyle factors, air and water pollution, infectious agents, and other hazards on human populations. Discussion of epidemiological study designs, biases, and risk assessment.

128. Analysis and Simulation of Complex Systems (3) III. Foin Lecture—3 hours. Prerequisite: Mathematics 168 or 21B; Statistics 102; upper division standing in the biological or social sciences. Analysis of systems and construction of simulation models of ecological and socioeconomic systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

128L. Modeling Complex Systems (3) III. Foin Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: course 102. Studies of habitats concurrently. Simulation modeling using DYNAMO. Students complete a series of exercises from model formulation to model experiments and develop a term project of their own choosing.

129. Physical Biology (3) III. The Staff Lecture—3 hours. Prerequisite: Chemistry 2B, Physics 1B, and Biological Sciences 1A and 1B. Comparative and evolutionary study of organismic responses and adaptations to the physical environment. Body size and metabolism, gas and nutrient exchange, thermoregulation, biomechanics, locomotion, and selected topics in current research.

132L. Physiological Ecology Laboratory (3) III. The Staff Laboratory—6 hours. Prerequisite: course 122 (may be taken concurrently) or the equivalent. Methods for monitoring physical variables in aquatic and terrestrial environments, and the minimal responses to them. Water balance, respiration, and thermoregulation are demonstrated and a bicovertive approach is considered. Enrolment limited.

(c) Cultural Ecology

133. Cultural Ecology (4) III. I. Olrove Lecture—3 hours; discussion—1 hour. Comparative survey of the human sciences. Lecture 129. How do social scientists view the world? An introduction to the major topics in cultural studies and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Anthropology 133.) General Education credit: Contemporary Societies.

(d) Aquatic Ecosystems Analysis

150A. Physical and Chemical Oceanography (4) I. McClain, Spero Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/G110, Physics 9B, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater; fluid dynamics; air-sea interaction; currents, waves, tides, mixing, major oceanic geo-chemical cycles. (Same course as Geology 50A.)

150B. Geological Oceanography (3) I. McClain (Geology) Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 50B.)

150C. Biological Oceanography (3) III. The Staff Lecture—3 hours. Prerequisite: Biological Sciences 1A and 1 course in general ecology, or consent of instructor. Special emphasis on major marine habitats including intertidal, shelf, benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to marine ecosystems of the Pacific Ocean. (Same course as Geology 50C.) Offered for alternate years.

151. Limnology (4) III. C. Goldman Lecture—3 hours; discussion—1 hour; special project. Prerequisite: Biological Sciences 1A and 1 junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

151L. Limnology Laboratory (3) III. C. Goldman Laboratory—6 hours; two weekend field trips. Prerequisite: course 151 (may be taken concurrently); junior, senior or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.

155. Wetland Ecology (3). I. Remarkova Lecture—3 hours. Prerequisite: course 100 or Botany 117; course 110 or 151 recommended. Introduction to wetland ecology. The structure and function of major wetland types. Includes course 1, 10, 110. Biological Sciences 1A, Environmental Toxicology 10, or Resource Sciences 100; English 1 and Political Science 1 recommended; introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. General Education credit: Contemporary Societies.

160. Environmental Decision Making (4) II. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, intermediate statistics, course 1 and course 166 or Political Science 182; upper division standing or consent of instructor. Alternative models of environmental policymaking, and applications of cost-benefit analysis to extemalities for decision making in the U.S. and California.

161. Environmental Law (4) II. Wandesforde-Smith Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science. Introduction to chemical and biological sciences, public policy, and law and the political analysis of regulatory and administrative controversies. Selected readings of classic texts.

162. Recreation Policy Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; Agricultural Economics 147 or 176; Environmental Biology and Management 127. Introduction to major issues and evaluative techniques in the analysis of outdoor recreation policy. Principles of valuation and economics in the protection of resources, and the problem of conflict resolution. Offered in alternate years.

163. Energy and Environmental Aspects of Transportation (3) III. Sperling Lecture—3 hours; Prerequisite: Civil Engineering 160 recommended. Application of engineering, economic, and system planning concepts to the analysis of energy, air quality, and other selected environmental attributes of transportation technologies. Investigation of strategies for reducing pollution and petroleum consumption in light of political and social constraints. (Same course as Civil Engineering 163.)

164. Ethical Issues in Environmental Policy (4) III. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: courses 160, 168A; seniors only in Environmental Policy Analysis and Planning concentration. Analysis of fundamental moral principles. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policy-making.

165. Science, Experts and Public Policy (4) II. Christ Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 162 or Political Science 108 recommended. Analysis of factors reflecting the influence of experts, and other experts in policymaking. Several cases and controversies will be examined.

166. Policy-Making in Natural Resource Agencies (4). Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, Statistics 13. Analysis of factors affecting decision-making within administrative agencies responsible for managing natural resources, such as the Forest Service and EPA. Emphasizes critical examination of written materials. General Education credit: Contemporary Societies.

167. Energy Policy (41). Johnston Lecture—4 hours. Prerequisite: Resource Sciences 3 or Engineering 169; course 161 or Political Science 101, 107, or 109. Overview of U.S. energy policy; policy analysis, philosophy and methods; major policy issues, such as renewable vs. nonrenewable; and applications of policy analysis to problems. General Education credit: Contemporary Societies.

168A. Methods of Environmental Policy Evaluation (5) I. Schwartz Lecture—3 hours; discussion—1 hour, term paper. Prerequisite: Statistics 100 or Agricul tural Economics 105A; Mathematics 168 or 21B; and course 1; upper division standing. Evaluation of alternatives for solution of complex environmental problems. Implicit analysis, cost-benefit analysis, technical analysis, decision making under uncertainty, and multiobjective evaluation.

168B. Methods of Environmental Policy Analysis (4) I. Schwartz Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on research and writing; evaluation of literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. Students will apply the methods and concepts by means of a major project.

(f) Environmental Planning

171. Environmental Planning (4) III. Johnston Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; a course in social science and a course in environmental science. Laws, institutions, design and analysis methods, and means of implementation of plans for land use, air and water quality, transportation, and energy are examined. Theoretical and practical readings are used. Political and technical problems common to all planning processes emphasized.

172. Public Lands Management (4). I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Investigation of alternative approaches to public lands management at federal, state, and local levels. Role of the federal government in land resource management. Credit: Contemporary Societies.

175. Natural Resource Economics (3) I and II. Lehr Lecture—3 hours; Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts
Environmental Toxicology

and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries and wildlife populations), and non-renewable resources (minerals and energy resources, soil). (Same course as Agricultural Economics 175.)

178. Applied Research Methods (4) I. The Staff Lecture—3 hours; laboratory—2 hours. Prerequisite: Statistics 103 or Sociology 105 or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey of research methods with emphasis on data collection techniques, demographic analysis, basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data.

179. Environmental Impact Reporting (3) I. Johnston Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing; Biological Sciences 1A; one course from the following: course 1, 10, 110, Environmental Toxicology 10, or Resource Sciences 100. Methods of analysis used in environmental impact reporting. Emphasis on effective writing, review and management of impact reports in the context of national democratic planning systems.

(g) Other Courses

180. Workshops on Environmental Problems (1-3) I, II, III. The Staff Laboratory—2–16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary teams guided by faculty and lay professionals. The teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff (Department Chair person in charge) Internship—3–36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off-campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

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

Graduate Courses

212A. Environmental Policy Analysis (4) III. Sabatier Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Critical analysis of major policy-making process, with particular emphasis on conceptual and methodological issues. Offered in alternate years. (Same course as Sociology 212A.)

212B. Environmental Policy Analysis: Evaluation (4) III. Schwartz Lecture—1 hour; discussion—1 hour; seminar—2 hours; independent evaluation project. Prerequisite: Economics 100 (or the equivalent), course 148A or the equivalent courses in policy analysis or resource economics), intermediate level statistics (e.g. Sociology 100 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs, and plans. Emphasis on professional preparation. Offered in alternate years. (Same course as Ecology 212B.)

228. Advanced Simulation Modeling (3) III. Foin Lecture—1 hour; laboratory—1 hour. Prerequisite: courses 128-128L, Statistics 108 or Agricultural Economics 106. Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Later half of course will introduce model evaluation in ecological and social system models.

228L. Modeling Laboratory (3) III. Foin Laboratory—2 hours; modeling and computing—7 hours. Prerequisite: courses 128-128L; course 228 concurrently or completion of course 128. Students are expected to complete a series of exercises on advanced topics in modeling and a term project based on their graduate research.

296. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing. (SU grading only.)

Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Takayuki Shibamoto, Ph.D., Chairperson of the Department

Department Office, 4138 Meyer Hall (916-752-1142)

Faculty

Michael S. Donison, Ph.D., Associate Professor
Bruce D. Harnack, Ph.D., Professor
Environental Toxicology, Entomology

Dennis P. H. Hopper, Ph.D., Professor
Theodore L. Hullah, Ph.D., Professor
Fumio Matsunuma, Ph.D., Professor
Marion G. Miller, Ph.D., Associate Professor
Clayton A. Keene, M.S., Lecturer
Robert H. Rice, Ph.D., Professor
James N. Seiber, Ph.D., Professor
Takeyuki Shibamoto, Ph.D., Professor
Michael W. Stimmel, Ph.D., Lecturer
Barry W. Wilson, Ph.D., Professor (Environmental Toxicology, Avian Sciences)

Emeriti Faculty

Richard G. Burau, Ph.D., Emeritus Professor
Donald G. Crosby, Ph.D., Emeritus Professor
Wendell W. Kilgore, Ph.D., Emeritus Professor
Ming-yu Li, Ph.D., Emeritus Professor
Way W. Winterhal, M.S., Emeritus Professor

The Major Program

Students in environmental toxicology study toxic substances which are found in our personal, occupational, community, and global environment. These substances are, where they are distributed and what happens to them, how they work, and detecting and analyzing these substances are the central focus of study. A special concern is with human-made toxicants such as pesticides, industrial chemicals, food additives, and environmental pollutants; but toxic substances that occur naturally in the environment (including heavy metals and toxic substances produced by plants, pests, molds, and bacteria) are also of concern.

The Program.

The study of environmental toxicology draws heavily from preparatory courses in biology, chemistry, microbiology, and physics. The major course offers an understanding of the chemical, biological, and legal aspects of environmental toxicology (legislation concerning pollution, pesticides, food additives, and consumer protection) as well as providing in-depth treatment of toxic substances. Students can specialize in any of several areas of environmental toxicology—for example chemical analysis, environmental monitoring, animal toxicology, or environmental health and safety—by choosing electives in these areas.

Internships and Career Alternatives. Research positions in both university and private laboratories, as well as with governmental regulatory agencies in nearby Sacramento, are examples of current internship openings for environmental toxicology majors. Approximately half of the undergraduates completing the environmental toxicology program elect to go on for advanced degrees in toxicology, pharmacology, public health, or the medical sciences. Others with the B.S. degree have found jobs with government agencies, universities, in industry, research and consulting firms, and with laboratories. Those students who specialize in the physical sciences in their study of toxicants would qualify for positions in residue analysis, environmental monitoring, and forensic toxicology. Those emphasizing the biological sciences would qualify for similar positions in animal toxicology, environmental health and safety, and pest control.

B.S. Major Requirements:

(For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses where possible; equivalent or more comprehensive courses may be substituted with advisor's approval. Courses shown without parentheses are required.)

UNITS

English Composition Requirement .......................... 6-8
See College requirement.

Preparatory Subject Matter .......................... 51-70
Biological sciences (Biology 1A, 1B, 1C) ................. 15
Chemistry (Biology 2A or 2B or 2C, or 2AH or 2CH) ... 21-24
Biology 10 or 118A or 118B or 118C .................. 12-24
Computer science (Agricultural Systems and Environment 21) .................. 3
Environmental sciences (Environmental Toxicology 10 or Environmental Studies 10) .................. 3-4
Mathematics (Mathematics 1A or 2A or 3A or 3B) ........ 6-4
Physics (Physics 1A or 2A or 5A or 5B) .................. 6-6
Statistics (Statistics 3A or 3E or 4A) .................. 4

Breadth/General Education .......................... 36
Satisfaction of the General Education requirement to include courses selected with advisor's approval to complement the major (courses in agricultural economics, environmental studies, political science, psychology, and sociology are particularly recommended). .................. 24
Additional breadth in humanities and social sciences .................. 12

Depth Subject Matter .......................... 29-30
Genetics and/or Biotechnology (Biology 101, 102, 103) .... 6-7

Restricted/Others Electives .......................... 24
Electives selected for area of specialization with advisor's approval.

Unrestricted Electives .......................... 13-29
Total Units for the Degree .......................... 180

Major Adviser. R.H. Rice

Advising Center for the major is in 4111 Meyer Hall (916-752-1042)

Minor Program Requirements:

UNITS

Environmental Toxicology .......................... 18
Environmental Toxicology 101, 112A, 114A, 138, 139
Elective courses 6 units minimum, selected from Environmental Toxicology 10, 128, 130A-E, 131, 132, 135, 190, 198 and 199 (4 units combined maximum) .................. 6

Minor Adviser. M.G. Miller.

Graduate Study. Programs of study leading to M.S. and Ph.D. degrees are available through related Graduate Groups such as Pharmacology and Toxicology, Ecology, and Agricultural and Environmental Chemistry. For information on graduate study, contact the Admin. Office of the appropriate graduate program. Refer also to the Graduate Studies section in this catalog.

Graduate Advisers. J.A. Last, B.W. Wilson (Pharmacology and Toxicology), T. Shimamoto and D.P.H. Hsieh (Agricultural and Environmental Chemistry).

Courses in Environmental Toxicology (ETX)

Lower Division Courses

10. Introduction to Toxicology (3) I, II. Hsieh Lecture—3 hours. Prerequisite: open to science and non-science majors. Study of some natural and man-made toxic substances in personal, occupational, community, and global environments. Emphasis placed upon occurrence, properties, and effects of toxic substances. Biological and physical factors which alter fate of substances are described.

99. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (PINP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

101. Principles of Environmental Toxicology (3) I. Denison Lecture—3 hours. Prerequisite: Chemistry 88B, 128B, or the equivalent; Biological Sciences 102 recommended. The fate, consequences, and assessment of toxicants in environmental and biological systems. Classes of environmental toxicants discussed include pesticides, air and water pollutants, phytotoxins, mycotoxins, food borne toxicants, and heavy metals.

112A. Toxins in the Environment (3) III. The Staff Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence environmental compartion, transport, and transformation of environmental pollutants which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants.

112B. Toxins in the Environment (4) III. Hsieh Lecture—3 hours. Laboratory—3 hours. Prerequisite: Chemistry 5; course 112A, consent of instructor. Continuation of 112A. Toxic chemicals—primarily pollutants and environmental contaminants. Effects of toxic substances on living organisms. Topics to be covered: fate and mechanism-of-action of representative toxins, types of effects, symptoms, and antidotes.

114A. Biological Effects of Toxics (3) III. Rice Lecture—3 hours. Prerequisite: Biological Sciences 103 (may be taken concurrently); course 101 and Physiology 110 recommended. Course designed to illustrate biological effects of toxic substances in living organisms. Topics to be covered: fate and mechanism-of-action of representative toxins, types of effects, symptoms, and antidotes.

114B. Biological Effects of Toxics: Experimental Methods (3) III. Miller Lecture/discussion—2 hours; discussion/laboratory—4 hours. Prerequisite: course 114A and consent of instructor if non-major. Illustrates basic principles of toxicochemistry and acquaints students with laboratory techniques for evaluating potential toxicity of chemicals. Continuation of course 114A. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

126. Food Toxicology (3) III. Shimamoto, Gruenwedel (Food Science and Technology) Lecture—3 hours. Prerequisite: Biological Sciences 110A and 130B, or consent of instructor. Toxins in foods: occurrence, identification, and prevention. Analysis of food and toxic substances. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128B.)

130A-E. Selected Topics in Environmental Toxicology (3) I, II, III. The Staff (Chairperson in charge) Lecture/discussion—3 hours. Prerequisite: consent of instructor; course 101 recommended. Selected topics of current interest in environmental toxicology. Topics will vary each term the course is offered, and will emphasize such areas as the microbiology of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in food, and the safety handling of toxic substances.

131. Air Pollutants and Inhalation Toxicology (3) III. Last (Internal Medicine) Lecture—3 hours. Prerequisite: Chemistry 88B (may be taken concurrently) or the equivalent; Biological Sciences 102 recommended. Chemistry of air pollutants in the environment and the occupational environments. Environmental factors, biological effects, air-quality criteria and standards, and pulmonary responses to these pollutants.

132. Chromatography for Analytical Toxicology (4) II. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 88B or the equivalent (may be taken concurrently); consent of instructor. Application and theory of basic chromatographic techniques such as thin-layer, gas-liquid, high-pressure liquid and column chromatography useful for analytical toxicology; residue analysis comprises one-third of course.

135. Health Risk Assessment of Toxicants (3) III. Hsieh Lecture—3 hours. Prerequisite: course 101; course 114A recommended. Current practices of health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals.

138. Legal Aspects of Environmental Toxicology (3) III. Stamm Lecture—3 hours. Prerequisite: consent of instructor; courses 10 and 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, carcinogens, consumer protection, and occupational exposure to toxic substances; roles of Federal regulatory agencies; alternatives to governmental control.

146. Exposure and Dose Assessment (3) III. Mckone, Layton Lecture—3 hours. Prerequisite: course 112A required; course 135 recommended. The exposure component of risk assessment; specifically, the presence and/or formation of toxic substances in environmental media, their movement within and between contaminated media, and the contacts of human populations with those media.

190. Seminar (1-12) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Selected topics presented by students, faculty, or outside speakers covering current research and institutional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (PINP grading only.)

190C. Research Group Conference (1) I, II, III. The Staff Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (PINP grading only.)

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (PINP grading only.)

194A, 194B. Honors Research (3-5) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing, minimum GPA of 3.25, consent of instructor. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (PINP grading only; deferred grading pending completion of sequence.)

194HC. Honors Research (3, 5) I, II, III. The Staff (Chairperson in charge) Laboratory—6-9 hours; discussion—1 hour. Prerequisite: senior standing, minimum GPA of 3.25, and consent of instructor. Continuation of course 194A-194B. (PINP 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 taught. Prerequisite: background in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (PINP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (PINP grading only.)

Graduate Courses

203. Environmental Toxicants (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C or the equivalent, or Chemistry 88B and consent of instructor. Toxic chemicals: selected topics in all areas of toxicology. Selection and study of topics of interest to students. (PINP grading only.)

220. Analysis of Toxicants (3) II. Harms, Denison Lecture—3 hours. Prerequisite: course 101 and consent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations concerning detection, separation, and quantitative determination of toxicants using chemical and instrumental techniques.

220L. Analysis of Toxicants Laboratory (2) II. The Staff Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.

226. Gas Chromatography/Mass Spectrometry of Toxics (3) III. Shimamoto. Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 129C; or consent of instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentation and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students.

234. Neurobehavioral Basis of Neurotoxicology (3) II. Woolley Lecture—3 hours. Prerequisite: Physiology 110 or the equivalent; basic understanding of neurophysiology.

Course not offered this academic year.
Mechanisms of action at the cellular and systemic level of a number of different neurotransmitters and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Physiology 254.)

240. Ecotoxicology (3) III. Matsumura
Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology or the equivalent, or consent of instructor. Principles of toxicology as applied to chemical action on natural populations and ecosystems. Physical, chemical, and biological characteristics which influence toxic effects, modeling, and field research. Selected case histories are analyzed and presented in class.

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Current topics in environmental toxicology. (SU grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (SU grading only.)

297. Tutoring in Environmental Toxicology (1-5) I, II, III. The Staff (Chairperson in charge)
Hours and duties will vary depending upon course being tutored. Prerequisite: graduate standing in Environmental Toxicology, a chair major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of instructor. May be repeated for credit up to a total of 5 units. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
(SU grading only.)

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

Epidemiology
(Â Graduate Group)
Tim E. Carpenter, Ph.D., Chairperson of the Group
Group Office: 2102 Medical Sciences 1A
(Department of Medicine and Epidemiology)
975-9174

Faculty. Includes members from the Department of Medicine and Epidemiology, Division of Occupational/Environmental Health and Epidemiology, Population Health and Reproduction, Division of Statistics, and other related departments in the Schools of Medicine, Veterinary Medicine, Graduate School of Management, and the Colleges of Agricultural and Environmental Sciences and Letters and Science.

Graduate Study. The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include: environmental/occupational epidemiology; infectious disease epidemiology; epidemiologic methods; health services and economics; and metabolic, nutritional, and genetic aspects of clinical epidemiology. For detailed information regarding the program, address the chairperson of the group.

Graduate Adviser. M. Thurmond (Department of Medicine and Epidemiology, 752-6320). J. Beaumont (Division of Occupational/Environmental Health and Epidemiology, 752-8036).

Required Courses for the Program

Pre requisite Courses. Prerequisites may be taken concurrently with required courses below.
Mathematics 16A-16B or 21A-21B
Preventive Veterinary Medicine 401
Preventive Veterinary Medicine 402, 403, and 404; or Statistics 102, 106, and 108

Required Courses. These courses are required of all students in the program (M.S. and Ph.D. degrees). These requirements cannot be waived and must be met before a student's Qualifying Examination.
Epidemiology 290: Occupational and Environmental Health and Risk Assessment
Preventive Veterinary Medicine 405 or Environmental Studies 126
Preventive Veterinary Medicine 406, 407
Statistics 130A-130B or 140A-140B
Select two courses from the three groups below: (the two courses may not be from the same group)
(a) Population Health and Reproduction 202 or Statistics 144
(b) Epidemiology 222 or 223
(c) Population Health and Reproduction 203

Related Courses. For additional coursework in Epidemiology, please see Medicine and Epidemiology, Preventive Veterinary Medicine, Population Health and Reproduction, and Internal Medicine: Occupational and Environmental Health.

Courses in Epidemiology (EPI)

Graduate Courses
222. Epidemiological Modeling (3) III. Carpenter
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405. Techniques of model building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, construction and validation will be emphasized. Offered in alternate years. (Former course Epidemiology and Preventive Medicine 222.)

223. Spatial Epidemiology (3) III. Carpenter
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405 or Environmental Studies 126 or Veterinary Medicine 406. Geographic Information Systems (GIS) and spatial statistics are expected to complete a term project based on graduate research. Offered in alternate years.

250. Introduction to Clinical Research Design and Epidemiology (1) I. McCurdy, B. Hirsch
Lecture—1 hour; discussion or medical standing or medical/nursing personnel. Medical personnel who are or will be involved in medical research. Review of basic clinical study design and analysis of clinical data. (SU grading only.)

251. Environmental Epidemiology (3) III. Gold
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 405 (may be taken concurrently); upper division undergraduates who have completed Environmental Studies 126, or the equivalent. Examination of the environmental health effects and the risk of disease from community, occupational, and personal exposure to toxic substances. Offered in alternate years.

260. Epidemiology of Chronic Diseases and Aging (3) II. Hirsch
Lecture/discussion—3 hours. Overview of the epidemiology of chronic disease in old age. Topics include biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementia, functional status and prevention of disease.

270. Research Methods in Occupational Epidemiology (3) III. Beaumont
Lecture/discussion—3 hours. Prerequisite: Environmental Studies 126 or Preventive Veterinary Medicine 405; and Statistics 102 or Epidemiology and Preventive Medicine 402. Offered in alternate years.

271. Epidemiology of Diseases and Injuries in Agriculture (3) III. Beaumont
Lecture/discussion—3 hours. Prerequisite: Environmental Studies 126 or Preventive Veterinary Medicine 405, or consent of instructor. Overview of disease and injury hazards in agriculture with emphasis on epidemiologic studies. Topics include respiratory diseases, zoonoses, occupational injuries, child injury, suicide, stress, pesticide injuries and illnesses, infectious disease hazards, reproductive hazards, and cancer hazards. Offered in alternate years.

290. Seminars in Epidemiology (1-3) III. The Staff
Seminar—1 hour. Students will actively participate in presentation and discussion of ongoing or published research projects in epidemiology. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff
Seminar—1 hour. Group study in selected areas of epidemiology.

299. Research (1-12) I, II, III. The Staff
Research in selected areas of epidemiology. (SU grading only.)

Family Practice
See Medicine, School of

Feminist Theory and Research
Linda Morris, Ph.D., Program Director
Program Office, 271 Kerr Hall (975-62-4866)
Graduate Study. The program in Women's Studies offers courses leading to a designated emphasis in Feminist Theory and Research. The courses provide theoretical and interdisciplinary perspectives to students already preparing for the Ph.D. in one of the following departments (Anthropology, Comparative Literature, Dramatic Art, Education, English, French, German, History, Italian, Psychology, Spanish, and Sociology). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consist of two core courses (Women's Studies 200A and 200B) and two courses on gender, one of which must be in the student's home department. It is expected that an analysis of gender will be a central component of the student's doctoral examination and dissertation.

Graduate Adviser. Consult the Women's Studies office (975-62-4866).

Fermentation Science
(College of Agricultural and Environmental Sciences)

The Major Program
The Fermentation Science major is a program of study offering 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 specialization in biology, (wine studies), brewing science, and fermentation of other foods and beverages. Industrial fermentations and waste treatments in the production of microbial cells, drugs, enzymes, hormones, solvents, acids, and vitamins are further opportunities for study.

The Program. The major in fermentation science leads to a Bachelor of Science degree. Most of the instruction for the major is done in the Department of Viticulture and Enology and in the Department of Food Science and Technology. Students also take courses in chemistry, biochemistry, microbiology, genetics, and computer science. Electives often include additional courses in sensory science, management and viticulture.

*Course not offered this academic year.
Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

Faculty
See Textiles and Clothing.

The Major Program
The fiber and polymer science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use.

The Program. All students in this major are required to take a common core of course work in chemistry, physics, and mathematics, and to select a minor area of interest from those approved by the faculty. Students are expected to select from courses approved by the faculty in areas such as computer science and mathematical sciences. Students are also expected to select from courses approved by the faculty in areas such as computer science and mathematical sciences. The program is designed to provide a foundation for careers in the chemical and plastics industries, as well as in government and other organizations.

Career Alternatives. Graduates qualify for supervisory, technical, production, product development, quality control, research, sales, or executive positions in the food, beverage, and allied industries, in the fermentation industry, and in governmental agencies. Students who choose to continue in graduate study have done so in such areas as food science, chemical engineering, microbiology, agricultural chemistry, and biochemistry.

B.S. Major Requirements:
(For convenience in program planning the usual courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

English Composition Requirement
See College requirement
Preparatory Subject Matter
Biochemistry (Biological Sciences 102, 103)...
Biology (Biological Sciences 1A)...
Chemistry (Chemistry 2A-2B-2C, and 8A-8B or 128A-128B, 129A)...
Computer science (Agricultural Systems and Environment 21, Computer Science Engineering 10, 30, or Engineering 5)...
Mathematics (Mathematics 16A-16B or 21A-21B)...
Microbiology (Microbiology 105, 105L, 205, 250, 250L)...
Physics (Physics 5A, 5B or 5C)...
Statistics, including analysis of variance (Agricultural Systems and Environment 120 or Statistics 130)...

Breadth/General Education
Satisfaction of General Education requirement (in "Civilization and Culture" and/or "Contemporary Societies") plus additional course work in social sciences and humanities or as approved by adviser to total 24 units.

Depth Subject Matter
Choose from:
Chemistry 107A, 107B, 108, 130
Chemical Engineering 161, 206
Biology 105, 105L, 205, 250, 250L
Viticulture and Enology 1, 123, 124, 125, 127, 128, 135, 140, 168, 190, 215, 235 (to variable-unit 190: 192, 196, 299 courses allowed toward depth requirement)

(Courses in depth subject matter may not be taken on the P/NP grading basis. Overall GPA in depth subject matter must be 2.0 or greater)

Restricted Electives
Selected according to student's educational goals and upon approval by adviser.

Unrestricted Electives
Satisfaction of General Education requirement; See advising office for breadth requirement.

Depth Subject Matter
Textiles Science and Textiles 163L, 163L, 168A, 168B...
Fiber and Polymer Science 100, 150, 161...
Chemistry (Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B)...

Restricted Electives
Select courses from the following:
Computer Science and Mathematics: Agricultural Systems and Environment 21; Engineering 5; Applied Science Engineering 115, 116; Food Science and Technology 156; Mathematics 22A, 22B Chemistry:

Unrestricted Electives: 23-40
Total Units for the Degree: 180

Major Adviser: Y.L. Hsien (Textiles and Clothing).

Advising Center for the major is located in 129 Everson Hall (316-752-4147).

Minor Program Requirements:

B.S. Major Requirements:

English Composition Requirement
See College requirement
Preparatory Subject Matter
Biochemistry (Biological Sciences 102, 103)
Biology (Biological Sciences 1A)
Chemistry (Chemistry 2A-2B-2C, and 8A-8B or 128A-128B, 129A)
Computer science (Agricultural Systems and Environment 21, Computer Science Engineering 10, 30, or Engineering 5)
Mathematics (Mathematics 16A-16B or 21A-21B)
Microbiology (Microbiology 105, 105L, 205, 250, 250L)
Physics (Physics 5A, 5B or 5C)
Statistics, including analysis of variance (Agricultural Systems and Environment 120 or Statistics 130)

Breadth/General Education
Satisfaction of General Education requirement (in "Civilization and Culture" and/or "Contemporary Societies") plus additional course work in social sciences and humanities or as approved by adviser to total 24 units.

Depth Subject Matter
Choose from:
Chemistry 107A, 107B, 108, 130
Chemical Engineering 161, 206
Biology 105, 105L, 205, 250, 250L
Viticulture and Enology 1, 123, 124, 125, 127, 128, 135, 140, 168, 190, 215, 235 (to variable-unit 190: 192, 196, 299 courses allowed toward depth requirement)

(Courses in depth subject matter may not be taken on the P/NP grading basis. Overall GPA in depth subject matter must be 2.0 or greater)

Restricted Electives
Selected according to student's educational goals and upon approval by adviser.

Unrestricted Electives
Satisfaction of General Education requirement; See advising office for breadth requirement.

Depth Subject Matter
Textiles Science and Textiles 163L, 163L, 168A, 168B...
Fiber and Polymer Science 100, 150, 161...
Chemistry (Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B)...

Restricted Electives
Select courses from the following:
Computer Science and Mathematics: Agricultural Systems and Environment 21; Engineering 5; Applied Science Engineering 115, 116; Food Science and Technology 156; Mathematics 22A, 22B Chemistry:

Unrestricted Electives: 23-40
Total Units for the Degree: 180

Major Adviser: Y.L. Hsien (Textiles and Clothing).

Advising Center for the major is located in 129 Everson Hall (316-752-4147).

Minor Program Requirements:

Fiber and Polymer Science

Textiles and Clothing 6, 163L, 163L, 168A, 168B...

Courses selected from the following:
Fiber and Polymer Science 100, 150, 161, 161L...
Textiles and Clothing 163L and 163L...

Minor Adviser: Y.L. Hsien

Courses in Fiber and Polymer Science (FPS)

Upper Division Courses

100. Principles of Polymer Materials Science (3) II. Zeronian
Lecture—3 hours. Prerequisite: Chemistry 2A-2B, Chemistry 8A-8B or Engineering 45; introductory physics. The basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Engineering: Materials Science 147.)

110. Plastics in Society and the Environment (4) III. Needles
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 10 or introductory course in physical sciences. Basic concepts and methodologies in the study of plastics. Formation, classification, structure, properties, processing, and formulation. Application to societal needs, and their impact on society and the environment. General Education credit: Nature and Environment.

150. Polymer Syntheses and Reactions (3) III. Hsien
Lecture—3 hours. Prerequisite: Chemistry 128B or 8B, and Chemistry 107A. Organic and physical chemistry aspects of polymer syntheses and reactions including polymerization mechanisms, kinetics and thermodynamics for major types of organic high polymers.

161. Structure and Properties of Fibers (3) I. Zeronian
Lecture—3 hours. Prerequisite: Textiles and Clothing 6 and Chemistry 8B. The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detergents. Offered in alternate years.

161L. Textile Chemical Analysis Laboratory (1) I. Zeronian
Lecture—3 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries. Offered in alternate years.
Food Biochemistry

(Private of Agricultural and Environmental Sciences)

The Major Program

The major in food biochemistry stresses the principles of chemistry and biochemistry as related to constituents of foods and the changes which occur in the constituents before and during processing and during storage. 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.

The Program. The food biochemistry curriculum stresses a strong background in chemistry, physics, mathematics, and biology at the lower-division level. At the upper-division level, students take specialized courses in food science and technology and advanced biochemistry and nutrition. Students are encouraged to choose the appropriate area of concentration, with some emphasis in research areas such as nutrition, food processing, or toxicology.

Career Alternatives. The major employment opportunities for a food biochemistry graduate are in research and development at large food industry units; in laboratory-related employment in quality assurance, new food technology, and food analysis; or in any position requiring knowledge of biochemical techniques, such as in clinical laboratories. The major offers excellent preparation for graduate study in areas such as food science, nutrition, biochemistry, and environmental toxicology. Food biochemistry has also been chosen as a pre-professional major by students interested in medical, veterinary, or dental school.

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>Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>English Composition Requirement</td>
<td>3-11</td>
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<tr>
<td>Preparatory Subject Matter</td>
<td>25-32</td>
</tr>
<tr>
<td>Biochemistry (Biological Sciences 102, 103)</td>
<td>7</td>
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<tr>
<td>Biology (Biological Sciences 1A)</td>
<td>5</td>
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<tr>
<td>Mathematics, (Mathematics 16A-16B-16C or 21A-21B-21C)</td>
<td>9-12</td>
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<tr>
<td>Microbiology (Microbiology 102, 103)</td>
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<tr>
<td>Physics (Physics 5A-5B-5C or 9A-9B-9C)</td>
<td>12</td>
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<tr>
<td>Other (one course from Computer Science Engineering 10, 30, Engineering 5, Mathematics 22A, 22B, 22C, Statistics 13, Agricultural Systems and Environment 120)</td>
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<tr>
<td>Breadth/General Education</td>
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<td>Satisfaction of General Education requirement</td>
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<tr>
<td>Breadth/Subject Matter</td>
<td>29</td>
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<tr>
<td>Food science (Biological Sciences 102-103)</td>
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<tr>
<td>Food composition (Food Science and Technology 100A)</td>
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<td>Food composition laboratory (Food Science and Technology 101A)</td>
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<tr>
<td>Food properties (Food Science and Technology 100B)</td>
<td>3</td>
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<tr>
<td>Food biochemistry (Food Science and Technology 100C)</td>
<td>3</td>
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<tr>
<td>Food microbiology (Food Science and Technology 104)</td>
<td>3</td>
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<tr>
<td>Food science seminar (Food Science and Technology 190)</td>
<td>1</td>
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<tr>
<td>Nutrition (see option for requirements)</td>
<td>3-5</td>
</tr>
<tr>
<td>Statistics (Agricultural Systems and Environment 120)</td>
<td>4</td>
</tr>
<tr>
<td>Internship (Food Science and Technology 192)</td>
<td>3</td>
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<tr>
<td>Special study (Food Science and Technology 190)</td>
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<tr>
<td>See options for additional requirements</td>
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</table>

Select one of the following five options:

Food Technology Option

Specific course requirements | 57-58 |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Biology (Biological Sciences 1B-1C)</td>
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<tr>
<td>Organic chemistry (Chemistry 2A, 2B)</td>
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<tr>
<td>Physics (Physics 5A-5B)</td>
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<tr>
<td>Food engineering (Food Science and Technology 110A-110B)</td>
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<td>Food engineering laboratory (Applied Biological Systems Technology 110L)</td>
<td>2</td>
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<tr>
<td>Food processing (Food Science and Technology 180)</td>
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<td>Food analysis (Food Science and Technology 103)</td>
<td>5</td>
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<tr>
<td>Food microbiology laboratory (Food Science and Technology 104L)</td>
<td>4</td>
</tr>
<tr>
<td>Nutrition (Nutrition 101 or approved substitute)</td>
<td>4</td>
</tr>
<tr>
<td>Plant sanitation (Food Science and Technology 108)</td>
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<tr>
<td>Project conduct (Food Science and Technology 160)</td>
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<tr>
<td>Quality assurance (Food Science and Technology 109)</td>
<td>3</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.
Food Science and Technology

Food Science (A Graduate Group)

Charles F. Shoemaker, Ph.D., Chairperson of the Group
Group Office, 109 Food Science and Technology
Bldg. (916-752-1415)

Food Biology/Microbiology Option

Food Science and Technology (College of Agricultural and Environmental Sciences)
Erika L. Barrett, Ph.D., Chairperson of the Department
Department Office, 126 Cruess Hall (916-752-1465)

Faculty
Everett Bandman, Ph.D., Professor
Erika L. Barrett, Ph.D., Professor

*Course not offered this academic year.
modifies are preserved and converted into edible foods; regulation of food manufacture and the chemistry and microbiology of food control are discussed. Not open for credit to students who have received credit for any other Food Science and Technology course. General Education credit: Nature and Environment.

49. Processing Plant Studies (1) III. M. McCarthy Discussion—1 hour; field trips—3 hours. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

50. Introduction to Food Science and Technology (3) I. Shoenker Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 2A, Biological Sciences 1A. Introduction to fruit, vegetable, dairy, seafood and meat technology. Overview of food processes used for preservation. Important current areas include food processing operations such as cheese making, canning, freezing, fermentation and dehydration of foods.

"93. Public Issues in Nutrition and Food Science (1) I. Schneerman Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to nutrition and food science literature for the campus. (Prn grade only.) Same course as Nutrition 93.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Barrett in charge) (Prn grade only.)

Upper Division Courses

100A. Principles of Food Compostion and Properties (3) I. Russel, Dungan Lecture—4 hours; laboratory—3 hours. Prerequisite: Chemistry BA-BB. 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 Compostion and Properties (3) II. Shoenker, Shuster Lecture—4 hours; laboratory—3 hours. Prerequisite: Chemistry BA-BB. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

100C. Principles of Food Biocomposition (3) III. G. Smith, Tappel Lecture—4 hours; laboratory—3 hours. Prerequisite: Chemistry 5, 8B; Biological Sciences 103 (may be taken concurrently). An introduction to the theory and application of chemical and physical methods for determining the composition of foods. Modern separation and instrumental analysis techniques are stressed.

104. Food Microbiology (3) Barrett, C. Price Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 102. Microorganisms in food safety, spoilage, and preservation; their role in disease and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Fermentation. The development of microbes as a resource for the food industry.

104L. Food Microbiology Laboratory (4) C. Price Lecture—1 hour per week; laboratory—3 hours; 4 hours of laboratory credits. Prerequisite: Biological Sciences 103 (may be taken concurrently). An introduction to the theory and application of chemical and physical methods for determining the composition of foods. Modern separation and instrumental analysis techniques are stressed.

107. Principles of Sensory Analysis of Foods (4) I. II. The Staff Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Systems and Environment 120 or the equivalent course in statistics. Nature of sensory responses with emphasis on aroma, taste, and texture of foods; critical of analytical laboratory methods; relation of sensory data to chemical and instrumental measurements; collection and statistical analysis and interpretation of sensory data.

108. Food Processing Plant Sanitation (3) III. Moser Lecture—4 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, Biological Sciences 103. A discussion of factors relating to sanitation control of food processing facilities, including washing water treatment, chemical and physical sanitizing agents, principles of cleaning and hard surface detergency; metal corrosion, concepts in the disposal of wastes and the pertinence of government control agencies.

110A. Physical Principles in Food Processing (3) I. K. C. McCarthy Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 5A and 5B or the equivalent; calculus recommended. Not open for credit to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and problem solving.

110B. Heat and Mass Transfer in Food Processing (3) I. Singh Lecture—2 hours; laboratory—2 hours. Prerequisite: course 110A or the equivalent. Applied Biological Systems Technology 101L recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation heat transfer; microwave heating, refrigeration, freezing, psychrometrics; mass transfer during drying and storage.

117. The Senses, Sensory Measurement, Psychophysics, and Food (4) I. O'Mahony Lecture—4 hours. Prerequisite: Biological Sciences 1A; Statistics 13 or Agricultural Systems and Environment 120 (may be taken concurrently). Structure and function of sensory receptor systems; psychological and physiological variables affecting sensory responses. Critical examination of modern psychophysical methods for the investigation of the mechanisms of human sensory systems. Problems of sensory measurement and their relation to food flavor.

119. Chemistry and Technology of Milk and Dairy Products (4) III. Hand Lecture—4 hours; demonstrations and a field trip. Prerequisite: Biological Sciences 1A and 103 or equivalent. Structure and function of milk and dairy products from milk. Related chemical, microbiological, and technological principles to commercial processing in the making of milk and its products.

120. Principles of Meat Science (3) III. Bandman, Lee Lecture—3 hours. Prerequisite: Biological Sciences 1A or equivalent. Anatomical, physiological and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology and public health issues associated with meat products. (Same course as Animal Science 120.)

120L. Meat Science Laboratory (2) III. Lee (Animal Science) Lecture—3 hours. Prerequisite: Biological Sciences 1A or equivalent. Anatomical, physiological and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology and public health issues associated with meat products. (Same course as Animal Science 120.)

121. Principles of Poultry Product Technology (3) I. King (Avian Sciences) Lecture—3 hours. Prerequisite: Biological Sciences 103. An introduction to the control of enzymes and their importance. Purification methods include control of enzymes and their importance. Purification methods and characteristics of enzymes are discussed in detail. Purification techniques used on animal and plant enzymes are discussed in detail. Purification techniques used on animal and plant enzymes are discussed in detail. Purification techniques used on animal and plant enzymes are discussed in detail. Purification techniques used on animal and plant enzymes are discussed in detail. Purification techniques used on animal and plant enzymes are discussed in detail.
120L. Enzymology Laboratory (2) III. Whitaker
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103, course 123 (concurrently). Laboratory procedures involved in detection, purification, and characterization of enzymes. (Former course number: Biochemistry and Biophysics 123L.)

125. Corrosion Principles in Food Processing Interactions (3) III. Gruwedewald
Lecture—3 hours. Prerequisite: Mathematics 16B; Physics 5C; Chemistry 88B. Course presents thermodynamic and kinetic principles of container-product interactions (internal corrosion) and investigates how these interactions affect the wholesomeness of processed, canned foods.

128. Food Toxicology (3) III. Gruwedewald, Shibamoto, Environmental Sciences Laboratory
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The acceptance and safe use of food additives. (Same course as Environmental Toxicology 128.)

131. Food Packaging (3) III. Krohta
Lecture—3 hours. Prerequisite: Chemistry 5B, Biological Sciences 1A, Physics 5B. Principles of food packaging. Filling, sealing, labeling, and other processes. Properties, processing, and regulation of food packaging.

140. Food Laws and Regulations (3) I. The Staff
Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Regulations involving the regulation of the nation’s food supply and nutritional status. Philosophy underlying the application of regulatory statutes. Sources of information necessary for communication with government on public food policy involving nutrition and food development.

150. Thermal Processing of Foods (3) III. Merson
Lecture—2 hours; discussion, demonstration, and problem workshops—2 hours. Prerequisite: courses 104 and 110B or the equivalent. Theory and practical calculations of thermal processing by canning, pasteurization, and aseptic processing. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutrition, and consumer acceptance. Description and engineering analysis of thermal processing equipment.

150L. Thermal Processing Laboratory (2) III. Merson
Lecture—2 hours. Prerequisite: courses 104 and 110B; course 150 may be taken concurrently. Laboratory exercise. Study of participation in the use and application of thermal processing methods and related procedures, and the interpretation of results, including evaluation of can closures, operation of thermal equipment, operation of retorts, and testing of sterilization processes.

151. Freezing Preservation of Foods (3) II. Reid
Lecture—3 hours. Prerequisite: course 110B, Biological Sciences 1A, and Chemistry 88B; course 104 recommended. Freezing of meats and fish with emphasis on physicochemical aspects. Consequences of frozen food freezing and thawing. Modeling of freezing for predictive purposes. Visualization and characterization of frozen materials. Offered in alternate years.

156. Computer interfacing for Laboratory and Process Control (4) III. Russell
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 126 and knowledge of microcomputer use in measurement and control of laboratory instrumentation and processing operations with both theoretical and practical aspects of computer interfacing.

160. Food Product Development (2) II. The Staff (Henderson in charge)
Lecture—2 hours. Prerequisite: course 1 or 2 and 100A. Basic principles of food product research and development from concept to final product. Ideation generation and associated screening and evaluation procedures for food formulation. Research and development project management.

160L. Food Product Development Laboratory (2) II. The Staff (Henderson in charge)
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 160 concurrently. Laboratory exercises applying the principles of food product research and development to the development of new food products.

160F. Food Processing (4) III. M. McCarthy
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100B, 104, 100C. Recent advances in food processing are examined in terms of their effects on foods. Laboratory procedures are demonstrated on various food materials. Pilot plant exercises will be employed to identify and illustrate common principles among apparently diverse processes.

190. Senior Seminar (1) I. Reid, German
Seminar—1 hour. Prerequisite: standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities.

192. Internship for Advanced Undergraduates (1-12) I, II, III. The Staff (Barrett in charge)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science. PNP grading only.

196. Methods of Fruit and Vegetable Analysis (2) III. The Staff
Lecture—10 hours total; laboratory—30 hours total. Prerequisite: Chemistry 2C, course 100B. Principles of laboratory methods for the color, texture, and flavor analysis of California fruits and vegetables used in food processing. Held during the first two weeks immediately following the last day of spring quarter; considered a spring course for registration.

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Barrett in charge)
Prerequisite: consent of instructor. (PNP grading only.)

Graduate Courses

201. Food Chemistry and Biochemistry (3) I. Tappel, Bernhard, Gruwedewald
Lecture—3 hours. Prerequisite: Biological Sciences 103. Topics on enzymes, proteins, pigments, lipids, and vitamins. Biochemical principles and methods related to food composition, preservation, and processing. Research proposals and group problem solving.

202. Chemical and Physical Changes in Food (4) II. Reid, Haard
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103; Chemistry 107B. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials.

203. Food Processing (3) I. K. McCarthy
Lecture—3 hours. Prerequisite: Physics 6C, Mathematics 6C, Chemistry 107B, undergraduate food processing course. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling products and qualities of finished foods.

204. Advanced Food Microbiology (3) III. Barrett in charge
Lecture—3 hours. Prerequisite: Biological Sciences 1C, 103, course 104 or a course in microbiology. Principles of food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentation.

205. Industrial Microbiology (3) I. Ozyrdzak
Lecture—3 hours. Prerequisite: Biological Sciences 1A and 102, 103; Microbiology 130A-130B or Genetics 102 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids.

207. Advanced Sensory-Instrumental Analyses (3) I. Nobile (Viticulture and Enology Laboratory)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemical analysis to compounds to perception of appearance, texture, flavor. Offered in alternate years.

210. Proteins: Functional Activities and Interactions (3) III. Whitaker
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal systems.

211. Lipids: Chemistry and Nutrition (3) I. German
Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 128B. Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure, organization, and composition in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.

235. Mycology of Food and Food Products (3) II. Miller
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 104 or consent of instructor. Morphology and physiology of fungi associated with food. Desirable activities of fungi: food fermentations, single-cell protein production, mushrooom culture. Undesirable activities: preharvest and postharvest deterioration, food spoilage and preservation, toxin production.

250. Chromatographic and Electrophoretic Methods (4) II. G. Smith, Bandman, German
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1A-1B-1C, 8A-8B, 107A-107B; Biological Sciences 102 and 103 or consent of instructor. Theory and practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems and recovery of purified sample components.

255. Chromatographic and Electrophoretic Methods Laboratory (1) I. G. Smith, Bandman, German
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 250 concurrently. Practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems, and recovery of purified sample components.

285. Computer Applications in Laboratory and Process Control (3) III. Russel
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 156 or the equivalent. Theory and practice of microcomputer interfacing to laboratory instrumentation for analytical and process control applications. Study of methods common to modern instrumentation and control systems including: A/D and D/A conversions, transducers, signal conditioning, and data transmission.

Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological sciences. Students choose and present lead discussion of recent research articles in a special topic area chosen by the instructor. Intended for seniors. Add-in course evaluation of scientific publications. May be repeated for credit.

290. Seminar (1) I, II, III. C. Price
Seminar—1 hour. (SU grading only.)

290C. Advanced Research Conference (1) I, II, III. The Staff (Barrett in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and
Food Service Management

(College of Agricultural and Environmental Sciences)

Faculty
See under the Department of Nutrition.

The Major Program and Graduate Study

Food Service Management is incorporated within the major in Dietetics in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, or contract food services, as well as in public or private institutions such as hospitals, correctional institutions, schools, or colleges; consult the Department of Nutrition.

Related Courses. See Food Science and Technology, and Nutrition.

Courses in Food Service Management (FMS)

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising Office, 1151 Meyer Hall (916-752-2812).

Upper Division Courses

120. Principles of Quantity Food Production (3) III
Prophet Lecture—3 hours. Prerequisite: Food Science and Technology 100B and 101B. Fundamental principles of food service management including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

120L. Quantity Food Production Laboratory (2).
Prophet Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

121. Institutional Food Purchasing and Sanitation (3) I
The Staff Lecture—1 hour; discussion—2 hours. Prerequisite: Biological Sciences 1A; course 120. Principles of quantity food purchasing and sanitation.

122. Food Service Systems Management (3) II
Prophet Lecture—3 hours. Prerequisite: Agricultural Economics 112, courses 120, 120D. Principles of quantity food production management; production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.

123. Personnel Management (3) III
The Staff Lecture—3 hours. Prerequisite: basic course in general psychology. Major personnel management functions; legal constraints and requirements; procedures in solving personnel problems faced by supervisors.

182. Internship (1-12) I, II, III.
The Staff Internship—3-36 hours. Prerequisite: one upper division course in Food Service Management and consent of instructor. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (PINP grading only.)

197T. Tutoring in Food Service Management (1-2) I, II, III.
The Staff (Prophet in charge) Discussion/laboratory—3 or 6 hours. Prerequisite: Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluation. May be repeated if tutoring a different course. (PINP grading only.)

198. Directed Group Study (1-6) I, II, III.
The Staff (Prophet in charge) (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III.
The Staff (Prophet in charge) (PINP grading only.)

French

(College of Letters and Science)
Manfred Kusch, Ph.D., Chairperson of the Department
Department Office (French and Italian), 558 Sproul Hall (916-752-0630)

Faculty
Marc E. Blanchard, Agrégé de Lettres, Professor (French, Critical Theory), Elizabeth M. Bloomberg, Ph.D., Associate Professor, Michele Hannoth, Ph.D., Associate Professor (French, Comparative Literature)
Manfred Kusch, Ph.D., Senior Lecturer (French, Comparative Literature)
Maria I. Manea-Manolli, Ph.D., Professor Michèle Praeger, Ph.D., Associate Professor Georges Van Den Abbeele, Ph.D., Associate Professor

Emeriti Faculty
Claude Abraham, Ph.D., Professor Emeritus Max Bach, Ph.D., Professor Emeritus Ruby Cohn, Ph.D., Professor Emeritus

Gerald Herman, Ph.D., Senior Lecturer Emeritus Mango R. Kaufman, M.A., Senior Lecturer Emerita Marshall Lindes, Ph.D., Professor Emeritus Ruth B. York, Ph.D., Senior Lecturer Emerita

The Major Program

The major program is designed to assure proficiency in all four of the language skills—speaking, understanding, reading, and writing—and to acquaint students with the intellectual and cultural contributions of the French-speaking world through the study of its literature, traditions, and institutions.

The Program. The department is strongly committed to undergraduate education. It encourages its students to work closely with the academic adviser in designing a major tailored to their needs and interests within the broad guidelines prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty. The department sponsors an active French Club and a chapter of Pi Delta Phi, the National French Honor Society. Each year, a substantial number of students with a good preparation in French participate in the university's very popular Education Abroad Program, which maintains centers at seven French universities.

Career Alternatives. Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, an anesthesiologist, a law professor, translators, a senior applications programmer, travel agents, independent business owners, a senior museum preparator, nurses, financial managers, stock brokers, and an industrial attaché for a French Trade Commission, all graduated with an A.B. in French from UC Davis and represent only a small fraction of the career choices documented in a recent survey of department graduates.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>19-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>French 1, 2, 3 (or the equivalent)</td>
<td>15-35</td>
</tr>
<tr>
<td>French 20</td>
<td>2</td>
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<tr>
<td>French 21, 22, 23</td>
<td>15</td>
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<tr>
<td>Linguistics 1</td>
<td>4</td>
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<table>
<thead>
<tr>
<th>Depth Subject Matter</th>
<th>44</th>
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</thead>
<tbody>
<tr>
<td>French 100</td>
<td>4</td>
</tr>
<tr>
<td>French 101, 102, 103</td>
<td>12</td>
</tr>
<tr>
<td>French 104</td>
<td>4</td>
</tr>
<tr>
<td>Two additional upper division French literature courses</td>
<td>8</td>
</tr>
</tbody>
</table>

Elective courses in French literature, language, and civilization to be chosen in consultation with an undergraduate adviser. 16

Total Units for the Major: 69-80

Recommended
French 101, 102, 103, 104, 107, and 160 plus other upper division courses for a total of 46 units for students interested in obtaining a "single subject" teaching credential in California.

Major Adviser. G. Herman.

Minor Program Requirements:

French

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>French 100</td>
</tr>
<tr>
<td>French 101, 102, 103</td>
</tr>
<tr>
<td>Two elective courses in French language, literature, or civilization to be chosen in consultation with an undergraduate adviser</td>
</tr>
</tbody>
</table>

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson.

Honors Program. Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of French 136H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chairperson. Only students who, at the end of the junior year (155 units), have attained a cumulative grade point average of 3.5 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in French are in addition to the regular requirements for the major in French.

Graduate Study. The department offers programs of study and research leading to the M.A. and Ph.D. degrees in French.

Candidates for the Ph.D. have the option of enrolling in their degree program by preparing a designated emphasis in either Critical Theory or Feminist Theory and Research, which are offered by the Program in Critical Theory and the Women's Studies Program, respectively. Detailed information may be obtained from the graduate advisers or the department chairperson.


Teaching Credential Subject Representative. J. Wagnild. See also under the 'Teaching Education Program.'

Courses in French (FRE)

Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement. Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 21.

*Course not offered this academic year.
Lower Division Courses
1. Elementary French (5) I, II, III. The Staff Discussion—3 hours; laboratory—1 hour. Students who have successfully completed French 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. All other students enrolling 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.

10. French for Graduate Students (5) III. The Staff Lecture/discussion—5 hours. A course designed to prepare students for the graduate reading examination in French. (P/NP grading only.)

2. Elementary French (5) I, II, III. The Staff Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.

3. Elementary French (5) I, II, III. The Staff Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.

4. French Conversation (2) I, II, III. The Staff Recitation—3 hours. Prerequisite course 2 or 3 or equivalent. Practice in initiating and maintaining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

20. Practical Phonetics (2) II, III. The Staff Lecture/laboratory—3 hours. Prerequisite: course 2 or the equivalent. Practically oriented presentation of French sounds and intonational pattern. Laboratory discussion of phonetic features specific to contemporary spoken French. Students will use the international phonetic alphabet. Not open for credit to students who have completed course 5. (Formerly course 5.45.)


25. Introduction to French Literature in Translation (3) II. The Staff Discussion—3 hours. Introductory study of outstanding works of French drama and prose. Topics include major dramatists, periods, and movements. Study of literary techniques, structure, and meaning to foster better understanding of creative processes in French cultural context. Intended for the nonmajor.

35. Explication and Dissertation (2) III. The Staff (Chairperson in charge) Lecture/discussion—2 hours. Prerequisite: course 25. Theory and practice of French explication de texte and ditruction. Explores phonetic strands of the discretion, and meaning for students planning to study abroad in French universities.

36. Intermediate French Conversation (2) I, II, III. The Staff Recitation—3 hours. Prerequisite: course 8 or the equivalent. Continued practice in initiating and maintaining conversation. Oral presentations, oral quizzes, and oral final exam. May be repeated once for credit. Not open to native speakers.

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

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses
100. Composing in French (4) I, II, III. The Staff Lecture—3 hours; laboratory—1 hour. Prerequisite: course 23; course 20 strongly recommended. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building.

101. Introduction to French Poetry (4) I, II, III. The Staff Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French drama, with emphasis on dramatic structure and techniques.

102. Introduction to French Drama (4) I, II, III. Abraham Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of plays representing the main types of French drama, with emphasis on dramatic structure and techniques.

103. Introduction to French Prose (4) I, II, III. The Staff Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing main types of French prose, with emphasis on narrative structure and techniques.

104. Translation (4) I, II. The Staff Lecture—3 hours; short in-class translations; frequent supplementary outside reading. Prerequisite: course 100 or equivalent. Practice in English-to-French translation using a variety of nonliterary materials, illustrating different problems and styles. Not open to students who have spent an academic year as an EAP student in a Francophone country or who have completed course 138.

106. French in Business and the Professions (4) I. Herman Lecture—1 hour; discussion—2 hours; frequent written assignment. Prerequisite: course 100 or equivalent. The French language as used in the commercial, industrial, and industrial settings. Paper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business.

107. Contemporary France (4) III. Praeger Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to aspects of French culture and institutions of the contemporary period such as art, architecture, music, literature. Provides a background in French contemporary history, sociology, and politics.

110. Stylistics and Creative Composition (4) II. Herman Lecture—3 hours; frequent papers. Prerequisite: course 100 or consent of instructor. Intensive course in creative composition using a variety of techniques and literary styles, patterned on Queneau's Exercices de style. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry.

112. Masterpieces of French Drama in Translation (3) II. The Staff Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Plays in translation representing the main types of French drama with emphasis on dramatic structure and techniques. Consideration of this genre within French social and cultural context. Intended for the nonmajor. General Education credit: Civilization and Culture.

113. Masterpieces of French Novel in Translation (3) III. The Staff Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Novels in translation representing works from the seventeenth to the present. Study of broad genre, theoretical, and historical contexts in France. Analysis of structure and techniques of the genre. Intended for the nonmajor. General Education credit: Civilization and Culture.

114. French Philosophical Literature in Translation (3) III. The Staff Lecture—3 hours. Prerequisite: course 25 or consent of instructor. French philosophical literature, with works analyzed within broad philosophic, moral, and historical contexts. Focus on such topics as stoicism, classicism, libertinism, naturalism, existentialism, absurdism, literary techniques, and styles analyzed. General Education credit: Civilization and Culture.

115. Medieval French Literature and Society (4) I. Van Den Abeele Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The social and cultural life of medieval France as studied through its representation in such literary works as La Chanson de Roland, courtly love lyric, the Arthurian romances of Chretien de Troyes, Aucassin et Nicolete, selected fabulaux and farces. Offered in alternate years.

116. The French Renaissance (4) III. Van Den Abeele Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Overview of major works and writers with particular attention to the historical context of the turbulent 16th century. Writers to be read may include Rabelais, Marot, Ronsard, Delai, Labay, Labe, Marguerite de Navarre, Montaigne, and D'Aubignie. May be repeated once for credit when topic differs. Offered in alternate years.

117A. Baroque and Preclassicism (4) I. Abraham Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The literature and intellectual culture of the period between the Renaissance and French classicism. Offered in alternate years.

117B. The Classical Moment (4) II. Abraham Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Literature, culture, and politics in the "Age of Louis XIV." May be repeated once for credit when topic differs. Offered in alternate years.

118A. The Age of Reason and Revolution (4) IV. Kuch Lecture/discussion—3 hours; term paper. Prerequisite: course 103. History of the French roman from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th century. Offered in alternate years.

119A. The Romantic Imaginary (4) I. Hanrooth Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolution, individualism, naturalism, and transcen- dantic irony, the creative imagination, the cult of rush. Offered in alternate years.

119B. Reality, History and the Novel (4) III. Hanrooth Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Investigation of the narrative and historical codes of French realistic fiction, with emphasis on the representation of history in the realist novel, its depiction of social "realities" such as class and gender, and its relation to the historical situation of post-revolutionary society. Offered in alternate years.

119C. From Baudelaire to Surrealism (4) I. Hanrooth Lecture/discussion—3 hours; term paper. Prerequisite: course 101. Study of the main poets and poetic movements from the mid-19th to the early 20th century, including Baudelaire, the Symbolists, and the Surrealists. Offered in alternate years.

120. Modern French Thought (4) I. Praeger Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Overview of post-Second World War French intellectual currents from existentialism to structuralism and deconstruction. Readings will include Sartre and de Beauvoir, Camus, Levi-Strauss, Lecan, Barthes, Foucault, Der- rida, Kristeva, Sollers, Cixous, and Irigaray. Offered in alternate years.

*Course not offered this academic year.
sent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as sub-jeccativization, passivation, relativization) focusing on the most recent developments in the field (i.e., case grammars, generative semantics, trace theory).

251. Trenda in French Contemporary Linguistics (4) I. Manea-Manouli Seminar—3 hours; term paper. Prerequisite: course 220A or 225C or consent of instructor. Issues in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc. Intended for students in French linguistics or those interested in applying linguistic models to literature.

251. Current Issues in Modern French Syntax (4) II. Manea-Manouli Seminar—3 hours; term paper. Presentation of contemporary approaches to French syntax. Explanations of various late regular phenomena, with reference to on-going changes in modern spoken French.

297. Individual Study (1-5) I, II, III. The Staff (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Selected—1 to 5 hours. May be repeated for credit with consent of instructor.

299. Research (1-12) I, II, III. The Staff (SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff (SU grading only.)

Professional Courses

300. Teaching of a Modern Foreign Language (3) III. The Staff Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

390A. The Teaching of French in College (2) I. Wagland Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (SU grading only.)

390B. The Teaching of French in College (2) II. Wagland Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (SU grading only.)

390C. The Teaching of French in College (2) III. Wagland Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (SU grading only.)

Freshman Seminar Program

Francisco J. Sanmiguel, Ph.D., Program Director
Program Office, 17 Wellman (Teaching Resources Center) (916-752-6050)

Committee in Charge
Stephanie Beardsey, Ph.D. (Residence Life)
George H. Cardinet, III, D.V.M., Ph.D. (School of Veterinary Medicine)
Richard Castanias, Ph.D. (Graduate School of Management)

William G. Davis, Ph.D. (Academic Senate Committee on Freshman Seminars)
Marina Estabrook, M.A. (Teaching Resources Center)
Todd Feinberg (Student Representative, ASUCD—Academic Affairs)
Louis Griotti, Ph.D. (Previous FRS instructor)
Annie King, Ph.D. (College of Agricultural and Environmental Sciences)
Alan Jackman, Ph.D. (College of Engineering)
Rex Perschbacher, J.D. (School of Law)
Carolyn Wall, Ph.D. (College of Letters and Science)
Donal A. Walsh, Ph.D. (School of Medicine)

Course in Freshman Seminar (FRS)

(Questions pertaining to the following course should be directed to the instructor or to the Teaching Resources Center.)

Lower Division Course

1. Freshman Seminar (2) I, II, III. The Staff Seminar—20 hours total (8 weeks). Prerequisite: open only to students who have completed fewer than 45 quarter units. Investigation of a special topic through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis upon student participation in learning.

Genetics

See Division of Biological Sciences; and Genetics (A Graduate Group), below

Genetics (A Graduate Group)

Kenneth Burns, Ph.D., Chairperson of the Group Group Office, 190 Briggs Hall (916-752-9092)

Faculty. Includes members drawn from the Colleges of Agricultural and Environmental Sciences, and Letters and Science, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. The Group is subdivided into three affinity groups: molecular, animal, and plant. Each of these affinity groups provides broad training in genetics, combined with an emphasis specific to its area. Both model genetic organisms and agricultural species are studied using molecular and classical approaches. For additional information regarding the programs, contact the group administrative assistant at 916-752-9091.

Graduate Adviser. Consult Genetics Graduate Group Office.

Courses in Genetics (GGG)

Graduate Courses

201A. Transmission Genetics (3) I. Gepts Lecture—3 hours. Prerequisite: Genetics 100, introductory statistics, and calculus. Study of segregation, linkage, and mapping and the modifications of Mendel's original genetic model.

201B. Cytogenetics (3) II. Dvorak and Murray Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Study of cytogenetics including meiosis, recombination, chromosomes, haploidy, aneuyploidy, trisomics, monosomes, autopolyploids and intra- and interspecific manipulation.

201C. Molecular Genetics (3) III. Gasser, Williamson Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Current topics in molecular genetics at the graduate level, with emphasis on the relationship between classical genetic studies and current molecular research, as well as on the molecular techniques used to develop the basic concepts of molecular genetics.

201D. Quantitative and Population Genetics (3) III. St. Clair Lecture—3 hours. Prerequisite: course 201A or consent of instructor. The basic concepts of quantitative and population genetics, including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation and evolution in populations, and experimental methodologies.

202. Scientific Professionalism and Integrity (1) I. Yoder Lecture—1 hour. Basic skills required of contemporary scientists will be reviewed. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Responsibilities of scientists to communicate results factually and thoughtfully will be emphasized. (SU grading only.)

205. Molecular Genetics Laboratory (5) I, II, III. Privatky and staff Laboratory—15 hours. Prerequisite: Genetics 100 (may be taken concurrently) or the equivalent, enrolled in Genetics Graduate Group, consent of instructor. Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation. May be repeated up to three times for credit. (SU grading only.)

207L. Research Methods in Plant Genetics Laboratory (2-5) I, II, III. Yoder and staff Laboratory—6-15 hours. Prerequisite: course 207 (may be taken concurrently). Working knowledge of contemporary methodologies in plant genetics is obtained by participating in research programs of the various Plant Genetics Affinity Group members. (SU grading only.)

291. Seminar in History of Genetics (2) II. Griseemer (Philosophy)

Seminar—2 hours. Prerequisite: Genetics 100. The development of modern genetic theories beginning with Mendel.

292A. Seminar in Cytogenetics (1-3) I. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the deletion, duplication and rearrangement of chromosome regions. Offered in alternate years. (SU grading only.)

292B. Seminar in Quantitative Genetics (1-3) II. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the inheritance of continuous characters. Offered in alternate years.

292C. Seminar in Developmental Genetics (1-3) I. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics in the area of cell-specific control of gene expression. Offered in alternate years. (SU grading only.)

292D. Seminar in Population, Evolutionary and Ecological Genetics (1-3) II. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics related to the analysis and prediction of genetic changes in populations. Offered in alternate years. (SU grading only.)

292S. Seminar in Animal Genetics (1-3) III. The Staff Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals. (SU grading only.)

*Course not offered this academic year.
295. Seminar in Molecular Genetics (1-3). The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the structure, function, and expression of genes. (SU grading only.)

297. Seminar in Plant Genetics (1-3) II. The Staff
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Current topics in plant genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal, and population genetics to address questions in plant biology will be examined. (SU grading only.)

298. Group Study (1-5) I, II, III. Members of the Group (Chairperson in charge)
Prerequisite: consent of instructor. Group Study of selected topics in Genetics. (SU grading only.)

299. Research (1-12) I, II, III. Members of the Group (Chairperson in charge)
(SU grading only.)

Geography

(College of Letters and Science)

Richard Cowen, Ph.D., Acting Chairperson of the Department
Department Office, 2201 Hart Hall (916-752-0790), or 752-0792

Faculty
Nigel J. R. Allan, Ph.D., Associate Professor
Conrad J. Bahr, Ph.D., Professor
Dennis J. Dingemans, Ph.D., Associate Professor
Academic Senate Distinguished Teaching Award
Deborah L. Elliott-Fisk, Ph.D., Associate Professor
Louise E. Gigliotti, Ph.D., Professor (Geography, Nutrition)
Jack D. Ives, Ph.D., Professor
Stephen C. Jett, Ph.D., Professor
Janet D. Morson, Ph.D., Professor
Mary L. Shelton, Ph.D., Professor

Emeriti Faculty
Howard F. Gregor, Ph.D., Professor Emeritus
Frederick J. Semoons, Ph.D., Professor Emeritus
Kenneth Thompson, Ph.D., Professor Emeritus

The Major Program

Geography is a multifaceted discipline defined by its concern with place. Geographers strive to answer spatial questions regarding the earth’s surface and adjacent atmosphere and to describe and explain the character of regions; to ascertain the ways in which humans, historical and contemporary, have used and shaped the earth’s surface; and to understand the physical, biotic, and human systems of our global environment and their interactions.

The Program. Both the Bachelor of Arts and Bachelor of Science degrees are offered in geography. A.B. students choose one of five possible emphases: 1) general geography, encompassing the whole spectrum of the field; 2) cultural/historical geography, which stresses traditional human uses of the earth and the search for explanations of the different customs, beliefs, and lifeways characteristic of different parts of the world; 3) economic urban geography, which focuses on the local and global factors affecting contemporary agricultural, industrial, and commercial activities, as well as on the characteristics and problems of urban centers; 4) physical geography, whose concern is the natural world, including climate, vegetation types, and the many physical features of the land’s surface; and 5) regional planning and analysis, which emphasizes how geographic principles are applicable to contemporary urban and environmental concerns. These areas of emphasis will be closely integrated into the department’s new specialization in mountain geography. The B.S. program emphasizes physical geography courses with training in other physical and biological sciences and mathematics. A geography minor is also available.

Career Alternatives. The study of geography provides background for students interested in careers in education, business, industry, and government. In business and industry, opportunities for employment include positions in locational analysis, international trade, environmental consulting, transportation planning, remote sensing, environmental-impact analysis, market planning, and aerial photo interpretation. Local and state governments offer opportunities for employment in city, state, and regional planning and environmental analysis, while various federal departments need regional analysts, cartographers, remote-sensing experts, climatologists, and conservationists.

A.B. Major Requirements:

Preparatory Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Geography 1, 2, and 5</th>
</tr>
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Depth Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Geography 105 or 106; 151; and one UCD regional course from Geography 121-127</th>
</tr>
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</table>

Choose one emphasis from the following five:

Emphasis I (General)

One course from each of the following three groups:

- a. Geography 170 or 171
- b. Geography 141 or 155
- c. Geography 108 or 115

Four additional upper division geography courses.

Emphasis II (Cultural/Historical)

Geography 170; 171; one course from Geography 108, 115, 141, 155.

Four additional courses from Geography 110, 143, 172, 173, 175.

Emphasis III (Economic/Urban)

Geography 110; 141, 155; one course from Geography 108, 115, 170, 171.

Three additional courses from Geography 104, 142, 143, 156, 160, 161, 162.

Emphasis IV (Physical)

Geography 3, 108, 110, 115, 162; 173; one course from Geography 141, 165, 170, 171.

One additional course from Geography 102, 112, 116, 117, 161.

Emphasis V (Regional Planning and Analysis)

Geography 150 or 156; 110; one additional course from Geography 121-127; and one course from Geography 142, 160, 161, 162, 170, 173.

Environmental Biology and Management 110; Environmental Biology and Management 134 or Environmental Studies 171; Political Science 107 or Environmental Studies 161; one course from Economics 115A, Agricultural Economics 148, or Geology 134.

Total Units for the Major

Recommended: Geography 4.

B.S. Major Requirements:

Preparatory Subject Matter

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<tr>
<th>UNITS</th>
<th>Geography 1, 2, 3, and 5</th>
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Statistics 13 or the equivalent

Mathematics 16A-16B, and 16C, or Mathematics 21A, 21B, and 21C

Computer Science Engineering 10 or 30

Chemistry 2A, 2B

Biological Sciences 1A-1C, or Biological Sciences 1C or Geology 60-60A, or Physics 6A and 6B

Depth Subject Matter

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Geography 105, 106, 108, 115, 151</th>
</tr>
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</table>

Two courses from Geography 102, 110, 112, 116, 117, 162, 173

One course from Geography 121-127

Four additional upper division, letter-graded units in Geography

Nine additional upper division units chosen in consultation with the undergraduate adviser.

Total Units for the Major

Recommended: Geography 4, Physics 8A, 8B, and 8C; Chemistry 8A and 8B.

Addendum: The B.S. major provides a wide diversity of possible themes, including geography, climatology, zoology, geology, plant geography, occupational geography, water-resources studies, and mathematical geography. An individual’s program may emphasize one or more of these themes, and is planned in consultation with the major adviser.

Minor Program Requirements:

Letters and Science students who do not major in Geography may satisfy the requirements for a minor in the field by successfully completing the minimum units as follows. When choices of individual courses are required, these must be made in consultation with the major adviser.

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Geography</th>
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Minor I (General)

Geography 151, plus one course from each of the following four groups:

Geography 108, 115, or 173

Geography 170 or 171

Geography 155, 160, or 161

Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

Minor II (Physical)

Geography 102, 108, 115, and 173, plus one course from Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

Minor III (Cultural)

Geography 170, 171, and 173, plus one course from each of the following two groups: Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127, and Geography 143, 172, or 175

Minor IV (Economic)

Geography 110 and 141, plus one course from each of the following three groups:

Geography 142, 143, or 156

Geography 160, 162, or 161, 170, 172, 173

Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

Minor V (Environmental/Ecological)

Geography 160, 161, 162, 173, and 175

Minor VI (World Regional)

Geography 121, 122A or 122B, 123 or 124, 125A or 125B, 126 or 127

Major Adviser: See Class Schedule and Room Directory.

Graduate Study: The department offers programs of study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

Graduate Adviser: See Class Schedule and Room Directory.

Courses in Geography (GEO)

Lower Division Courses

1. Physical Geography (4) III. Ives

Lecture—3 hours; laboratory—2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.
needs of specific areas, and geographical problems associated with current and future water requirements.

168. Mountain Geocology: Human Geography (4) III. Allan Lecture—3 hours, term paper. Prerequisite: course 118 or consent of instructor. Analysis of traditional adaptations of mountainous cultures to their habitats; resource use and environmental degradation; tourism impacts and Third World development issues. Emphasis on Himalayas, Andes, Alps, and Rocky Mountains, providing historical perspectives and discussion of current environmental crises.

170. Cultural Ecology (4) I, III. Jett Lecture—3 hours, term paper. Prerequisite: course 2 or Anthropology 2. Geographic theories of environment-man relations; economic relations of gatherers, fisherfolk, hunters, cultivators, and urbanites; their environmental impacts; their domestic plants and animals. General Education credit: Contemporary Societies.

171. Cultural Geography (4) I, III. Jett Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Consideration of principal concepts and approaches in cultural geography in modern times, and links with, and parallels in, other disciplines. General Education credit: Contemporary Societies.

172. Animals and Culture History (4) III. The Staff Lecture—4 hours. Prerequisite: course 2 or Anthropology 2, or consent of instructor. Theories of group size, domestication, spread of domesticated animals in Old and New Worlds; contrasting roles of domesticated animals in human ecology through time; pastoral nomads, hunter-gatherers, and sedentary economies.

173. Humans and Vegetation Change (4) III. Ehrlich Lecture—3 hours; term paper. Prerequisite: course 1 or Biological Sciences 1A, or consent of instructor. Role of humans in modifying the earth's vegetation. Emphasis on cultural plant geography, factors of plant distribution, classification and mapping of vegetation, world vegetation patterns, human impact on major regions, and case studies of land use and vegetation change.

175. Geography of Food and Diet (4) II. Grievetti Lecture—4 hours. Prerequisite: course 2 or Anthropology 2. Nutrition 20 recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Offered in alternate years.

192. Student Internship in Geography (2-4) I, II, III. The Staff Internship—15 hours at employing agency; term paper. Prerequisite: consent of undergraduate Geographics, approval of advisor, and consent of instructor. Supervised and evaluated program of student internships with public agencies dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only).

Graduate Courses

200. Research Trends in Geography (1) I. The Staff Chairperson in charge) Seminars—1 hour. Major current research themes and trends in geography. (SU grading only.)

201. Sources and General Literature of Geography (4) I, II, III. The Staff Discussion—4 hours. Prerequisite: graduate status in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

"Course not offered this academic year."
The Major Programs

"Civilization exists by geological consent—subject to change without notice."

Will Durant

Geology is the study of the Earth, and in particular the history, the structure, the evolution of life, and the processes that have shaped the Earth and its inhabitants. The coming of the space age has also extended the field to include the solid planets of the solar system. Although often attracted to the study of geology by an aesthetic appreciation and enjoyment of the earth, geologists commonly approach their studies from an interest either in the academic or the applied aspects of the science.

The academic aspects include the study of the history of life, the Earth, and the planets, and of the processes that drive the historical evolution. It is the study of this historical evolution through "deep time" that fundamentally distinguishes geology from most of the other physical sciences. The study of the processes that drive this evolution is of the application of any of the physical or life sciences to understanding the Earth. In this sense, geology is truly an interdisciplinary science.

The applied aspects of the science generally involve the interaction between the humans and the Earth. Applied studies include the study of mineral resources including oil and water; identification and mitigation of Earth hazards such as earthquakes, landslides, and volcanic eruptions; identification and mitigation of polluted ground water; and land use planning.

The Program. Students interested in becoming professional geologists or continuing their geological studies at the graduate level should elect the Bachelor of Science degree program. The Bachelor of Arts program is designed for students interested in an interdisciplinary program of study, or who plan to go into biology or chemistry. Both programs include twelve units of upper division electives that provide students an opportunity to emphasize an aspect of the field of particular interest to them. The electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study which must be approved by an undergraduate advisor before they are taken. Transfer students should have completed as much as possible of the "preparatory subject matter" listed below. High school preparation for either program should include high school chemistry and four years of mathematics or a relevant equivalent.

Internships and Career Alternatives. The largest employer of geologists has traditionally been the oil industry, although recently more opportunities have been available in environmental geology with consulting firms and government agencies. Government organizations and research laboratories also employ geologists in a variety of other capacities. There is a growing need for earth science teachers at all pre-college levels, and colleges and universities provide opportunities in teaching and research. Entry level positions are available with a Bachelor's degree. A Master's degree is the usual professional level degree, and a Ph.D. is generally required for research and academic positions. Internships during undergraduate training are a means of exploring potential career opportunities and can lead to positions after graduation. Davis students have interned at the California Division of Mines and Geology, the State Department of Water Resources, and various consulting firms.

A.B. Major Requirements:

Preparatory Subject Matter: 44-45
Geology 3, 3L, 50, 50L, 60, 60L ........ 14
Mathematics 16A-16B-16C or 21A-21B-89-9
Chemistry 2A-2B or 2AH-2BH ........ 10
Physics 1, 3, 14, 28-29 ........ 14
Depth Subject Matter: 39
Geology 102, 105, 105L, 106, 110, 110L, 122, 123 ........ 27

Additional upper division electives chosen from upper division courses in geology. Upper division courses in related fields may satisfy the major if approved in advance by the major adviser .......... 12

Total Units for the Major: 83-84

Recommended
Chemistry 2C or 2CH; Geology 3, 3L, Statistics 13 or 102.

B.S. Major Requirements:

Preparatory Subject Matter: 56
Geology 3, 3L, 50, 50L, 60, 60L ........ 14
Mathematics 21A-21B-21C ........ 12
One course chosen from Mathematics 22A, 22B, 21D, Statistics 32, 102 ........ 4
Chemistry 2A-2B-2C, or preferably 2AH-2BH-2CH ........ 15
Physics 9A-9B-9C or 5A-5B-5C ........ 14

Depth Subject Matter: 54
Geology 102, 105, 105L, 106, 110, 110L, 122, 123 ........ 35
Geology 190 (repeat course at least once) .... 2
One course chosen from Geology 124, 125-5 .... 5
Additional upper division electives chosen from selected courses in geology and related fields approved in advance by the major adviser (see adviser for list of approved courses) .......... 12

Total Units for the Major: 110-111

Recommended
Electives for general geology emphasis: Geology 108, 108L, completion of 124, 125 sequence plus one other course (consult adviser).

Additional recommended courses: one or more of the following courses, depending on emphasis in geology:


Minor Program Requirements:

Students in other disciplines may elect to complete a minor in Geology by choosing a geological subject emphasis listed below. On transcripts the minor will appear as a minor in Geology.

General Geology emphasis ........ 22
Geology 50 and 50L (or 1, 1G, and 1L) .... 5
Geology 105, 105L, 106 ........ 9
Geology 108 and 108L or 107 and 107L .... 5
Geology 113, 115, or 116 ........ 3

Minor Advisers. R. Cowen, R.J. Twiss.

Engineering Geology emphasis ........ 22
Geology 50 and 50L ........ 5
Civil Engineering 171, 171L ........ 5
Three courses chosen from Geology 117A, 117B, 134, Hydrologic Science 103, 145, Soil Science 115, 120 ........ 9-12

Minor Adviser. R.J. Twiss.

Geochemistry emphasis ........ 18-20
Chemistry 110A, 110C ........ 6
(Chemistry majors must substitute one of the elective courses for Chemistry 110C.)
Geology 60, 60L, 115, 180 ........ 9
One elective course chosen from Chemical Engineering 115, Chemistry 126, Geologic Engineering 130, 132, Geology 150A, Hydrologic Science 136, Soil Science 102 ........ 3-5

Minor Adviser. R.E. Criss.

Geomorphology emphasis (Minor under revision; see adviser) ........ 22
Geology 50 and 50L (or 1, 1G, and 1L) .... 5
Geology 152 or Geography 106 ........ 4
Geology 153 or Geography 108 ........ 4
Geology 135 or 164 ........ 3

At least six additional units chosen from Civil Engineering 171, 171L; Geography 112, 117, 118; Soil Science 116, 120, Hydrologic Science 136; Civil Engineering 142 ........ 6

Minor Adviser. R. Cowen, R.J. Twiss.

Oceanography emphasis ........ 20-25
Geology 106, 116, 150A, 150B, 150C ........ 17
One course chosen from Environmental Studies 100, 151, Geology 111A, 111B, S119, Hydrologic Science 136 ........ 8-9


Paleobiology emphasis ........ 18-21
Geology 107 and 107L ........ 14
Geology 111A or 111B, 145 or 146 ........ 7
At least six additional units from the following: Anthropology 151 or 152, Botany 116, 140 Genetics 103, Geology 111A, 111B, 145, 146, 150C, Zoology 105, 112, 125, 148 ........ 6-9

Minor Adviser. R. Cowen.

Interdisciplinary minors. The Geology Department administers two interdisciplinary minor programs, "Environmental Geology and Geophysics," which may be completed by students majoring in any discipline including Geology. Programs for these minors are listed separately in this catalog in alphabetical order. For Geography majors, courses from these minor programs can be counted toward satisfaction of the Geography degree requirements.

Teaching Credential Subject Representative. R. Cowen. See also Under Teacher Education Program.

Graduate Study. The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Graduate Advisers. J.F. Mount, J.S. McClain, P. Schirra.

Courses in Geology (GEL)

Lower Division Courses

1. The Earth (3) I. Cowen; II. Signor; III. Varosub Lecture-3 hours. Introduction to study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. General Education credit with concurrent enrollment in course 1G: Nature and Environment.

1G. Earth: Discussion (1) I. Cowen; II. Signor; III. Varosub Discussion-1 hour. Prerequisite: course 1 concurrent. Small group discussion and preparation of short papers for course 1. General Education credit with concurrent enrollment in course 1: Nature and Environment.

1L. Earth Laboratory (1) I. Cowen; II. Signor; III. Varosub Laboratory-3 hours. Prerequisite: course 1 (preferably taken concurrently). Introduction to Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and the processes that form them. Not open for credit to students who have taken course 50L.

3. History of Life (3) II. Cowen Lecture-3 hours. Prerequisite: course 1 recommended. The history of life during the thousand half billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remnants. General Education credit with concurrent enrollment in course 3G: Nature and Environment.

3G. History of Life: Discussion (1) II. Cowen Discussion-1 hour. Prerequisite: course 3 concurrently. Small group discussion and preparation of short papers for course 3. General Education credit with concurrent enrollment in course 3: Nature and Environment.

3L. History of Life Laboratory (1) I. Cowen Laboratory-3 hours. Prerequisite: course 3 concurrently. Exercises in understanding fossils as the clues
to interpreting ancient life, including their functional morphology, paleoecology, and evolution.

12. Evolution and Paleobiology of Dinosaurs (2) I. Cowen Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies.

17. Earthquakes and Other Earth Hazards (2) I, II Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and floods on Man, his structures and his environment. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.

20. Geology of California (2) I, II. Moores Lecture—2 hours, demonstration—1 hour. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape.

43. Form, Function, and Evolution: The Moluscan Shell (3) I. Vermeij Lecture/discussion—2 hours; term paper. Prerequisite: course 1, 3, or Biological Sciences 10. Evolutionary principles relating form, function, and environment are explained through the study of shells of living and fossil mollusca. Topics include shell geometry, mechanical design, adaptation to enemies, and the distribution of shell architectural types in space and time. General Education credit: Nature and Environment.

50. Physical Geology (3) I. McClain Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for course 1 or the equivalent may receive only 2 units for course 50.

50L Physical Geology Laboratory (2) I. McClain Laboratory—6 hours; one or two one-day field trips. Prerequisites: course 30 (preferably taken concurrently). Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L.

60. General Mineralogy (3) I. Holmester Lecture—3 hours. Prerequisite: Chem 2A or 2AH. Crystallography: physical and chemical structure and properties of the common rock-forming minerals.

60L General Mineralogy Laboratory (2) I. Holmester Laboratory—6 hours. Prerequisite: course 40 (preferably taken concurrently). Morphological crystallography: structural projection, identification of the common rock-forming minerals.

99. Special Study for Undergraduates (1-5) I, II, III, IV The Staff (Chairperson in charge) Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

105. Field Geology (5) III. Leisher Lecture—1 hour; laboratory—2 hours; field study—8 full days. Prerequisite: course 105L, 106, 123 (may be taken concurrently); course 124 or 125 recommended. Instruction in geologic mapping techniques; field geology study of selected areas to expose students to a variety of geologic features. Preparation of geologic maps, cross-sections, stratigraphic sections, and descriptions of geologic rock units is prepared (30 hours may be taken concurrently).

105L Structural Geology (3) II. Moores Lecture—3 hours. Prerequisite: courses 50-50L, 50S; Physics 5A or 9A; Mathematics 21A, 21B recommended. Description and origin of the deforming features common to any or all crustal environments. Brittle deformation, stress, faults and fractures, ducile deformation, strain, folds and foliations. Experimental rock deformation.

105L Structural Geology Laboratory (2) II. Moores Laboratory—6 hours; fieldwork—three 1-day field trips. Prerequisite: course 50 or consent of instructor; course 105 concurrently; high school trigonometry and geometry. Graphical and trigonometric solutions to structural problems; introduction to field methods and field mapping; introduction to geometric maps.

106. Ancient Environments (4) I, II Mount Lecture—3 hours. Study of ancient environments in three blocks: 1) methods and principles of study of ancient environments; 2) methods and principles of study of ancient environments, including the effects of age and climate on the Earth's surface; 3) methods and principles of study of ancient environments, including the effects of age and climate on the Earth's surface. General Education credit: Natural Science.

107. Principles of Paleobiology (3) II. Cowen Lecture—3 hours. Prerequisite: courses 3-3L, or Biological Sciences 1B. The evolution and ecological structure of the biosphere from the origin of life to the present.

107L Principles of Paleobiology Laboratory (3) II. Cowen Laboratory—6 hours. Prerequisite: courses 3-3L, or Biological Sciences 1B; course 107 may be taken concurrently. Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.

108. Regional Structure and Stratigraphy (3) III. Moores Lecture—3 hours. Prerequisite: courses 105, 105L, 106. Global tectonic features and processes. Structure, stratigraphy, and evolution of large-scale features of the earth's crust; shield and platforms, continental margins, ocean basins, plateau and mountain building.

108L Regional Structure and Stratigraphy Laboratory (2) III. Moores Laboratory—6 hours; two one-day field trips. Prerequisite: course 105L taken concurrently; laboratory under instruction. Emphasis on the interpretation of regional geologic history using geologic maps selected from a variety of structural and stratigraphic provinces.

111A. Paleobiology of Invertebrates (4) I. The Staff Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematic, evolution, and ecology of the major phyla of invertebrates. Offered in alternate years.

111B. Paleobiology of Protozoa (4) II. Spero Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematic, evolution, and ecology of single-celled organisms. Offered in alternate years.

113. The Solar System (3) III. The Staff Lecture—two courses in physical science. Nature of the Sun, Moon and planets as determined by recent manned and unmanned exploration of the solar system. Comparison of terrestrial, lunar, and planetary geologic processes. Search for life on the solar system. General Education credit with concurrent enrollment in course 113G; Nature and Environment.

113G. The Solar System: Discussion (1) III. The Staff Discussion—1 hour. Prerequisite: course 113 concurrently. Small discussion groups and preparation of papers for course 113. General Education credit with concurrent enrollment in course 113G; Nature and Environment.

114. Climates of the Past: Key to the Future (3) II. Spero Lecture—3 hours. Prerequisite: Chemistry 2A or Biology 3. Lecture or equivalent. Analysis of present-day evidence for climate warming and the greenhouse effect with comparison to the history of Earth's climate fluctuations over the last 70 million years. Past and present climate records are used to examine potential future climatic scenarios.

115. Geochemistry (3) I. Criss Lecture—3 hours. Prerequisite: Chemistry 2A (may be taken concurrently); course 50. Application of principles of solution, physical, structural, and isotopic chemistry to geologic problems. Formation of carbonate rocks and other chemical sediments, rock weathering, and clay mineral formation. Magmatic, metamorphic, and hydrothermal processes and radiometric dating techniques.

116, The Oceans (3) I, II. Spero, II. Cowen and staff Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents, geological history, and the sea's biota; and utilization of marine resources. (Same course as Environmental Studies 116G.) General Education credit with concurrent enrollment in course 116G: Nature and Environment.

116G. The Oceans: Discussion (2) I, II. Spero, II. Cowen and staff Lecture—3 hours. Prerequisite: course 116; Environmental Studies 116 concurrently. Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of papers. (Same course as Environmental Studies 116G.) General Education credit with concurrent enrollment in course 116E: Nature and Environment.

117A. Exploration Geophysics and Seismology (3) I. The Staff Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 6C or 9C, or consent of instructor. Principles of exploration geophysics and seismology. Use of gravity, magnetic, electrical resistivity, electromagnetic, and seismic techniques to determine structure of the Earth's crust. Interpretation of data using computers. Survey of well-logging techniques. Seismology and earthquakes.

117B. Geophysics of the Solid Earth (3) II. Kellogg Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 6C or 9C, or consent of instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, seismology, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics.


118. Summer Field Geology (8) Extra-semester summer registration. Lecture—12 hours; laboratory—25 hours. Prerequisite: one course in biology or geology and consent of instructor. Lectures and field-laboratory studies of physical and biological aspects of nearshore marine environments, and the reconstruction of ancient environments through the study of fossil assemblages and sedimentary rocks in nearby coastal areas. Full time residence at Bodega Marine Laboratory is required. A $250.00 lab fee is required.

119. Field Studies in Marine Paleocology (3) Summer, Farmer Lecture—12 hours; laboratory—25 hours. Prerequisite: one course in biology or geology and consent of instructor. Lectures and field-laboratory studies of pre- and post-glacial marine environments, and the reconstruction of ancient environments through the study of fossil assemblages and sedimentary rocks in nearby coastal areas. Full time residence at Bodega Marine Laboratory is required. A $250.00 lab fee is required.

120. Volcanoes (4) II. Schiffman Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: upper division standing and course 1 or 50. Study of how volcanoes, their eruptions, and their eruptive products shape our planet's crust, influence its oceans, atmosphere, and biota, and provide essential human resources, including mineral deposits and geothermal energy.

122. Optical Mineralogy (3) II. Day Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 63, 60L, or consent of instructor. Optical properties of crystals and techniques of mineral identification with the petrographic microscope.

123. Igneous Petrology (5) III. Leisher Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.
124. Sedimentary Petrology (5). II. Mount Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of sedimentary rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

125. Metamorphic Petrology (5). I. Day Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122; consent of instructor. Composition and origin of metamorphic rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

130. Non-Renewable Natural Resources (3). III. Crisis Lecture—3 hours. Prerequisite: course 122; consent of instructor. The environment as a finite energy resource. Problems of discovery, production, and management. Estimates and limitations of reserves, and their sociopolitical, political, and economic effects.

131. Earth Science, History, and People (4). I. Cowen Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 1, Study of interplay between the earth and its human inhabitants through history, including consideration of acute events like earthquakes and eruptions as well as the geology of resources, topography, and water. General Education credit: Environ.

134. Environmental Geology and Land Use Planning (3). II. The Staff Lecture—3 hours. Geologic aspects of land use and development planning. Problems concerning waste disposal, land use planning, and eingue prediction. Analytic techniques, presentation of reports, and legal aspects of selected case studies.

135. Rivers of California: Geology and Land Use (3). III. Mount Lecture—2 hours; discussion—laboratory—3 hours. Prerequisite: courses 1 and 10 or consent of instructor. The geology of rivers and their role in the development of California. Field studies include both water trips on Sierra Nevada watersheds. Field study includes two raft trips on Sierran rivers and visit to the Auburn Dam site. General Education credit: Nature and Environment.

140. Geologic Data Collection and Report Preparation (2). III. The Staff Lecture—2 hours. Prerequisite: upper division standing and a major in Geology. Collection, organization and analysis of geologic reports. Participants will analyze published reports, write syntheses of published reports and write abstracts.


150A. Physical and Chemical Oceanography (4). I. McClain, Spero Lecture—3 hours; discussion—1 hour. Prerequisite: course 116 or Environmental Studies 116; Physics 98B; Mathematics 21D; Chemistry 2C; or upper division standing in a natural science and consent of instructor. Composition, physical-chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanographic cycles. Offered in alternate years. (Same course as Environmental Studies 150A.)

150B. Geological Oceanography (3). II. McClain Lecture—3 hours. Prerequisite: course 50 or 116. Introduction to and geologic evolution of ocean basins. Composition of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Environmental Studies 150B.)

150C. Biological Oceanography (3). III. The Staff Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Survey of the ecology of major marine habitats including pelagic, coastal, shelf, benthic, estuarine, and plankton communities. Known ecological and contemporary issues in research will be equally stressed. A portion of the course will be devoted to man's use of and impact on the ocean. Offered in alternate years. (Same course as Environmental Studies 150C.)

152. Photogeology and Remote Sensing (4). II. Higgins Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1L or 50L; course 106 recommended. Field use of aerial photographs: types and availability, stereoviewing, and basic geometry. Geological uses and interpretation of aerial photographs and of images obtained by remote sensing.

153. Geomorphology (4). II. Higgins Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 50-50L or 1-1L; Geography 1 recommended. Landforms, landscapes, and the processes that shape them. Introduction to geomorphic observation and theory. Alternates with and complements course 154. Offered in alternate years.


162. Stress and Deformation (4). II. Green Lecture—2 hours; discussion—3 hours. Prerequisite: Mathematics 21C and Physics 98B. Mathematics 22a, 1D, and Physics 9C recommended. Introduction to tensor analysis: tensor notation transformations, representation quadratic forms, Mohr-Circle construction; stress, strain, strain-rates, elasticity. Solution of general, three-dimensional problems with geological application.

180. Sample Preparation and Techniques (1). I. Winter Laboratory—3 hours. Prerequisite: course 122. Introduction to petrographic laboratory techniques for petrographers. Topics covered may include thin and polished section preparation, rock crushing/girding, mineral separation, staining, and photomicroscopy. (P/NP grading only.)

183. Advanced Field Geology (1-6). I, II, III. The Staff Fieldwork—3-18 hours; report. Prerequisite: course 118 or graduate standing in Geology. Advanced problems and methods in field geologic studies; preparation of a geologic report. May be repeated for credit for total of 6 units when different subject matter studied.

190. Seminar in Geology (1) I, II, III. The Staff Discussion—1 hour; seminar—1 hour; written abstracts. Prerequisite: major in Geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (P/NP grading only.)

192. Internship in Geology (1-12). I, II, III. The Staff (Chairperson in charge) Internship. Prerequisite: upper division standing; project approval prior to internship. Supervised work experience in professional geology. May be repeated for credit for a total of 10 units. (P/NP grading only.)

194A-194B. Senior Thesis (3-3). I-II. III. The Staff (Chairperson in charge) Prerequisite: open to geology majors who have completed 135 units, who do not complete the honors program. Guided independent study of a selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of course sequence.)

194HA-194HB. Senior Honors Project (3-3). I, II, III. The Staff (Chairperson in charge) Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5). I, II, III. The Staff (Chairperson in charge) Prerequisite: senior standing in geology or consent of instructor.

198A. General Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

206. Stratigraphic Analysis (3). III. Mount Lecture—3 hours. Prerequisite: courses 105L and 106 or consent of instructor. Advanced historical geology; analysis of stratigraphy and geologic history of North America and selected parts of other continents. Emphasis on interpreting lithologic assemblages and stratigraphic relations in terms of modern tectonic-depositional models. Offered in alternate years.

208. Origin and Significance of Metamorphic Textures (4). II. Green Seminar—3 hours, laboratory—3 hours. Interpretation of metamorphic textures in terms of surface energy anisotropy, growth anisotropy, crystal deformation processes, and disequilibrium phenomena. Offered in alternate years.

213. Studies in Geomorphology (3). I. Higgins Lecture—seminar—3 hours. Prerequisite: course 153 or Geography 108. Topics selected from: studies of landforms and landscape development; and of the action of formative processes, methods of analysis of geomorphic problems, development of geomorphic theory. Topics change from year to year. May be repeated for three times for credit.

215A. Geochemistry (3). II. Criss Lecture—3 hours. Prerequisite: Chemistry 110A, or consent of instructor. Principles and applications of nuclear chemistry to geology, emphasizing radioactive dating methods. Topics include K-Ar, Rb-Sr, Sm-Nd and U-Th-Pb systems, and the age and origin of Earth, Lunar, and meteoric materials. Offered in alternate years.

215B. Stable Isotope Geochemistry (3). II. Criss Lecture—3 hours. Prerequisite: Chemistry 115, Chemistry 110A, Mathematics 222B, or consent of instructor. Principles of equilibrium and kinetic isotope fractionation and material balance with special applications to the distribution of oxygen and hydrogen isotopes in natural systems. Topics include isotope hydrology, geothermometry and paleotemperatures, igneous rocks and materials, and fluid-rock interaction. Offered in alternate years.

216. Tectonics (3). I. Moores Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts.

217. Topics in Geophysics (3). I. Kellogg Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Course times may change from year to year. May be repeated for credit.

218A. Structural Analysis I: Macrofabrics (3). II. Twiss Seminar—3 hours. Prerequisite: consent of instructor. Symmetry and geometric analysis and interpretation of mesoscopic and macroscopic geologic structures and fabrics; geometry of folding, superposed folding, and folded lineations; symmetry arguments in the interpretation of fabrics; determination of slip lines of deformation; regional structural synthesis. Offered in alternate years.

218B. Structural Analysis II: Microfabrics (4). III. Green Seminar—3 hours; laboratory—3 hours. Prerequisite: consent of instructor; course 218A recommended.
Microscopic structural aspects of deformed metamorphic rocks, emphasizing deformation features and the origin and significance of preferred crystallographic orientation. Offered in alternate years.

219. Special Studies in Marine Geology and Palaeoecology (6-0) Summer. Farmer Discussion—5 hours; seminar—3 hours; laboratory—20 hours. A study of living standing or completion of course 119, and consent of instructor. Independent field and laboratory investigation of selected topics in marine geology and palaeoecology. Offered in alternate years.

222. Mechanics of Geologic Structures (3) I. Trias
Lecture—2 hours; seminar—1 hour. Prerequisite: course 162, or consent of instructor and course 105. Application of principles of continuum mechanics to understanding the mechanics of geologic structures such as folds, fractures, faults, dike, cleavage, boudinage. Offered in alternate years.

226. Advanced Sedimentation and Sedimentary Petrology (4) III. Mount
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 124 or consent of instructor. Advanced petrographic and stratigraphic study of major sedimentary rock suites. Lecture emphasis on recognition and interpretation of the spatial and temporal variations in sedimentary rock assemblages and mineralogies. Laboratory focus on provenance and diagenesis. Subjects vary yearly. May be repeated for credit. Offered in alternate years.

227. Stable Isotope Biogeochemistry (3) III. Spero
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Application of stable isotope techniques to paleoecological, paleoecological, paleoceanographic, ecological, and anthropological research problems. Emphasis on carbon, oxygen, nitrogen, hydrogen and sulfur stable isotopes.

228. Marine Geology (3) III.
Lecture—3 hours. Prerequisite: courses 106, 116, 1506, or consent of instructor. Critical discussions and analyses of research papers and reviews. Topics such as paleoceanography, biogeochemistry of the ocean basin, evolution of ocean basins and margins, and sea-bed mineral resources. Topics vary yearly. May be repeated twice for credit.

230. Advanced Mineralogy (3) II. Hofmester
Lecture—3 hours. Prerequisite: introductory mineralogy and differential equations or consent of instructor. Crystallography and crystal chemistry of rock-forming minerals and high pressure phases. Mechanisms of phase transformations, with emphasis on pressure-induced polymorphism. Effect of kinetics and diffusion on mineral behavior. Processes of exsolution, disorder/order, and crystallization. Offered in alternate years.

231. Mineral Physics Seminar (3) II. Hofmester Seminar—3 hours. Prerequisite: course 230. Critical review of selected topics in mineral physics (e.g., the earth's thermal state; elastic properties and equations of state; phase transitions and mantle petrology; earth's structure and its evolution; transport phenomena in the earth's interior). May be repeated for credit. Offered in alternate years.

232. Spectroscopic Methods in the Geosciences (3) II. Hofmester
Lecture—3 hours. Prerequisite: course 230 or consent of instructor. Overview of spectroscopic methods used in mineralogy and geology. Theory and practice of the infrared technique. Use of symmetry to establish type and number of vibrational modes. Raman, optical, Mossbauer, EPR and NMR methods. Applications of vibrational data to thermodynamic problems. Offered in alternate years.

236. Inverse Theory in Geology and Geophysics (3) III. McClan
Lecture—3 hours. Prerequisite: consent of instructor. Inverse theory is applied to model parameters, evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gibson inversion. Offered in alternate years.

238. Theoretical Seismology (3) III. McClan
Lecture—3 hours. Prerequisite: consent of instructor. Elementary theory of seismology, wave equations, wave functions and source representations. Ray theory, plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. (P/N P grading only.) Offered in alternate years.


242. Paleomagnetism (3) I. Versob

245. Metamorphic Petrology (5) I. Day
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 125 or consent of instructor. Metamorphic processes: origin and characteristics of metamorphic rocks. Laboratory study of representative rock suites in hand specimen and thin section. Offered in alternate years.

246. Physical Chemistry of Metamorphic Processes (3) I. Day
Lecture—3 hours. Prerequisite: course 125, Chemistry 110A, or consent of instructor. Physical-chemical principles of metamorphic mineral assemblages and metamorphic processes. Analysis of geothermometry and geobarometry. Offered in alternate years.

247. Metamorphic Petrology Seminar (3) II. Day Seminar—3 hours. Prerequisite: course 245; course 246 recommended. Selected topics in metamorphic petrology. Methodology of research and selected projects. May be repeated for credit when topic changes. Offered in alternate years.

250. Advanced Geochronology (3) I. Criss
Seminar—3 hours. Prerequisite: course 115 or consent of instructor. Critical review of selected topics in geochronology including: age determination, hydrothermal and geothermal fluid systems, and geochronology of rocks. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.

254. Phase Equilibria (3) I. Hofmester Seminar—3 hours. Prerequisite: Chemistry 2C and Mathematics 22A; physical chemistry recommended. Physicochemical aspects of phase states in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks.

260. Paleontology (3) I. Signor; II. Vermili; III. The Staff
Seminar—3 hours. Prerequisite: graduate standing in geology or biological science. Selected problems in paleontology. Subject to be determined. May be repeated for credit when topics change. Offered in alternate years.

263. Functional Morphology of Fossil Invertebrates (4) III. Cowen
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A or Zoology 112. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate phylogeny. Offered in alternate years.

289. Evolutionary Biology of Protists (3) II. The Staff
Seminar—3 hours. Prerequisite: course 111B. Analysis and discussion of selected topics on the evolution of single-celled organisms with emphasis on their fossil record and biology. Offered in alternate years.

280. Igneous Petrology (3) I. Lesher Seminar—2 hours; laboratory—3 hours. Prerequisite: course 123. Integrated laboratory, field study, and seminar on igneous processes and products.

282. Geological X-Ray Spectrometric Analysis (4) III. Schiffman
Lecture—3 hours; laboratory—3-4 hours. Prerequisite: course 60, Chemistry 2C or 2CH, Physics 9D, graduate standing in Geology. Theory of generation and detection of x-rays as applied to analytical chemistry of rocks and minerals. Laboratory sessions on use of the x-ray fluorescence spectrometer, electron microprobe, and x-ray diffractometer.

290. Seminar in Geology (1) I, II, III. The Staff Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (SU grading only.)

291. Geology of the Sierra Nevada (1) I. Day Seminar—one day-long session. Prerequisite: consent of instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. (SU grading only.)

295. Advanced Problems in Geodynamics (3) II. Trias Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., ductile deformation mechanisms, brittle fracture, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature. May be repeated for credit. (SU grading only.) Offered in alternate years.

296. Advanced Problems in Tectonics (3) II. Moores Seminar—3 hours. Prerequisite: course 108 or consent of instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. May be repeated for credit. (P/N P grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

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

Professional Course

390. Methods of Teaching Geology (1). I. Staff
Discussion—1 hour. Prerequisite: graduate student standing in Geology. Discussion of methods and problems of teaching geology. Topics include departmental policies, teaching evaluation, teaching techniques for lectures, discussions, and labs. Participation in teaching program required for Ph.D. in Geology. (SU grading only.)

Geophysics (College of Letters and Science)
Geophysics is the study of the physical properties and processes within and surrounding the Earth. Many problems in the Earth Sciences require geophysical techniques for study. The interdisciplinary nature of geophysics is designed for students with backgrounds in the physical sciences, engineering and other fields who are interested in pursuing a graduate or professional career in geophysics, or who require a significant foundation. The curriculum reflects the needs of such students to have a firm foundation of geophysics classes, as well as the
vast diversity of subdisciplines from many departments that are included in geophysics.

The minor is sponsored by the Department of Geology, 174 Physics/Geology Building.

**Minor Program Requirements:**

**UNITS**

**Geophysics:** 21-24

Engineering 5........................................3

Geology 117A, 117B.................................6

Applied Science Engineering 115........3

Other course sequence chosen from the following:........................................9-12

a. Atmospheric Science 120, 191A, 191B.

b. Electrical and Computer Science Engineer-
ing 112, 151, 161, 162.

c. Geology 105, 162, Physics 105C.

d. Mathematics 128A, 128B, 128C.

e. Physics 104A, 104B, 105C.

**Minor Adviser:** J.S. McClain, Department of Geology, 275A Physics/Geology, 752-7080.

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**German**

(College of Letters and Science)

Winder McConnell, Ph.D., Chairperson of the Department

Department Office (German and Russian), 432 Spraul Hall (916-752-2114)

**Faculty**

Clifford A. Bend, Dr.Phil., Professor

Gail Tinney, Ph.D., Professor

Ingeborg Henderson, Ph.D., Senior Lecturer, Acade-

mic Senate Distinguished Teaching Award

Anna K. Kahn, Ph.D., Professor

Winder McConnell, Ph.D., Professor

Karl R. Menges, Dr.Phil., Professor

Peter M. Schaeffer, Ph.D., Professor

**Emeriti Faculty**

John F. Felzer, Ph.D., Professor Emeritus

Rudolf W. Hoermann, Ph.D., Professor Emeritus

H. Guenter Neres, Ph.D., Professor Emeritus

Fritz Gammern-Frankenberg, Dr.Phil., Lecturer Emeritus

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**A.B. Major Requirements:**

**UNITS**

**Preparatory Subject Matter**........................................2-23

German 1-2-3 (or the equivalent)...............................0-15

German 4.................................................4

German 51................................................4

**Depth Subject Matter**...........................................48

**General Program**

German 101..............................................12

German 102.............................................12

German 103.............................................12

German 120.............................................12

Three courses chosen from the following:..........................9-12

a. Comparative Literature, Survey of German

b. German Literature, Survey of German

c. Comparative Literature, Survey of German

**Total Units for the Major**....................................48-50

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**German Language and/or Literature**

**Minor Program Requirements:**

The Department offers a German Language and Liti-

erature minor. In addition, individualized minor pro-

grams may be designed upon consultation with the

undergraduate advisor.

Students are particularly encouraged to consider a

minor that combines a coherent group of courses

emphasizing area studies in Germany (i.e., German phi-

losophy, art, history, political science) as well as

literature. The purpose of the minor is to provide

students with the opportunity to augment their

training in other fields by acquiring proficiency in the

German language and exposure to German literature

and culture.

**UNITS**

**Choose courses numbered from German 100

through 108B and literature courses that are
taught in German.**..........................20-24

One lower division course from German 46 to

52A, 52B, 52C may be counted.

**Major Adviser:** P. Scheffer

**Prerequisite Credit.** Credit normally will not be
given for the upper division level for a course that is the pre-

requisite of a course already successfully completed.

**Honors and Honors Program.** The honors program

comprises a two quarters of study under course 194A-

194B, which include a research paper. See also the

University and College requirements.

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*Course not offered this academic year.*
6. Conversational German (3) I, II, III. Henderson Discussion—3 hours. Prerequisite: course 3. Designed to develop conversational German skill with special emphasis on communication and grammatical correctness. Course 6 may be taken concurrently with course 4.

10. Basic Reading German (3) I. The Staff Discussion—3 hours. Intensive course for non-majors, providing reading proficiency of texts containing basic sentence patterns and standard general vocabulary. Outside preparation will focus on developing translation techniques with general texts.

11. Intermediate Reading German (3) II. The Staff Discussion—3 hours. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10. Study of advanced reading grammar to gain mastery of advanced texts of intermediate difficulty. (PINP grading only.)

12. Advanced Reading German (3) III. The Staff Discussion—3 hours. Prerequisite: successful completion of course 11 or the equivalent. Continuation of course 11, with specialized focus for upper-division and graduate students on individualized translation projects within each student's field of academic specialization. Systematic review of reading grammar in terms of the student's knowledge of German. (PINP grading only.)

48. Myth and Saga in the Germanic Cultures (4) I. The Staff Lecture—3 hours; term paper. Knowledge of German not required. Reading in English translation from the Nordic sagas and Sigurð-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner’s “total artwork” concept and The Ring of the Nibelung cycle. May not be counted toward major in German. General Education credit: Civilization and Culture.

49. Freshman Colloquium (2) I. The Staff (Chairperson in charge) Seminar—2 hours. Prerequisite: open only to students who have completed 40 or fewer quarter units of transferable college-level work. Reading, discussion and written projects treating topics such as communist-capitalist tension in German literary culture; masculine “versus” feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; excoriating post-holocaust national guilt and individual frustration—Germany’s new “European mission.”

50. Oral Communication Skills (4) I. The Staff Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Characteristic themes in the mainstream of German culture, from medieval intellectual and artistic achievements to the modern emphasis on the role of the arts and literature. Frequent short written reports and in-class expository presentations. General Education credit: Civilization and Culture.

51. Introduction to Literary Analysis (4) I. Michele Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Introductory study of various genres of German literature with emphasis on the intellectual, literary form and content and the impact on contemporary literary appreciation. (PINP grading only.)

52A. Great Books of German Culture in English Translation: The Age of Faith (4) I. The Staff (Chairperson in charge) Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 50 recommended. The transformation of ideas resulting from the German cultural experience and its expression within the context of the general Western development from Charlemagne through medieval chivalry to Luther and Grimmeishausen Knowledge of German not required. General Education credit: Civilization and Culture.

52B. Great Books of German Culture in English Translation: The Age of Reason (4) II. The Staff (Chairperson in charge) Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50 recommended. The significant cross-currents in the history of ideas as these shape the modern sense of cultural exchange, from the Reformation and the waning Holy Roman Empire, through the Enlightenment and Lessing, to Weimar's Classicism and its 19th-century transformations in Romantic Idealism. Knowledge of German not required. General Education credit: Civilization and Culture.

52C. Great Books of German Culture in English Translation: The Age of Relativity (4) III. The Staff (Chairperson in charge) Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50 recommended. The conflict between European and individual consciousness and national cultural identity, from Büchner, Wagner and Nietzsche, the project of the German genius and the conflicts, both internal and external, that determined the direction of Germany’s political and cultural development. Knowledge of German not required. General Education credit: Civilization and Culture.

98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily 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

100. Intensive Conversational German (4) I. The Staff Discussion—4 hours; course 101 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

102. Composition and Conversation (4) I, II, III. The Staff Discussion—3 hours; written reports. Prerequisite: course 101 or consent of instructor. Practice in short essay writing with an aim toward refinement and expansion of vocabulary. Discussion based on readings in a variety of German texts.

133. Writing Skills in German (4) I, II, III. The Staff Lecture—3 hours; term paper. Prerequisite: course 101. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts.

104A. Translation (4) I. McConnell Discussion—3 hours; written reports. Prerequisite: course 102 or the equivalent. Exercises in General German translation with emphasis on cultural and literary texts. (PINP grading only.)

104B. Advanced Translation (4) II. McConnell Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German translation and literary and non-literary texts.

105. The Modern German Language (4). Benware Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 4; Linguistics 1 recommended. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations.

106. History of the German Language (4) II. Benware Discussion—3 hours; written reports. Prerequisite: course 102; course 105 or Linguistics 1 recommended. Survey of the development of the German language and study of its structure in historical perspective.

107. Modern German Syntax (4) III. Benware Discussion—3 hours; written reports. Prerequisite: course 102 or the equivalent consent of instructor; Linguistics 1 recommended. Examination of the major problems in describing modern German sentence structure.

108. Varieties of Contemporary German (4) I. Benware Lecture—3 hours; laboratory and/or individual group consultation on projects. Prerequisite: courses 102, 105. Study of relations between Standard language, Lingangssprachen and dialects. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the contiguous German-speaking area of Europe.

109A. Business German (4) II. Henderson Lecture/discussion—4 hours. Prerequisite: course 101 or consent of instructor. Specialized advanced language course designed as a sequel to Advanced Business German course used business-oriented information and publications as the basis for discussions, role-play, reports, compositions and translations.

109B. Advanced Business German (4) III. Henderson Lecture/discussion—3 hours; laboratory—discussion—1 hour. Prerequisite: course 109A or consent of instructor. Specialized advanced language course designed as a sequel to Advanced Business German course used business-oriented information and publications as the basis for discussions, role-play, reports, compositions and translations.

110. Older German Literature in English (4) I. McConnell Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. An overview of English language literature from the Middle Ages through the Reformation (Nibelunglied, Gotthfried’s Tristan und Isolde or Wolfram’s Parzival, lyric poetry, selections from Johann von Tegernsee’s Sebastian Brant, Erasmus, Luther). General Education credit: Civilization and Culture.

111A-H. Major Writers in Translation (4) I, II. The Staff Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: sophomore standing; course 50, and 52A or 52B or 52C (as appropriate to current segment topic) recommended. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement in each case: (A) Goethe; (B) E.T.A. Hoffmann; (C) Thomas Mann; (D) Franz Kafka; (E) Bertolt Brecht; (F) Christa Wolf; (G) Günter Grass; (H) Friedrich Schiller. General Education credit for 111A or 111E: Civilization and Culture.

112A-C. Topics in German Literature (4) I, II, III. The Staff Discussion—3 hours; term paper. Prerequisite: courses 50 and 52A or 52B or 52C recommended. Investigation of significant themes and issues within their European context: (A) Women in Literature; (B) Anti-Hero Figures in Literature; (C) Literary Fairy Tales. Knowledge of German not required. May be repeated in different subject area. General Education credit for 112A, 112B: Civilization and Culture.

113. Goethe’s Faust (4) II. Bernd, Schaeffer Discussion—3 hours; term paper. Intensive study of one of the great works of world literature. Parts I and II. Discussions and readings in English; reading the text in the original is encouraged. General Education credit: Civilization and Culture.

114. The Faust Tradition Before and After Goethe (4) I. The Staff Lecture—3 hours; term paper. Examines predecessors of Goethe’s Faust (the German chapbook of 1587, Marlowe’s Troubadour History of Dr. Faustus of 1592), and some success of 1947 in order to underscore key variations of this provocative and pervasive theme. Knowledge of German not required. Offered in alternate years. General Education credit: Civilization and Culture.

115A. German Literature Since 1945 (4) I. Menges Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading of major writers including the post-war generation of Austria, Switzerland and West Germany. Discussion of novels like Jürgen von Togorsch’s DOLLY, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrenmatt and Hochhuth, and poets like Celan, Enzensberger and Aichinger. General Education credit: Civilization and Culture.

115B. German Literature since 1945 (4) II. Kuhn Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading and discussion of
the literature of the German Democratic Republic (East Germany), the theory of literature in the socialist world, the practice of this literature as exemplified in such authors as Strittmatter, Seghers, Wolf, Kant, Hacks.

116. From Goethe's Werther to Today's Werthers (4) II. The Staff Lecture—3 hours; discussion—1 hour; written reports. Prerequisite: course 51 or SBE recommended. Comparison of Germany's first international best-seller, Goethe's The Sufferings of Young Werther (1774) with its later counterparts, culminating in Pfitzner's novel of the 1920's, The New Sufferings of Young W. General Education credit: Civilization and Culture.

117A. The Tristan Tradition: Medieval, Musical, Modern (4) III. McConnell Lecture—3 hours; term paper. Prerequisite: courses 51, 52A, and Music 10 recommended. Three different modes of the Tristan and Isolde legend: the medieval epic poem of Gottfried von Strassburg (1210), the music drama of Wagner (1858) and Thomas Mann's parodic novella (1903) in their intellectual environment and interrelationship. General Education credit: Civilization and Culture.

117B. The Nibelungen Tradition: Medieval, Musical, and Modern (4) III. McConnell Lecture—3 hours; term paper. Prerequisite: course 51 or 52A or Music 10 recommended. Knowledge of German not required. Three modes of the Nibelungen legend: the medieval epic poem Nibelungenlied, the opera by Wagner, and Mann's novel The Magic Mountain in their intellectual environment and interrelationship. Knowledge of German not required. General Education credit: Civilization and Culture.

117C. Parzival Tradition: Medieval, Musical, Modern (4) III. McConnell Lecture—3 hours; term paper. Prerequisite: Music 10 and course 51 recommended. Three modes of the Parzival legend: the medieval epic, Parzival; Wagner's music drama Ring of the Nibelungen; and Thomas Mann's novel Blood of the Walsungs in their intellectual environment and interrelationship. General Education credit: Civilization and Culture.

118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire) (4) I. Kuhn Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B) Expressionism in graphic arts, literature, film, New Objectivity, Brecht, and Bauhaus considered in the context of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. Offered in alternate years. General Education credit: Civilization and Culture.

118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4) I. Kuhn Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European historical history (e.g., History 147B), Expressionism in graphic arts, literature, film, New Objectivity, Brecht, and Bauhaus considered in the context of the failure of the German experiment in democracy. The Weimar Republic of 1919-33. Offered in alternate years. General Education credit: Civilization and Culture.

118C. Germany Under the Third Reich (4) I. Kuhn Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: German 118B and History 147B recommended. Background in European history helpful. Interdisciplinary study of German politics, society, and culture during the Third Reich (1933-45). Historical, literary, psychological, philosophical readings; study of architecture, graphic arts, cinema; fascism aesthetic. Everyday life in Hitler's Germany: content, dissent, opposition, and resistance. Jews in Germany; the Holocaust. General Education credit: Civilization and Culture.

118E. Contemporary German Culture (4) II. The Staff Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 50. Through introduction to the political, economic, social, and cultural life of Germany today (Austria and Switzerland marginally included). Historical background and comparative perspectives. Readings from a variety of sources, films and videotapes. Knowledge of German not required. Offered in alternate years. General Education credit: Civilization and Culture.

119. From German Fiction to German Film (4) II. The Staff Lecture—3 hours; discussion—1 hour; term paper. Examines a number of film adaptations of major German prose works and plays to ascertains the types of changes involved in the shift in medium and the positive and negative effects achieved by such transfers. General Education credit: Civilization and Culture.

120. Survey of German Culture (4) III. Feitzen Leutreira—3 hours; discussion—1 hour. Prerequisite: course 101. Major developments in such areas of German life as the arts, philosophical thought, social institutions, and political history.

121. The Medieval Period in German Literature (4) I. McConnell Discussion—3 hours; term paper. Prerequisite: course 101. Literary and philosophical profile of the Mittelhochdeutsche Blütezeit in terms of the significant epics, romances, and lyric poetry. Readings in modern German.

122A. Humanism and Reformations (4) I. Schaeffer Lecture/discussion—3 hours; term paper. Prerequisite: course 101. Exemplary literary works of the sixteenth century tracing the principal lines of development and showing the reflection in literature of the social change. Special emphasis on the Wittenberg period.

122B. The Literary Baroque (4) II. Schaeffer Lecture/discussion—3 hours; term paper. Prerequisite: course 101. Exemplary literary works of the seventeenth century tracing the principal lines of development and showing the reflection in literature of the social change. Special emphasis on the Wittenberg period.

124A-D. Major Movements in German Literature (4) I, II, III. Staff Lecture—3 hours; term paper. Prerequisite: course 101 or the equivalent. Course 101. Selections from some of the major works of each period from Sturm und Drang individualism and rebellion to the balanced harmony of the classical period.

124A. Major Movements in German Literature (4) I. Menges Discussion—3 hours; term paper. Prerequisite: course 101 or the equivalent. Course 101. Selections from some of the major works of each period from Sturm und Drang individualism and rebellion to the balanced harmony of the classical period.

124B. Modern German Literature (4) I. Menges Lecture—2 hours; discussion—1 hour; term paper. Knowledge of German not required. Aesthetic repre- sentation and neohumanist interpretation of the Holocaust in its human and historical perspective. Offered in alternate years. General Education credit: Civilization and Culture.


124D. Contemporary German Press (4) I. Schaeffer Lecture/discussion—3 hours; term paper. Prerequisite: course 103 or the equivalent. Readings in contemporary German-language newspapers and magazines for insight into political and cultural developments in German-speaking countries. Discussion of contents. Critical approaches. Writing of summaries, rebuttals, comments.

125. Contemporary German Literature (4) I. Kuhn Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 103 or the equivalent. Readings in contemporary literature, including texts by Christa Wolf, Helga Königsdörffer, Monika Marbach, Günter Grass, Peter Schneider, Günter de Bruijn. Offered in alternate years.

160. Love in the Middle Ages (4) I. McConnell Lecture—2 hours; discussion—1 hour. Prerequisite: 101. Analysis of the phenomenon of love in selected medieval lyric poems and romances of the twelfth and thirteenth century Blützeit. Origins of...
200C. German Colloquium Series (2) III. The Staff Lecture/discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (from 1900 to present), including pertinent bibliographies and other research tools. Required of M.A. candidates. (SU grading only.)

202B. German Colloquium Series (2) II. The Staff Lecture/discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (1790-1900), including pertinent bibliographies and other research tools. Required of M.A. candidates. (SU grading only.)

205. Aesthetics in the Age of Goethe (4) I. Mangen Seminar—3 hours; term paper. Prerequisite: German 204A, 204B. Focuses on the emergence of aesthetics, beauty from German Romantic and Neo-classical poets during the Age of Goethe. This involves the shift from a model based on the imitation of nature (and the Ancients) to a new concept grounded in the individuality of aesthetic experience.

265. Renaissance and the Reformation in German Literature (4) I. Schaefer Seminar—3 hours; term paper. Prerequisite: German 204A, 204B. Focuses on the importance of Renaissance and Reformation in shaping the literary landscape of the late sixteenth and early seventeenth centuries.

270. German Literature of the Baroque (4) I. Schaefer Seminar—3 hours; term paper. "The Eleagntiades"
and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

290. The Enlightenment in German Literature (4). I. The Staff Seminar—2 hours; term paper. Revolve against the concept of the "Enlightened Age," and evolution of a new literature based on reason and wit. May be repeated for credit with consent of instructor.

292. Sentimentality and "Sturm und Drang" in German Literature (4). II. Menges Seminar—3 hours; term paper. Course on the works of the early Goethe and Schiller. May be repeated for credit with consent of instructor.

293. The Classical Age of German Literature (4). II. Menges Seminar—3 hours; term paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literature. May be repeated for credit with consent of instructor.

294. The Romantic Period in German Literature (4). II. Menges Seminar—3 hours; term paper. Course on the works of the mid-nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

295. The Crisis in German Literature (4). I. Menges Seminar—3 hours; term paper. Course on the works of the mid-twentieth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

296. The Twentieth-Century German Literature (4). I. Menges Seminar—3 hours; term paper. Course on the works of the mid-twentieth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.

297. Special Topics in German Literature (4). I, II. The Staff Seminar—3 hours; term paper. Various special topics in German literature. May be repeated for credit with consent of instructor.

298. Group Study (1-3). I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12). I, II, III. The Staff (Chairperson in charge)

300. Special Study for the Doctoral Dissertation (1-12). I, II. The Staff (Chairperson in charge)

301. Special Study for the Master's Thesis (6). I, II, III. The Staff (Chairperson in charge)

Professional Courses

300A. The Teaching of German (2). I. Henderson Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SHU grading only.)

300B. The Teaching of German (2). I. Henderson Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SHU grading only.)

300C. The Teaching of German (2). II. Henderson Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (SHU grading only.)

391. Teaching Practicum and Coaching Conference (1). I, II. Henderson Conference—4 hours. Prerequisite: appointment as Teaching Assistant, course 390A, 390B, 390C. Experience in teaching with Language Teaching Supervisor. May be repeated for credit. (SHU grading only.)

Professional Course

400. Tutorial and Instructional Internship (1-3). I, II, III. The Staff (Chairperson in charge)

Discussion—1-3 hours. Prerequisite: graduate standing. Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions, intern leadership, discussion and evaluation sessions under staff supervision. May be repeated for credit.

Greek

See Classics

Hebrew

See Religious Studies

History

(College of Arts and Science)

Barbara Metcalf, Ph.D., Chairperson of the Department

Department Office, 176 Voorhies Hall (916-752-0776)

Faculty

Arnold J. Bauer, Ph.D., Professor
Cynthia L. Brantley, Ph.D., Associate Professor
Sandra Boesel, Ph.D., Assistant Professor
William W. Hagen, Ph.D., Professor
Karen Huttunen, Ph.D., Professor
Phyllis J. Jobe, Ph.D., Assistant Professor
Catherine Kudlick, Ph.D., Assistant Professor
Norma B. Landau, Ph.D., Professor
Susan L. Man, Ph.D., Professor
Roland Marchand, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Ted W. Margadant, Ph.D., Professor
Barbara Metcalf, Ph.D., Professor
Don C. Price, Ph.D., Professor
Ruth E. Rosen, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Michael Salter, Ph.D., Assistant Professor
Michael Smith, Ph.D., Associate Professor
Academic Senate Distinguished Teaching Award
Kathleen Stuart, Ph.D., Assistant Professor
Charles Walker, Ph.D., Assistant Professor
Clarence E. Walker, Ph.D., Professor
Emeritus

William M. Bowsky, Ph.D., Professor Emeritus
David Brody, Ph.D., Professor Emeritus

Daniel H. Cahoun, Ph.D., Professor Emeritus
Robert O. Crumney, Ph.D., Professor Emeritus
Manfred P. Fleischer, Ph.D., Professor Emeritus
Paul Goodman, Ph.D., Professor Emeritus
William Greene, M.D., Professor Emeritus
Rollie P. Poppino, Ph.D., Professor Emeritus
Morris Rothstein, Ph.D., Professor Emeritus
Richard N. Schwab, Ph.D., Professor Emeritus
Bryan B. Sherwood, Ph.D., Professor Emeritus
James H. Shidler, Ph.D., Professor Emeritus
Wilson Smith, Ph.D., Professor Emeritus
Stylianos Spyrakos, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award

F. Roy Willis, Ph.D., Professor Emeritus, UC Davis Prize for Teaching and Scholarly Achievement

The Major Program

The history major is designed to develop critical intelligence and to foster an understanding of our past and our world through the study of the past—both remote and recent.

The Program. A student electing a major in History may complete Plan I or Plan II. Plan I prepares students to receive a broad education in 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, or to emphasize the study of the history of one geographic area or time period of their choosing. Students preferring more active engagement in research and writing are encouraged to follow Plan II.

Career Alternatives. A degree in history is excellent preparation for a professional career as teaching, law, journalism, public administration, or business management. Professional school in these and related fields is looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and present conclusions logically in everyday language. These analytical skills are stressed in many history courses, and the mastery given the history student a solid preparation for subsequent training in a specialized career.

A.B. Major Requirements: 20

Preparatory Subject Matter 20

Plan I or II 20

Five lower division courses, including at least two from each of two of the following fields.

a. Western Civilization: History 4A, 4B, 4C, 3, 10, 30
b. Asian Civilization: History 8, 9A, 9B
d. Africa: History 16

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.

At least three upper division courses from one of the other fields listed.

At least one course from the following: History 101, or 102 (in field of concentration); in exceptional circumstances, a student may with the permission of an adviser, take the seminar in another field), or 103 (in field of concentration)

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.

At least three upper division courses from one of the other fields listed.

History 101 5
History 102 in field of concentration [in exceptional circumstances, a student may with the permission of an advisor, take the seminar in another field], or 103 (in field of concentration) .................................................. 5 History 103 in field of concentration ................................................................. 62 Total Units for the Major, Plan II ................................................................. 62

**Fields of Concentration**


**f. A student may group courses from two related fields, (a) through (e) above, to make a major or concentration when there are not enough courses in one particular area of study. Approved groupings include:** Africa and Europe, Africa and Latin America, Africa and the United States. For other groupings, or to meet special needs, a student should obtain written approval from an advisor. Within broad fields, a student may wish to concentrate some of the courses in a particular area, such as China or Great Britain or Medieval Europe. Special approval is not required.

**History and Philosophy of Science**

The following courses from the History and Philosophy of Science program count toward the History major and may serve as requirements in the European field: History and Philosophy of Science 120, 130A. The following courses fulfill upper division requirements in either the U.S. or European field: History and Philosophy of Science 120, 130B, 130C. Students can create a major field in the History of Science upon consultation with a faculty advisor. They may draw upon the relevant History courses (History 85, 86, 135A, 135B, 185A, and 185B) as well as History and Philosophy of Science offerings to do so.

Consult the History and Philosophy of Science program for a more detailed description of course offerings in this area and the minor in History and Philosophy of Science.

**Minor Programs Required:**

History majors may take a single field of concentration, such as Africa, East Asia, Europe, Latin America or the United States. Alternatively, students may select a minor with a thematic emphasis, as listed below, or design a thematic minor in consultation with a Department advisor.

**Courses in History (HIS)**

**Lower Division Courses**

3. **Cities:** A Survey of Western Civilization (4.0) II. The Staff

4A. **History of Western Civilization (4.0):** I. The Staff
   Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture.

4B. **History of Western Civilization (4.0):** III. The Staff
   Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture.

**Course not offered this academic year.

4C. **History of Western Civilization (4.0), II, III. The Staff**
   Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. General Education credit: Civilization and Culture.

6. **History of Indian Civilization (4.0):** III. Metcalf
   Lecture—3 hours; discussion—1 hour, written reports. Survey of Indian civilization from the rise of cities (ca. 2000 B.C.) to the present, emphasizing themes in religious, social, and political organization, and art and literature that reflect cultural interaction and change. General Education credit: Civilization and Culture.

9A. **History of East Asian Civilization (4.0):** I. The Staff
   Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided.

10. **World History of the Twentieth Century (4.0):** I. The Staff
   Lecture—3 hours; discussion—1 hour. History of the world in the twentieth century, emphasizing major powers and their leaders (Wilson, Lenin, Hitler, Roosevelt, Stalin, Mao, Nehru, Nasser, Castro). General Education credit: Contemporary Societies.

15. **Introduction to African History (4.0):** II. Bradley
   Lecture—3 hours; discussion—1 hour. Examination of the long-range historical context as background to current conditions in Africa. Includes the early development of African civilizations, the slave trade and its abolition, 20th century colonization, and African independent states.

17A. **History of the United States (4.0):** II. Hallum
   Lecture—3 hours; discussion—1 hour. Growth of the American people from 1865 to 1915. General Education credit: Civilization and Culture.

17B. **History of the United States (4.0):** II, III. Walker
   Lecture—3 hours; discussion—1 hour. Growth of the American people from 1865 to 1915. General Education credit: Civilization and Culture.

17C. **History of the United States (4.0):** Marchard
   Lecture—3 hours; discussion—1 hour. Growth of the American people from 1915 to 1935.

25. **Thematic History Seminar (4.0):** II. The Staff
   Lecture—3 hours; term paper—1 hour. Emphasizes in-depth a historical topic related to the research interests of the instructor. Addresses historical questions, controversies, methodology, and interpretation.

30. **Russian Cultural History (4.0):** I. Rosen
   Lecture—3 hours; discussion—1 hour. Survey of Russia's history over the last thousand years as reflected in the lives of her political leaders, artists, and rebels. Lecture will use the biographies of Russian political leaders, intellectuals and artists to illustrate the general currents of the country's political, social, and cultural development. General Education credit: Civilization and Culture.

72. **Social History of American Women and the Family (4.0):** I. Rosen
   Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles and the family from colonial America until the late nineteenth century emphasizing changes resulting from the industrialization, commercialization, and industrialization of American society. General Education credit: Civilization and Culture.

72B. **Social History of American Women and the Family (4.0):** III. Rosen
   Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family in twentieth-century America, emphasizing female reformers and revolutionaries, working class women,
consumerism, the use of media, the "feminine mystique" in changes in family life, and the emergent women's movement. General Education credit: Civilization and Culture or Contemporary Societies.


86. Quakerism and Pseudoscience in America (4) Lecture—3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in America: witchcraft, medical quackery, spiritualism, science hoaxes, technological frauds, literary and artistic frauds, and popularized philosophy, psychoanalysis, and parapsychic phenomena. Emphasis upon explanations for the existence of deception and pseudoscience.

88. Directed Group Study (1-5) The Staff (Chairperson in charge) Prerequisite: consent of instructor. Primarily for lower division students. (P/N grading only.)

99. Special Study for Undergraduates (1-5) The Staff (Chairperson in charge) (P/N grading only.)

Upper Division Courses

*101. Introduction to Historical Thought and Writing (5) The Staff Lecture—3 hours; term paper. Prerequisite: consent of instructor. Study of the history of historical thought and writing; analysis of critical and speculative philosophies of history and evaluation of modern organization, interpretation, and style in historical writing.

102A-R, X. Undergraduate Proseminar in History (5) I, II, III. The Staff Seminar—3 hours; term paper. Designed primarily for history majors and minors, this seminar covers the major historical periods. Credit 3.

103. Topics in Historical Research (4) The Staff (Chairperson in charge) Discussion—3 hours; individual consultation with instructor; term paper. Prerequisite: consent of instructor. Research methodology in the humanities. Credit 3.

104A. Introduction to Historical Research and Interpretation (4) The Staff Seminar—3 hours; term paper. Prerequisite: acceptance into History Department Honors Program. Directed reading and research aimed at preparing students to select appropriate topics and methodology for the historical essay, emphasizing the ability to examine and to state their topics within a meaningful, broad context of historical interpretations. Credit 3.

104B. Honors Tutorial (4) The Staff Tutorial—4 hours; term paper. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)

104C. Honors Tutorial (4) The Staff Tutorial—4 hours; term paper. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty adviser.

110. Themes in World History (4) Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Historical issues in world history from 1400 to the present. Topical will emphasize the interaction of diverse regions of the world as well as common patterns of historical change. Offered in alternate years.

*111A. Ancient History (4) Spyrakidis Lecture—2 hours; discussion or paper (student option). History of early civilizations, ancient Egypt, and the Near East and their political development. Credit 3.

111B. Ancient History (4) I. Spyriakidis Lecture—3 hours; discussion or paper (student option). Political, cultural, and intellectual development in Greece. Credit 3.

115A. History of West Africa (4) Brantley Lecture—3 hours; term paper. Prerequisite: course 115 recommended. Introduction to the history of West Africa from the earliest times to the present.

115B. History of East and Central Africa (4) II. Brantley Lecture—3 hours; term paper. Prerequisite: course 115 recommended. Introduction to the history of East and Central Africa from the earliest times to the present. This course is a part of an interdisciplinary East African sequence which includes History 115B (Winter) and Political Science 138.

115C. History of Southern Africa, Swaziland, Lesotho, and Botswana from 1500 to the Present (4) Brantley Lecture—3 hours; term paper. Prerequisite: course 115 recommended. Introduction to the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1500 to the present.

116. African History: Special Themes (4) The Staff Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B recommended. Themes in African history, such as African states and empires, slave trade, relationships of Europe to Africa, and post-colonial Africa. Credit 3.

117. Medieval History (4) The Staff Lecture—3 hours; discussion and panel presentations—3 hours. European history from the fall of the Roman Empire to the fourteenth century.

118. Medieval History (4) The Staff Lecture—3 hours; discussion and panel presentations—3 hours. European history from the twelfth to the fourteenth century.

121C. Medieval History (4) The Staff Lecture—3 hours; discussion and panel presentations—3 hours. European history from Charlemagne to the fourteenth century.

122. Selected Themes in Medieval History (4) The Staff Lecture—3 hours; term paper. Prerequisite: course 121C. Offered in alternate years. Credit 3.

125. Topics in Modern European History (4) Ill. Stuart Laboratory/discussion—3 hours; term paper. Prerequisite: course 121C. Topics in modern European history, including the history of science, political and social movements, and the history of modern Europe. Credit 3.

125A. Christianity and Culture in Europe (5) I. Stuart Lecture—3 hours; term paper or research paper. A history of the works of the Church and the Enlightenment in the history of culture and society, focusing on the development of Christianity and its impact on the European intellectual and cultural landscape. Credit 3.

125B. Christianity and Culture in Europe: 1450-1600 (4) I. Stuart Lecture—3 hours; term paper or research paper. A history of the development of the Church and the Enlightenment in the history of culture and society, focusing on the development of Christianity and its impact on the European intellectual and cultural landscape. Credit 3.

130C. Christianity and Culture in Europe: 1600-1800 (4) I. Stuart Lecture—3 hours; research paper or research paper. A survey of the development of the Church and the Enlightenment in the history of culture and society, focusing on the development of Christianity and its impact on the European intellectual and cultural landscape. Credit 3.

131A. Early Modern European History (4) Stuart Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1350 to about 1500.

131B. Early Modern European History (4) II. Stuart Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1500 to about 1600.

131C. Early Modern European History (4) III. Stuart Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B, 131C recommended. Western European history from about 1650 to about 1780.

132. The Age of Ideas (4) The Staff Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B, 132 recommended. Western European history from about 1650 to about 1780.

133. The Age of Revolution (4) The Staff Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B, 133 recommended. Western European history from about 1650 to about 1780.

134A. The Age of Revolution (4) I. Dobbs Lecture—3 hours; term paper. Prerequisite: upper division standing. Study of the development of the American Revolution, the French Revolution, and the Napoleonic era.

134B. History of Science to the 18th Century (4) I. Dobbs Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Survey of the historical development of science, technology, and medicine from the ancient world to the eighteenth century, with special emphasis on Isaac Newton as the culmination of the seventeen-century scientific revolution.

135B. History of Science, 18th to 20th Centuries (4) II. Dobbs Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Survey of the historical development of science, technology, and medicine from the eighteenth century to the present, with special emphasis on the emergence of new scientific principles and the scientific revolution.

136. Scientific Revolution (4) I. Findley Lecture/discussion—3 hours; term paper. Prerequisite: course 135B. Recommended. History of the scientific revolution in Western Europe from the sixteenth to the eighteenth century, with special emphasis on the scientific revolution and the changing definitions of science in the age of Copernicus, Galileo, Newton, and the Enlightenment.

137A. Russian History: Kievan Rus, Muscovite, and Petrine (4) I. Brower Lecture—3 hours; term paper. Russian civilization from the Russian-Turkish War to the Russian Revolution. Credit 3.

137B. Russian History: The Empire, 1725-1900 (4) II. Brower Lecture—3 hours; term paper. Russian civilization from the Patrice reforms to the end of the century. Credit 3.

137C. Revolutionary and Soviet Russia, 1900 to the Present (4) III. Brower Lecture—3 hours; term paper. Russian civilization from the Patrice reforms to the end of the century. Credit 3.

147C. European Intellectual History, 1920-1970 (4) III. Saler Lecture—3 hours; term paper. European thought and culture since World War II. Coverage includes: literature and politics; Communism and Western Marxism; Fascism, McCarthyism, Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woff and de Beauvoir. General Education credit: Civilization and Culture.

148A. Women and Society in Europe: 1500-1799 (4) I. Kudlick Lecture—3 hours; term paper. Prerequisite: course 4B recommended. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and social commentators.


151A. England: The Middle Ages (4) III. Jesteck Lecture—3 hours; term paper. Prerequisite: course 4A and 151A recommended. Origins of England to the accession of the Tudor monarchs. Survey includes: impact of Normans, Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wycliff.

151B. England: The Early Modern Centuries (4) I. Kudlick Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B and 151A recommended. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton.

151C. Eighteenth-Century England (4) I. Landau Lecture—3 hours; term paper. English history from the Glorious Revolution to the French Revolution. Examination of the transformation of one of Europe’s most politically unstable kingdoms into the firmly established constitutional monarchy which provided an environment fit to engender the industrial revolution.

151D. Industrial England (4) III. Landau Lecture—3 hours; term paper. English history from Waterloo to 1815. Rise and consolidation of the industrial order, the economic and social order of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Bloomsbury, empire to commonwealth.

161A. History of Colonial Spanish America (4) I. C. Walker Lecture/discussion—3 hours; written reports. Pre-Columbian civilizations of Middle America and the Andean region (mainly Azteco and Incas); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides. General Education credit: Civilization and Culture.

161B. Latin American History (4) II. Bauer Lecture/discussion—3 hours; written reports. Evolution of modern Latin America: export economies; oligarchic rule; reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides.

162. History of the Andean Region (4) III. C. Walker Lecture/discussion—3 hours; written and/or oral reports. History of the Andean region, the area now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present.

163A. History of Brazil (4) III. The Staff Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in alternate years.

163B. History of Brazil (4) II. The Staff Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in alternate years.

164. History of Chile (4) II. Bauer Lecture—3 hours; term paper. Prerequisite: course 161A, 161B, 165, or 169 recommended. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the role of the military; the impact of the richness of Chilean literature. Offered in alternate years.

165. Latin American Social Revolutions (4) III. Bauer Lecture—3 hours; written reports. Major social upheaval since 1900 in selected Latin American nations: similarities and differences in cause, course, and consequence. General Education credit: Contemporary Societies.

166A. History of Mexico to 1848 (4) II. Bauer Lecture/discussion—3 hours; written and/or oral reports. Mexico from 1821 to 1848. Offered in alternate years.

166B. History of Mexico Since 1848 (4) II. The Staff Lecture/discussion—3 hours; written reports. Historical development of pre-Columbian, colonial and national Mexico to 1848. Offered in alternate years.

168W. History of Inter-American Relations (4) II. The Staff Lecture—3 hours; written reports. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America.

169A. Mexican-American History (4) II. The Staff Lecture/discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. General Education credit: Civilization and Culture.

169B. Mexican-American History (4) II. The Staff Lecture/discussion—3 hours; written and/or oral reports. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture and society of the Southwestern United States since 1910. General Education credit: Civilization and Culture.

170A. Colonial America (4) I. The Staff Lecture—3 hours; term paper. Colonial society from 1607 to 1783 as a base for the study of the American Revolution, with emphasis on European expansion, political, social and economic foundations, colonial thought and culture, and imperial rivalry.

170B. The American Revolution (4) I. The Staff Lecture—3 hours; term paper. Analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period.

170C. The Early National Period, 1789-1815 (4) III. The Staff Lecture—3 hours. Political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences.

171A. The Jacksonian Era (4) I. The Staff Lecture—3 hours; term paper. Social history of the American republic from the War of 1812 to the Compromise of 1850.

171B. U.S. Civil War: Politics and Society (4) I. The Staff Lecture/discussion—3 hours; term paper. Social crisis, 1848-1877: slavery and the West, new political parties, secession, mobilization and emancipation, economic nationalism and Reconstruction (for military aspects, see course 173).

174. The Emergence of Modern America, 1785-1914 (4) I. Margulies Lecture—3 hours; term paper. Rise of modern business and labor organizations, changing political insti-
tutions, the culmination and decline of Victorian culture, the formation of nudocrats, populists, socialists, feminists, and social reformers to industrialization and urbanization.

**174B. America in War, Prosperity and Depression, 1914-1945 (4) Marchman**

Lecture—3 hours; term paper. America’s emergence as a world power, the business culture of 1920s, the New Deal and World War II. Emphasis on such issues as government regulation of the economy, welfare capitalism, and class, racial, ethnic and gender conflicts.

**174C. The United States Since World War II, 1945 to the Present (4) III. M. Smith**

Lecture—3 hours; term paper. America’s struggle to respond to new threats, both foreign and domestic, social tensions, family changes and media. Emphasis on such topics as: Cold War, anticommunist crusade, civil rights, feministic and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority.

**174D. Selected Themes in Twentieth-Century American History (4) The Staff**

Lecture—3 hours; term paper. Prerequisite: course 175 or the equivalent or consent of instructor. Interpretative overview of a single topic in twentieth-century America with emphasis on the phases and processes of historical change.

**175A. Intellectual History of the United States (4) The Staff**

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: course 17A or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American thought from the Puritans through the era of the American Enlightenment. General Education credit: Civilization and Culture.

**175B. Intellectual History of the United States (4) III. The Staff**

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in political economy; the Renaissance, political theory, American literature, or sociological theory. Twentieth-century American thought from 1900 to 1945, emphasizing the pragmatic tradition, naturalism in law and literature, protestant liberalism and neo-orthodoxy, Freudian currents in social thought and social criticism of the 1960s.

**175A. Cultural and Social History of the United States (4) The Staff**

Lecture—3 hours; term paper. Study of social and cultural forces in American society in the nineteenth century with emphasis on social structure, work and leisure, religious and social change, family, social reform movements and changes in cultural values.

**176B. Cultural and Social History of the United States (4) III. Halttunen**

Lecture—3 hours; term paper. Study of social and cultural forces in American society in the twentieth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values.

**177A. History of Black People and American Race Relations (4) II. Walker**

Lecture—3 hours; term papers. Prerequisite: course 17A or 17B. Afro-American history. History of black people in the United States from Reconstruction to the present. General Education credit: Civilization and Culture.

**177B. History of Black People and American Race Relations (4) I. Walker**

Lecture—3 hours; term papers. Prerequisite: course 17A or 17B. Afro-American history. History of black people in the United States from Reconstruction to the present. General Education credit: Civilization and Culture.

**180A. Growth of American Politics to 1815 (4) The Staff**

Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlements to 1815 focusing on the distribution of power, its change over time and the ways power has been used. Examines political party development and the social and ideological dimensions of political behavior.

**180B. Growth of American Politics, 1815-1899 (4) I. The Staff**

Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A.

**180C. Growth of American Politics, 1890 to the Present (4) III. The Staff**

Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B.

**181I. Religion in American History to 1800 (4) The Staff**

Lecture—2 hours; discussion—1 hour; oral and written reports. Religious ideas and institutions from the Puritans to about 1800. Survey of the large-scale social changes associated with revivalism and the great awakenings and the movement from Protestant orthodoxy to pluralism in industrial America.

**183A. The Frontier Experience: Trans-Mississippi West (4) III. The Staff**

Lecture—3 hours; written and/or oral reports. The fur trade, western exploration and transportation, the Oregon Country, the Great Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War.

**183B. The Frontier Experience: Trans-Mississippi West (4) III. M. Smith**

Lecture—3 hours; written and/or oral reports. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West.

**185A. History of Science in America (4) I. The Staff**

Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from the founding to 1865.

**185B. History of Technology in America (4) Smith**

Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, inventions, ideas, and relationships between technology and society from colonial times to present.

**187A. American Business History to the 1880s (4) The Staff**

Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the colonial period to the 1880s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

**187B. American Business History, 1860s to the Present (4) The Staff**

Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1860s to the present, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in alternate years.

**188A. History of Agriculture in the U.S. to 1900 (4) The Staff**

Lecture—3 hours; term paper. Agricultural settlement and development in the U.S. with emphasis on government policies, economic and social institutions. Offered in alternate years. General Education credit: Civilization and Culture.

**188B. History of Agriculture in the U.S. since 1900 (4) II. The Staff**

Lecture—3 hours; term paper. Agricultural settlement and development in the U.S. with emphasis on government policies, economic and social institutions. Offered in alternate years. General Education credit: Contemporary Societies.

**189A. History of California (4) III. The Staff**

Lecture—3 hours; written and/or oral reports. Spanish colonization and settlement; the missions as a frontier institution; revolt of the Californios; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War.

**189B. History of California (4) I. M. Smith**

Lecture—3 hours; written and/or oral reports. State constitution; land grant and Indian policies; Gold Rush; vigilantes; railroad construction; the wheat era; changing economy; social and literary developments; Progressive reform.

**190C. History of the People’s Republic of China (4) The Staff**

Lecture—3 hours; discussion—1 hour; term paper. Analysis of China’s cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolutionary strategy (1949), with some attention to its implications for post-revolutionary culture and politics. Offered in alternate years.

**190D. The Chinese Revolution (4) The Staff**

Lecture—3 hours; discussion—1 hour; term paper. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Offered in alternate years.

**191A. Classical China (4) The Staff**

Lecture—3 hours; term paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy, to the rise and fall of the Five Dynasties.

**191B. High Imperial China (4) The Staff**

Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of T’ang, Sung, and Ming with analysis of society, culture and thought.

**191C. Late Imperial China (4) I. Mann**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A or upper division standing. Patterns and problems of Chinese life traced through the Ming and Ch’ing dynasties, 1360-1910, prior to the confrontation with the West in the Opium War. Readings include primary sources and novels portraying elite ethos as well as popular culture. Offered in alternate years.

**191D. Nineteenth Century China: The Empire Confronts the West (4) II. Bosler**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A, or upper division standing. The decline and fall of the Chinese Empire with particular attention to the social and political crises of the 19th century, and the response of government officials, intellectuals, and ordinary people to the increasing pressures of Western imperialism.

**192. Internship in History (1-12) I, II. The Staff**

Chairperson in charge: Prerequisite: enrollment dependent on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an
History and Philosophy of Science
College of Letters and Science

James R. Griesemer, Ph.D., Program Director
Program Office, Social Sciences and Humanities Building (916-752-9621)

Committee in Charge
Betty Jo T. Dobbs, Ph.D. (History)
Michael R. Dietrich, Ph.D. (History and Philosophy of Science)
Paul Findlay, Ph.D. (History)
James R. Griesemer, Ph.D. (History)
Michael Smith, Ph.D. (History)
Paul Teller, Ph.D. (Philosophy)

The Program. The interdisciplinary minor in the history and philosophy of science invites students to examine historical and contemporary problems in a variety of scientific disciplines, and to explore concepts and procedures basic to science and how they have evolved. The minor is sponsored by the Program in the History and Philosophy of Science.

Minor Program Requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>History and Philosophy of Science</td>
<td>24</td>
</tr>
<tr>
<td>Philosophy 104</td>
<td>4</td>
</tr>
<tr>
<td>History 135A or 135B</td>
<td>4</td>
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</tbody>
</table>

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History and Philosophy of Science

*Course not offered this academic year.*
Four courses from those listed below. One course must be from each of the areas: (a) history, (b) philosophy, and (c) history and philosophy of science. 

(a) History of Ideas (History 102, 136, 139A, 139B, 158A, 158B, 188P, 188B).
(b) Philosophy 106, 107, 108, 109, 110, 111, 112.
(c) History and Philosophy of Science 20, 130A, 130B, 150, 160.

Minor adviser. M. Dietrich, Humanities/Social Science Building, 916-752-3709.

Courses in History and Philosophy of Science (HPS)

Lower Division Courses

20. Cosmic Origins and Structures: Scientific and Non-Scientific Theories (4) I. Dobbs Lecture/discussion—3 hours; term paper. Broad cultural survey of cosmogenies and cosmologies from several societies. Non-technical study of developments in Western culture that produced the cosmologies of Plato, Newton, and Einstein; also cosmological speculations of astrologers, alchemists, Christian mystics, women, and Native Americans. General Education credit: Civilization and Culture.

*90X. Lower Division Seminar (1-2) I, II, III. The Staff (Chairperson in charge) Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in History and Philosophy of Science through shared readings, discussions, written assignments, or special activities such as films, library work, archival work, etc. May be repeated once for credit when content differs. Limited enrollment.

Upper Division Courses

130A. From Natural History to the History of Nature (4) III. Findlen Lecture/discussion—3 hours; term paper. Prerequisite: History 130A recommended. Evolution and demise of natural history as a discipline from Aristotle to Linnaeus. Considers ancient views of nature and its Renaissance rediscovery; the emergence of biology, botany, geography, and zoology; the history of taxonomy and classification. General Education credit: Civilization and Culture or Nature and Environment.

130B. History of Modern Biology (4) II. Dietrich Lecture/discussion—3 hours; term paper. Prerequisite: course 130A recommended. Development of modern biological concept of Darwinian roots to the present. Considers emergence of modern biological specializations and consolidation of biological theory around evolutionary ideas. History of allied fields such as genetics, paleontology, embryology, ecology, systematics and molecular biology. General Education credit: Civilization and Culture or Nature and Environment.

150. Gender and Science (4) III. Dietrich Lecture/discussion—3 hours; term paper. An interdisciplinary approach to the relations between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women as practitioners of science, and feminist approaches to science.

180. Topics in History and Philosophy of Science and Technology (4) II. The Staff Seminar—3 hours; term paper. Prerequisite: course in History and Philosophy of Science or other course work relevant to the particular offering. In-depth treatment of selected topics in the history and philosophy of science. Possible topics include: history of modern physics, history of molecular biology: science and society, scientific explanation: technology and culture, theory testing.

186. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PINP grading only.)

189. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (PINP grading only.)

Graduate Courses

250. History and Philosophy of Science (4) III. Dietrich Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary seminar in the history and philosophy of science. Focuses on issues such as historiography, methodology, and the conceptual foundation of science. May be repeated for credit with consent of instructor.

296. Group Study (1-12) I, II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Director in charge) Prerequisite: consent of instructor. (SU grading only.)

Horticulture (A Graduate Group)

David W. Burger, Ph.D., Chairperson of the Group

Group Office, 140 Environmental Horticulture Facility. The faculty includes departmental members of Environmental Design, Environmental Horticulture, Entomology, Plant Pathology, Pomology, Vegetable Crops, and Viticulture and Enology.

Graduate Study. The Graduate Group in Horticulture offers programs of study leading to the M.S. degree. The programs provide opportunities for specialized study of the production, management, and utilization of horticultural plants and the postharvest handling of horticultural commodities. Areas of specialization include: floriculture, nursery production, landscape horticulture, pomology, vegetable crops, and viticulture. Research may be conducted on an applied or basic problem having a physiological, genetic, or ecological emphasis.

Preparation. A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes course work in general botany, chemistry, physics, statistics, genetics and introduction to plant physiology. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail and may be obtained from the Group Office.

Graduate Advisers. Consult the Group Office.

Courses in Horticulture (HRT)

Graduate Courses

251. Modelling Horticultural Systems (3) I. Leth Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 101, calculus, or consent of instructor. Introduces students to systems modeling. Primary emphasis on physiological and ecological models with examples drawn from areas of interest to class participants. Applications to horticultural systems will be explored. Students will receive hands-on experience.

260. Seminar (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate standing at UC Davis. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (SU grading only.)

*Course not offered this academic year.

Human Anatomy

See Cell Biology and Human Anatomy in Medicine, School of
Human Development (Human Development 30).
Nutrition (Nutrition 10 or 101)..............3-5
Physiology (Neurobiology, Physiology and Behavior 10 or 110)..............4
Psychology (Psychology 1 or 15)..............3-4
Statistics (Education 114, Psychology 41, Sociology 46A and 46B, or Statistics 13)..............4

Breadth/General Education..............24-32
Satisfaction of General Education requirement (History 17A, 17B, 17C, 72A, 72B, and Political Science 1 are recommended courses)..............16-24

American history/American government (History 17A, 17B, 17C, 72A, 72B, and Political Science 1 are recommended courses)..............16-24

Depth Subject Matter..............52-53
Human Development 100A, 100B, 100C, 110..............16
Social-cultural processes (Human Development 102 or 103)..............8
Assessment (Human Development 120 or 121)..............8

Cognitive Processes (Human Development 101 or 132)..............8

Exceptional children (Human Development 130 or 131)..............8

Practicum (Human Development 140-140L, 141 or 142 or 143)..............8

Four additional upper division courses chosen from the Human Development courses or from a list of restricted electives (in consultation with faculty adviser)..............16

Unrestricted Electives..............38-72
Total Units for the Degree..............180

Related Major Program. See the major in Applied Behavioral Sciences.

Minor Program Requirements:

Aging and Adult Development..............21-27
Human Development 100C, 100 L, 191..............16
Community Health 180..............4
Human Development 110, Applied Behavioral Sciences 173..............8
Practicum, 2 units minimum..............2-6

Minor Adviser. C. Juslin, B. Ober.

Human Development..............20

Human Development 103A..............4
Human Development 103B or 100C..............4
Human Development 110 or 103 or 151..............4
Two courses from Human Development 101, 102, 130, 131, or 132..............8

Minor Adviser. L. Harper.

Graduate Study. Refer to the Graduate Studies section in this catalog.

Courses in Human Development (HDE)

Questions pertaining to the following courses should be directed to the instructor or to the Applied Behavioral Sciences Advising Office, 1303 Harle Hall (818-756-2244).

Lower Division Courses

12. Human Sexuality (2) II, III. The Staff

Lecture—2 hours. Vocabularly: 15. Human development (including: family cycle, impact of alcohol and drug abuse. Sources of strength and help. Not open for credit to students who have completed courses 100A, 100B, 110 and/or Psychology 112, 114, and 115. General Education credit: Contemporary Societies.

19. Life Cycles, Kinship, and Growth in Human Populations (4) II. Carey

Lecture—3 hours; discussion—1 hour. Human populations at different levels of organization: including life course, family life cycle, race, ethnicity, gender, and population traits and changes. General Education credit: Nature and Environment.

30. Observation Techniques in Human Development (4) II, III. The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: Psychology 1 and consent of instructor. Observational techniques used in the study of human behavior and development, with focus on ages six months to five years; and use of field data. Students may not pre-enroll for the course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.

98. Directed Group Study for Undergraduates (1-5) II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (PINP grading only.)

99. Special Study for Undergraduates (1-5) II, III. The Staff (Chairperson in charge)

(PINP grading only.)

Upper Division Courses

100A. Infancy and Early Childhood (4). Harper, II. Accredito

Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Analysis of the biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six.

100B. Middle Childhood and Adolescence (4). I, II. Accredito, II. Ober

Lecture—4 hours; discussion—1 hour. Prerequisite: Psychology 1 or 15. Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging."

101. Cognitive Development (4) II. Goodman

Lecture—4 hours. Prerequisites: courses 100A and 100B, or consent of instructor. Theories of cognitive development including developmental views of perception, learning, memory, concept formation, and language.

102. Social and Personality Development (4) II. Rodman

Lecture—3 hours; discussion—1 hour. Prerequisite: Introductory psychological course 100B or the equivalent. Theories of development of a child's personality through interactions with children and adults; development of interpersonal and culturally valued skills.

103. Cross-Cultural Study of Children (4) III, Chisholm

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, III. Chisholm

Lecture—4 hours. Prerequisite: introductory psychology. Focuses on factors influencing American families including: aging, economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.

120. Research Methods in Human Development (4) II. Barton

Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: courses 100A and 100B; elementary statistics. Research methods in selected areas of human development (i.e., infancy, learning, cognition, personality).

*Course not offered this academic year.

121. Psychological Assessment (4) I, Barton, III. The Staff

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) II. Bryant

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Discussion of psychosocial, neurotic, behavior disorders, and learning difficulties in children.

131. Developmental Disabilities (4) II. The Staff

Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities, etiology, diagnosis, education and socialization. Introduction to community resources.

132. Individual Differences in Giftedness (4) III. Kraft

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Conceptualization, identification and education of the intelligent, the creative, and the talented, gifted individual.

140. Communication and Interaction with Young Children (2) II, III, Stockman

Lecture—2 hours. Prerequisite: courses 30A, 100A, and 140L (may be taken concurrently). Theory and practice in the area of effective interaction with young children. Humicentric, child-centered approach. Awareness of values and responsibilities as these affect interactions. Students may not pre-enroll for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.

140L. Laboratory in Early Childhood (3-6) II, III, Stockman

Discussion—1-3 hours; laboratory—6-12 hours. Prerequisite: course 140 (may be taken concurrently). Application of theories of learning and development to interaction with children six months to five years at Early Childhood Laboratory. Applied skills in communication, discipline and curriculum. May be repeated for credit for a total of 12 units.

141. Field Studies with Children and Adolescents (4-6) II. The Staff, III. Kraft

Discussion—2 hours; field study—6-12 hours. Prerequisite: course 100B or the equivalent and consent of instructor. Study of children's affective, cognitive and social development within the context of family, school, and community environments, hospitals and foster group homes. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

142. Field Studies with Exceptional Children (4-6) II. Bryant

Discussion—1-2 hours; field study—6-12 hours. Prerequisite: consent of instructor and one course from courses 120, 130, or 131 (or 130 may be taken concurrently). Field study with children who are identified as developmentally disabled, emotionally distressed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation and consent of instructor.

143. Field Studies of the Elderly (4-6) II. Ober

Fieldwork—8-12 hours; discussion—1-5 hours. Prerequisite: course 100C or 160 may be taken concurrently. To apply theory and research on adult development and aging, to work with older adults in a variety of settings, and to develop skills relevant to that application. Students will also develop a small research project. Offered alternately winter quarter of one year, then in spring quarter the next year.

150. Supervision and Administration of Early Childhood Education Programs (4) I. The Staff

Lecture—40 hours total. Prerequisite: course 140 or prior experience in an early childhood education program. History of early childhood programs in California; federal, state and local regulations. Implications of different regulations for funds and budgets, policy making mechanisms, professional and legal responsibilities, staff development, and professional attitudes and issues. Offered in alternate years.
151. Shared Child Care (4) II. Warner
Lecture—4 hours. Prerequisite: courses 100A or 110, Psychology 112, or Anthropology 131. Examines roles of caregivers other than parents in contemporary society, and the impact of grandparents, siblings, family day care providers, other parents, church- and employer-sponsored child care on children's development. Reviews child care legislation and social policy issues.

158. Social Aspects of Aging (4) II. Aldwin
Lecture—4 hours. Prerequisite: course 100C or Psychology 115. How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class project.

162. Issues in Aging (3) I. Aldwin
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 100C or 160. Research and policy issues concerning the elderly and aging in contemporary society.

190C. Introductory Research Conference (1), II, III.
The Staff
Discussion—1 hour. Prerequisite: involvement in ongoing research. Instructors lead discussions with undergraduate students who involve themselves in a research project. Papers are reviewed and aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. (P/NP grading only.)

*191. Proseminar: Issues in Aging (2) II. The Staff Seminar—2 hours. Prerequisite: upper division standing. Discussion of selected critical issues in aging.

192. Internship—(1-12) I, II, III. The Staff (Chairperson in charge)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship off and on campus, in community, and institutional settings. (P/NP grading only.)

198. Directed Group Study—(1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates—(1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

200A. Early Development (4) I. Harper
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology/physiology; one upper level course in psychology or a related field; one upper division or graduate course in developmental psychology (may be taken concurrently). Theory and research on the biological, social, cognitive, and emotional aspects of development from conception to the age of five years.

200B. Middle Childhood and Adolescence (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology; and at least two upper division or graduate-level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five until late adolescence.

200C. Development in Adulthood (4) III. Ober
Lecture/discussion—4 hours. Prerequisite: course 200A and 200B. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on the theory development and continuity and change.

201. Social-Emotional Development in Infancy (4) II. Rodning
Lecture—discussion—4 hours. Prerequisite: course 200A. Analysis of theory, methods, and research on social-emotional development in infancy. Emphasizes the development of primary and secondary emotions, and the development of attachment. Other possible topics include infant temperament, sex differences, compliance, and self-regulation. Offered in alternate years.

203. Development in Middle Childhood (3) I. Bryant
Seminar—3 hours. Prerequisite: graduate standing; some background in developmental psychology or human development; consent of instructor. Critical evaluation of relevant theories and research regarding normal and "abnormal" development in middle childhood. Emphasizes social-emotional development in varying contexts (family, school, neighborhood) and considers the interplay of cognitive, biological, social, and emotional processes during middle childhood. Offered in alternate years.

210. Theories of Behavioral Development (3) III. The Staff
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical sociology, (e.g., social learning, social interaction) as scientific theories. Offered in alternate years.

211. Physiological Correlates of Behavioral Development (3) III. Harper
Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and non-human primates.

212. Adaptation and Aging (3) I. Aldwin
Lecture/discussion—3 hours. Prerequisite: course 200C. Interdisciplinary perspective of the ways biological, psychological, and sociocultural factors affect aging and adaptation in later life. Focus on the ways in which stress, coping, and social support affect health and the factors which contribute to optimal aging. Offered in alternate years.

213. Cross-Cultural Study of Children (3) III. The Staff
Lecture—2 hours; discussion—1 hour; field project or paper. Prerequisite: graduate standing in Human Development, Education, Anthropology, Psychology or a related field. Comparative study of children in different cultures and subcultures in U.S.A. Offered in alternate years.

217. Development of Cortical and Perceptual Latency (3) II. Kraft
Seminar—3 hours. Prerequisite: graduate standing in child or human development or consent of instructor. Current theory and research regarding the development of human cortical and perceptual latency — emphasizing the relationships of this development to thinking and behavior — are surveyed in alternate years.

220. Research Methods in Human Growth and Development (3) II. Barton
Lecture—3 hours. Prerequisite: Statistics 13 or the equivalent and at least two upper division courses in human biology or developmental psychology. Theory and research methods in biological growth, and cognitive and social/emotional development from prenatal period to death.

221. Psychological Assessment of Children (4) III. Barton
Lecture—2 hours; discussion—2 hours. Prerequisite: course 121 or consent of instructor. Study of children's behavior through examination, analysis and evaluation of perceptual-motor, affective, and social development. Problems in assessment of exceptional children considered. Assignments focus on preparation of a comprehensive report on one child.

225. Behavioral Development and Food Intake (4) II. Politt
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development (related fields) and Nutrition. Multidisciplinary view covering key theoretical and research issues in basic human development processes related to food intake.

231. Issues in Cognitive and Linguistic Development (3) III. Kraft
Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

232. Cognition and Aging (3) I. Ober
Lecture/discussion—3 hours. Prerequisite: course 200C. The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Offered in alternate years.

237. Parent-Child Interaction (3) III. The Staff
Seminar—3 hours. Prerequisite: consent of instructor; upper division course on the family recommended. Current theory and research. Emphasis on parental behavior in other animals and other cultures, childrearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, sex-role development, and moral development. Offered in alternate years.

241. Consultation Approaches to Child Development (3) II. Bryant
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate standing; supervised field experience with children (e.g., course 140, 141, 142, may be taken concurrently); and consent of instructor. Analysis and application of theories and approaches of consultation and child development to facilitate delivery of child-related services (e.g., educational and mental health). Develop working knowledge and consultation skills for working with adults directly interacting with children and adolescents. Offered in alternate years.

242. Adolescent Health Behavior: Theory and Programs (2) I. Braverman
Lecture/discussion—2 hours. Prerequisite: graduate standing in child or human development, or consent of instructor; course 2008 recommended. Theoretical conceptions relating to adolescent behaviors that have potential impact on health (e.g., use of tobacco, alcohol and other drugs; sexual behavior; accident prevention). Development and evaluation of programs that aim to influence adolescents' behaviors or attitudes in these areas. Offered in alternate years.

246. Sex, Evolution, and Development (4) I. Chisholm
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development or related field. An evolutionary and cross-cultural perspective on current research, with special attention to the history of the theory and personal investment theory and their relevance for understanding the development of alternative mating and parenting strategies in humans.

250. Seminar (3) I, II, III. The Staff
Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

290C. Research Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Supervising instructors lead research discussions with graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (S/U grading only.)

291. Research Issues in Human Development (3) I. Kraft; II. The Staff
Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. Research presentations of research issues in particular areas of behavioral development.

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

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
(S/U grading only.)
Human Development (A Graduate Group)
Rosemarie Kraft, Ph.D., Chairperson of the Group
Office Group. 1303 Hart Hall (916-752-1926)
Faculty. Core faculty are developmental psychologists housed in the Division of Human Development. Students may also choose to work with faculty from the Departments of Anthropology, Behavioral Biology, Neuroscience, Nutrition, Psychology, Physiology, the Division of Education, and the Schools of Law and of Medicine.
Graduate Study. The interdisciplinary and interdepartmental Graduate Group in Human Development offers a program of study leading to the Ph.D. degree. The aim of the program is to provide students with a coordinated postgraduate 1-year study of human behavioral development and to educate students in the theories, methods, and accumulating research that provide the basis for current understanding and expanding knowledge of the development of human behavior. The program has a three-pronged structure:
(1) It incorporates study in three domains of human development—biological, cognitive, socio-emotional;
(2) It centers on the study of human development across the lifespan from conception through aging; and,
(3) It emphasizes the internal and external contexts within which human development takes place—cultural institutions such as families, schools, and hospitals, and other contextual conditions such as government/social policy, nutrition, disease, and health/mental health. Recipients of the degree will be prepared to teach, to conduct research, and to be actively involved in public service in human behavioral development.

Humanities
(College of Letters and Science)
Clarence Walker, Ph.D., Program Director
Program Office, Humanities Institute (916-757-3470)
Committee in Charge
Kay Flavell, Ph.D., (Critical Theory)
Catharin Kudlick, Ph.D., (History)
Jay Mechling, Ph.D. (American Studies)
Darío Molèse, Ph.D., (Sociology)
Carol Smith, Ph.D. (Anthropology)
George Van Den Abbeele, Ph.D. (French)
The Program of Study
Courses in the Humanities Program are designed to provide instruction in interdisciplinary areas which do not fit readily into existing departments or programs.
Courses in Humanities (HUM)
Lower Division Course
20A. Priority in the West (4) II. Murak Lecture/discussion—3 hours; term paper. Interdisciplinary study of privacy in the West. History of privacy as a positive concept in American constitutional tradition. Supreme Court cases. Privacy as a negative concept in Western religious tradition and Marxism. Privacy and gender, e.g., Anita Hill and Clarence Thomas.
40. Introduction to Computing in the Humanities (4) I. Roddy Lecture—3 hours; laboratory—3 hours. Survey of current approaches to use of computers in such fields as language, literature, history, art, music, and drama. Laboratory in text creation and analysis.

Upper Division Courses
110A. Interdisciplinary Approaches to Narrative (4) I. Blanchard Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Interdisciplinary approach to contemporary issues (abortion, AIDS, civil rights, war and peace, welfare state) around which individuals, communities and institutions define themselves in American society, by applying principles of narrative theory to the narratives where those issues are embedded. General Education credit: Civilization and Culture.
140. Advanced Computing in the Humanities (4) I. Roddy Lecture—3 hours; laboratory—3 hours; research project. Prerequisite: course 40 or consent of instructor. The computer as support for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and data base management (design, application and evaluation, and search strategies).
180. Topics in the Humanities (4) I, II, III. The Staff Lecture/discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics will vary. May be repeated once for credit.
198. Directed Group Study (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)
199. Special Study for Advanced Undergraduates (1-4) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)
Graduate Courses
250. Topics in Humanities (4) I, II, III. The Staff (Program Director in charge) Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit.
299. Individual Research (1-4) I, II, III. The Staff (Program Director in charge) Individual research in the humanities resulting in a formal written research report. (SU grading only.)

Hydrologic Science
(College of Agricultural and Environmental Sciences)
Faculty. See under Department of Land, Air and Water Resources, Hydrologic Science Section.
The Major Program
Hydrologic Science is the study of the occurrence, distribution, circulation, and behavior of water in the environment of Earth. It includes measurement and analysis of water phenomena in the subsurface, on the Earth's surface, and in the atmosphere for the purpose of understanding and addressing problems that affect sustainability of both water quantity and water quality. The Program. Hydrologists generally need strong backgrounds in physics, mathematics, chemistry, biology, geology, field methods, and computer methods. Knowledge of biology and chemistry is important for understanding modulators of water quality. Geology is essential for those working in groundwater hydrology. Field methods are necessary for observing and measuring hydrologic phenomena, and computer methods and mathematics are routinely needed for collectively analyzing field data and forecasting future system behavior. Contemporary hydrologic problems include more efficient use and development of groundwater and surface water resources; pollution of subsurface and surface waters from such sources as urban runoff, leaky underground storage tanks, and agricultural drainage; water quality criteria for drinking water and for fish and aquatic life; acidic precipitation and its impact on the environment; and the role of water in natural disasters such as flooding, landslides, and land subsidence. Other contemporary concerns include artificial recharge of groundwater, remote sensing for water resources, risk analysis in the operation of surface water reservoirs, and hydrologic prediction under uncertainty. The resolution of these problems demands hydrologic scientists with the comprehensive, multidisciplinary education embodied in this program.
Internships and Career Alternatives. Numerous opportunities for internships exist with state and federal agencies in the Greater Sacramento-Davis area. Career opportunities in hydrologic science are available in private consulting firms, environmental interest groups, and government agencies with water resources, including the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricultural Research, Forest Service, and Soil Conservation Service), Environmental Protection Agency, national research laboratories (Lawrence Livermore National Laboratory, Oak Ridge National Laboratory), and California Department of Water Resources, Water Resources Control Board, Regional Water Quality Control Boards, Conservation, Fish and Game, and Toxic Substances. The major is excellent preparation for advanced degrees in hydrologic science and related fields.

B.S. Major Requirements:

Hydrologic Science 100.5
Probability and statistics, Civil and Environmental Engineering 12A and 130B.5
Hydrologic Science 103.3
Hydrology.5
Select from Atmospheric Science 133, Civil and Environmental Engineering 142, 142L, Geography 182, Hydrologic Science 141. Subsurface hydrology.10-12
Select from Civil and Environmental Engineering 140, 140L, Environmental Studies 110, Hydrologic Science 122, 122L, 134, 136, Soil Science 120. Water policy and social awareness.6-8
Select from Agricultural Economics 147, Environmental Studies 160, 161, 179, Geography 160, 161, 170, Geology 134, Hydrologic Science 150. Restricted Electives.16-25

*Course not offered this academic year.
these areas may be taken from Hydrologic Science, Soil Science, Geology, Atmospheric Science, Environmental Toxicology, and Environmental Studies, in addition to advanced courses in Mathematics, Chemistry and Statistics.

Unrestricted Electives 2-20
(Including units earned from 192 and 199 courses.)

Total Units for the Degree 180

Minor Program. The Hydrologic Science Section of the Department of Land, Air and Water Resources offers the following minor program. The minor in Hydrologic Science is designed for natural science students who have an interest in water/environmental issues. The interested student should have completed preparatory coursework in calculus (Mathematics 165), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 5A), and biology (Biology 1A).

Minor Program Requirements:
Coursework in the minor provides fundamental skills and knowledge of the hydrologic sciences. The program is sufficiently flexible for students to pursue particular water issues or problems of interest to them.

Hydrologic Science 20-22

Hydrologic Science 100 .......................... 5
Three Depth Courses: Select three courses from each pair below (the alternate course may be chosen as an elective) ....... 9
(a) Hydrologic Science 140 or 145
(b) Hydrologic Science 122 or 136
(c) Hydrologic Science 150 or Environmental Studies 161

Two Elective Courses: Select two courses from the following .............................. 6-8
Hydrologic Science 103, 110, 113, 115, 117, 123, 131, 132, 141, 111, 118, 109, Environmental Sciences 150A, 151, Atmospheric Sciences 133.

Courses in Hydrologic Science (HYD)
Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 111A Vehmeyer Hall or 122 Hoagland Hall (916-732-1669).

Lower Division Courses
21. Ecology of Polluted Waters (3) (II. Knight (Lecture)—3 hours. Prerequisite: Biological Sciences 1A or 1B. Introduction to the nature of polluted waters, their pollutants, and the organisms that are affected. Special emphasis on water and other aquatic organisms.)

103. Introduction to Fluid Mechanics (3) (II. Parfange (Lecture)—3 hours. Prerequisite: Physics 5A and Mathematics 168; course 100 recommended; or consent of instructor. An introduction to fluid properties, fluid statics, conservation of mass, momentum and energy. Dimensional analysis and boundary layer flow phenomena will also be considered. Not open to students who have completed Water Science 142.

110. Irrigation Principles and Practices (3) (III. Schwankl (Lecture)—2 hours; laboratory—3 hours. Prerequisite: Physics 5A; Soil Science 100 recommended. General course for agricultural and engineering students dealing with design and operation of irrigation and drainage. Soil-water movement and storage, plant responses to irrigation regimes, water use by crops: procedures for determining frequency and depth of irrigation, drainage. Not open for credit to students who have completed Water Science 110.

113. Water Quality, Soil Salinity and Reclamation (4) (I. Biggar (Lecture) 3 hours; laboratory—3 hours. Prerequisite: Chemistry 28, Soil Science 100 recommended; or consent of instructor. Water quality parameters, water analysis and salinity control in relation to soil and plant factors: reclamation of soil and disposal of waste water with their effects on streams, rivers and lakes. Localized and regional river basin problems in relation to salinity control and water quality. Not open for credit to students who have completed Water Science 113.

115. Irrigation and Drainage Systems (4) (II. Walender, Grismer, Hills (Lecture) 4 hours. Prerequisite: Engineering 103A or course 103. Engineering and scientific principles applied to the design of surface, sprinkler and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage will be emphasized. Same course as Biological Systems Engineering 146. Not open to students who have completed Water Science 145.

117. Irrigation Water Management (3) (III. Hopmans (Lecture) 3 hours; discussion—1 hour. Prerequisite: course 110 or 124, or consent of instructor. Irrigation principles of soil-water and plant-water relations with irrigation system characteristics and other factors into an analytical framework for irrigation water management. Case studies discussed. Not open to students who have completed Water Science 117.

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 relation to their environment; emphasis on characterizing the distribution of freshwater plants and animals is emphasized in a manner particularly suitable for students of freshwater ecology, soil and water science, and renewable natural resources. Not open for credit to students who have completed Water Science 122.

122L. Biology of Running Waters Laboratory (2) (I. Knight (Lecture) 2 hours. Prerequisite: 122. Laboratory—2 hours (including 2 or 3 weekend field trips). Prerequisite: introductory course in biology or consent of instructor and junior standing; course 122 (concurrently). Course allows interested students to obtain experience in sampling, processing, and synthesizing field data. Field trips will allow students to obtain an understanding of the structure and function of stream ecosystems. Not open for credit to students who have completed Water Science 122L.

124. Plant-Water-Soil Relationships (4) (III. Hila-Olivi (Lecture) 3 hours; laboratory—1 hour. Prerequisite: course 100; Soil Science 100 recommended, and one additional course in botany or plant physiology; or consent of instructor. Principles of plant interactions with soil and water environments and their application in crop and grass management. Including nutrient and water uptake and transport; transpiration; soil processes affecting supplies; deficiencies and plant responses. Not open for credit to students who have completed Water Science 104.

134. Aquatic Geochemistry (3) (III. Casey (Lecture) 3 hours. Prerequisite: Chemistry 2; upper division students. Acid-base equilibria, metal hydrolysis and complexation, mineral solubilities, and rate laws to describe natural water chemistry. Course is intended to complement course 180. Chemistry of the Hydroosphere.

136. Chemistry of the Hydrosphere (3) (III. Tanji (Lecture) 3 hours. Prerequisite: Chemistry 2B and an upper division course in inorganic chemistry, general chemistry, geology, or limnology; course 134 recommended. Chemical characteristics of water in the hydrologic cycle. Understanding processes and conditions regulating chemical composition of natural waters, particularly emphasis on dissolved and particulate mineral constituents. Not open for credit to students who have completed Water Science 180.

141. Hydrology (4) (II. Puente (Lecture) 3 hours; discussion—1 hour. Prerequisite: Physics 5B or 5B, Mathematics 168 or 218; course 100 recommended. Study of the processes that constitute the hydrologic cycle: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff. Not open to students who have completed Water Science 141.

145A. Groundwater Hydrology (3) (II. Marino (Lecture) 3 hours. Prerequisite: course 100, 103 or Engineering 103A recommended. Occurrence, distribution, and movement of groundwater. Study of groundwater flow and transport systems. Aquifer tests. Well construction, operation, and maintenance. Groundwater exploration, quality, and contamination. Not open to students who have completed Water Science 145A.

145B. Groundwater Hydrology (3) (II. Fogg (Lecture) 3 hours; laboratory—3 hours. Prerequisite: course 145A or Civil and Environmental Engineering 144. Physical and chemical processes in contaminant transport, with emphasis on effects of aquifer complexity. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport modeling. Laboratory includes field pumping test and work with real-time and computer models. Not open to students who have completed Water Science 145B and 145L.


154. Water and Related Resource Allocation from Economic Principles (2) (II. Girmure (Lecture) 2 hours. Prerequisite: Math 16A or consent of instructor. An examination of information needed for analysis and basic procedures of production economics used for an appropriate allocation of water and related resources in agriculture. Cost minimization in production and alternative goals are considered. Offered in alternate years. Not open to students who have completed Water Science 154.

186. Environmental Remote Sensing (3) (II. Ustin (Lecture) 3 hours. Prerequisite: 124 as either a division course in soil science, hydrologic science, environmental studies or the plant sciences. Overview of satellite, airborne, and ground-based remote sensing. Building on properties of EM radiation, electromagnetic and non-isotropic scattering and absorption, the course examines applications in hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry, and agriculture.

192. Hydrologic Science Internship (1-12) (I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off-campus in a science related field internship supervised by a member of the staff. (P/NP grading only.)

198. Directed Group Study (1-5) (I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)
Hydrologic Science

Graduate Courses

200. Survey of Hydrologic Sciences (1, 2, 3). Grimmer
Seminar—1 hour; paper. Prerequisite: open to students in the Hydrologic Science program. Seminar covers the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated twice for credit. (SU/G grading only.)

210. Hydrologic Modeling of the Vadose Zone (3) III. Tener
Lecture—2 hours; discussion—1 hour. Prerequisite: Soil Science 107, Mathematics 22B, Programming Language. Principles and modeling of soil water, solute transport, heat and water flow, water and nutrient uptake. Numerical techniques to incorporate soil heterogeneity. Not open for credit to students who have taken Water Science 200 or Hydrologic Science Graduate Course 210. Offered in alternate years.

212. Evapotranspiration (3) III. Parmalee
Lecture—3 hours. Prerequisite: course 103. Review of lower atmosphere properties; introduction to similarity theory; surface roughness parameterization, calculation of energy fluxes, local advection and turbulence measurement will be studied in the field. Not open for credit to students who have completed Water Science 202. Offered in alternate years.

222. The Biology of Streams (5) III. Knight
Discussion—2 hours; seminar—1 hour; laboratory—8 hours (includes field trip). Prerequisite: courses in aquatic entomology, limnology, and physiology. Course will relate various environmental factors to the ecology and productivity of flowing freshwater systems. Emphasis is placed on relationships between stream organisms and their environment by means of integrated field and lecture activities. Offered in alternate years.

235. Advanced Topics in Water and Soil Chemistry (2, 3). Grimmer
Lecture—3 hours. Prerequisite: a course in physical chemistry and soil chemistry or consent of instructor. Advanced course in water chemistry, emphasizing principles governing interactions of ionic constituents in water with sediment and soils. Topics include electrokinetic properties of clays, membrane phenomena, rate processes and thermodynamic applications to the water-soil system. Not open for credit to students who have completed Water Science 215. Offered in alternate years.

236. Hydrochemical Models (3) II. Tener
Lecture—2 hours; laboratory—3 hours. Prerequisite: background in inorganic chemistry and PC and mainframe computers; numerical analyses recommended. Application of mathematical and computer models to chemical problems. Emphasis on process level models (transport, rate and equilibrium) with same exposure to systems level models. Not open for credit to students who have completed Water Science 217.

243. Water Resource Planning and Management (3) I. Manifo
Lecture—3 hours. Prerequisite: course 141 or the equivalent. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design and management. Emphasis on capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. Not open for credit to students who have completed Water Science 216. (Former course course Water Science 206.)

244. Multi-phase Transport in Soils (3) III. Grimmer
Lecture—3 hours. Prerequisite: course 103 or Engineering 103A or Civil and Environmental Engineering 141. Aspects of multi-phase flow in soils and their application to infiltration and immissible displacement problems. Gas phase transport and entrainment during infiltration, and oil-water-gas displacement will be considered. Offered in alternate years. Not open for credit to students who have completed Hydrologic Science Graduate Course 240 or Biological Systems Engineering Graduate Course 240.

245. Advanced Soil Physics (3) III. Nielsen
Lecture—3 hours. Prerequisite: Mathematics 228 or consent of instructor; Soil Science 107 and 207 recommended. Theoretical and applied aspects of the simultaneous transport and retention of water, solutes, heat, and gases in unsaturated soils. Emphasis given to current soil physics research topics of general interest in soil, water, and engineering sciences. Offered in alternate years. Not open to students who have completed Water Science 250.

264. Modeling of Hydrologic Processes (3) III. Puente
Lecture—3 hours. Prerequisite: course 141 or the equivalent and Statistics 102 or the equivalent. Techniques used to model the spatial-temporal structure of rainfall and runoff are introduced. Procedure studied included those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Offered in alternate years. (Former course Hydrologic Science Graduate Course 254.)

289. Numerical Modeling of Groundwater Systems (3) III. Fogg
Lecture—4 hours. Prerequisite: course 145A or Civil Engineering 144 and course 145B. Mathematics 22B. Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and applying modeling models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics, not open to students who have completed Hydrologic Science Graduate Course 220. (Former course Hydrologic Science Graduate Course 220.)

273. Introduction to Geostatistics (3) I. Fogg
Lecture—3 hours. Prerequisite: Statistics 130A and 130B, or the equivalent. Statistical treatment of spatial data with emphasis on hydrologic problems. Topics include theory of random functions, variogram analysis, Krigeing, indicator geostatistics, and stochastic simulation of spatial variability. Demonstration and use of interactive geostatistical software included. Not open for credit to students who have completed Hydrologic Science Graduate Course 230. Offered in alternate years.

275. Analysis of Spatial Processes (3) III. Puente
Lecture—3 hours. Prerequisite: Statistics 102 or the equivalent; course 273 or Statistics 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursion sets, i.e., level crossing and excursion sets. Gaussian and irregular random fields; geostatistical applications. Offered in alternate years. Not open for credit to students who have completed Hydrologic Science Graduate Course 235 or Water Science 255.

276. Seminar I (1). II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Review of hydrologic science problems and issues; oral presentation of research. (SU/G grading only.)

278. Seminar in Water-Soil Plant Relations and Irrigation (1), I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing and background in water-soil-plant relations. Informal presentations on current developments in water-soil-plant relations, plant water use, and irrigation management. Associated discussion analyzes research approaches and techniques and data interpretations. (SU/G grading only.)

279. Seminar in Hydrologic Science (3) III. The Staff
Seminar—3 hours. Prerequisite: graduate standing; background in hydrologic science and consent of instructor. Discussion on current research in hydrologic sciences. Topic will change from year to year. May be repeated for credit. (SU/G grading only.)

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU/G grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: graduate standing and consent of instructor. (SU/G grading only.)

Hydrologic Science

(A Graduate Group)

Graham E. Fogg, Ph.D., Chairperson of the Group, Group Office, 1151 Meyer Hall (916-752-2512)

Faculty. The Group consists of faculty members from the Departments of Chemical Engineering, Civil and Environmental Engineering; Geology; and Land, Air and Water Resources.

Graduate Study. The Graduate Group in Hydrologic Science is a unique interdisciplinary program offering M.S. and Ph.D. degrees. Education in the Group is designed to broaden the skills and knowledge of the physical science or engineering student interested in the phenomena, diagnosis and properties of water on earth. Because of water's ubiquity and importance to physical, chemical and biological processes, hydrologic science involves the geologic, atmospheric and oceanic sciences, as well as engineering and other applied physical sciences. Basic to the Hydrologic Science program is a core curriculum of courses in fluid dynamics, hydrologic phenomena, hydrology, hydrogeochemistry, hydrologic techniques, and hydrologic policy. The program has three degree options including Hydrobiology, Hydrology (Hydrogeology) and Hydrogeochemistry.

Preparation. Applicants to the program are expected to have completed or to 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 applied statistics, computer programming, and geology are recommended.

Specialization. Each student will pursue an individual program of advanced study under the direction of a group of faculty members with similar interests but diverse backgrounds. Coursework in addition to the above is typically taken in the most appropriate disciplines.


Immunology

(A Graduate Group)

M. Eric Germain, M.D., Chairperson of the Group - Group Office, 1151 Meyer Hall (916-752-2512)

Faculty. The faculty includes members from several colleges and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The Graduate Group in Immunology is a multi-disciplinary group offering programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunology. Possible areas of specialization include molecular biology, immunology, immunogenetics, cellular immunology, clinical immunology, and tumor and developmental immunology.

Preparation. Applicants for candidacy to these programs should have completed undergraduate preparation in general biology, zoology or botany, general bacteriology or microbiology, general genetics, mathematics, general physics, chemistry, and biochemistry.
For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements more specialized preparation in at least one of the following is required: (a) microbiological specialties (bacteriology, virology, parasitology, medical microbiology); (b) zoological specialties (cell biology, endocrinology, embryology, protozoology, histology, cytology, physiology); (c) chemical specialties (analytical chemistry, pharmacology, clinical pathology, reproduction, hematology, epidemiology); (d) biochemistry/biophysics specialties (biologically active molecules, control mechanisms); (e) genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

Graduate Adviser: Contact the Group Office.

Courses in Immunology (IMM)

Additional courses are available and listed under the individual sponsoring departments. Contact the group office for information.

Graduate Courses

292. Immunotoxicology Seminar (2) II. Golub Seminar—2 hours. Prerequisite: graduate standing in Pharmacology/Toxicology, Immunology, Physiology, or Biochemistry. Seminar presentations dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. Offered in alternate years. (SU grading only.)

295. Cytokines: An Expanding Class of Cell Regulatory Agents (2) II. Benton, Erickson Lecture/discussion—2 hours. Prerequisite: undergraduate courses in immunology, cell biology and biochemistry, lectures, discussion and presentations which examine the role of cytokines in immunity, inflammation, tissue injury and disease. Current knowledge of their molecular structures specific receptors, antagonists and signalling mechanisms will be discussed.

296. Advanced Topics in Immunology (3) II. Cheung Seminar—3 hours. Prerequisite: graduate standing. Presentation, discussion and analysis of research topics in immunology, with emphasis on investigatory bench research. (SU grading only.)

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Independent Study Program

Information:
Chairperson
Committee on Courses of Instruction
c/o Academic Senate Office (916-752-2231)

The Independent Study Program offers an opportunity for upper division students to design and pursue a full quarter (12-15 units) of individual study in an area of special interest.

A program qualifying as Independent Study will consist of one or more courses in the 190-199 series. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is not to be considered a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:

1. develop, in general terms, a plan of study;
2. locate a faculty sponsor or panel of sponsors, and with their help and approval develop a detailed plan;
3. complete a project proposal form (obtained from the Academic Senate Office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the end of the second week of the term prior to the term in which the project is to be undertaken. (See the Academic Calendar at the front of the catalog for specific dates.) You must report the completion or termination of the project to the Committee on Courses of Instruction.

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Individual Major

(Colleges of Agricultural and Environmental Sciences and Letters and Science)

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisers and appropriate college committees. This major enables a student to pursue a specific interest which cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

Proposals for individual majors should be submitted before the fourth quarter prior to graduation. Specific requirements for each college are shown below. Application forms are available in program offices.

College of Agricultural and Environmental Sciences

Academic Advising Center, 228 Mrak Hall (916-752-0610)

B.S. Major Requirements:

English Composition requirement..........................0-8
See College requirement
Preparatory Subject Matter ...................................(variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division courses.

Breadth/General Education........................................5-24
Satisfaction of General Education requirement.

Depth Subject Matter..................................................45-54
Upper division coursework must include:

a) related coursework from two or more campus departments focused on a single educational theme, and
b) at least 30 units must be taken from courses provided by the College of Agricultural and Environmental Sciences.

Note: the completed proposal should be submitted to the Individual Major Committee at least four quarters before graduation; otherwise graduation may be delayed.

Unrestricted Electives.............................................(variable)
Total Units for the Degree........................................180

Master Adviser: G.C. Martin (Pomology). The individual major proposal must be developed in consultation with the Academic Advising Center and two or more faculty members prior to final review by the Individual Major Committee for the College.

Incoming transfer students applying for an Individual Major will be admitted into the Exploratory Program.

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Integrated Studies

(College of Letters and Science)

Nora A. McGuinness, Ph.D., Program Director
Program Office, 816 Sproul Hall (916-752-3377)

Committee in Charge

Richard T. Curley, Ph.D. (Anthropology)
Kurt Kreith, Ph.D. (Mathematics)
Nora A. McGuinness, Ph.D. (Integrated Studies)
Jay Meching, Ph.D. (American Studies), Chairperson
Kenneth L. Verosub, Ph.D. (Geology)

Faculty

Richard T. Curley, Ph.D., Lecturer (Anthropology)
Dennis Dingemans, Ph.D., Associate Professor (Geography)

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*Course not offered this academic year.*
2D. Civilization and Culture: Literature and Writing (4) I. McGuinness Lecture—3 hours; small-group writing workshop. Prerequisite: completion of Subject A requirement. Exposure to basic methods of literary analysis in drama, fiction and poetry and concepts that guide literary scholars in making critical judgments. Formal writing training. General Education credit: Civilization and Culture.

2E. Civilization and Culture: Playing Shakespeare (4) II. Schroeder Lecture—3 hours; laboratory—2 hours. Prerequisite: completion of Subject A requirement. Shakespeare as a theatre professional: producer, actor, director. His use and development of Elizabethan theatre and space. Objective analysis of how Shakespeare's text actually works on stage. Scene exercises to illustrate effective playing of the text.

3A. Contemporary Societies: History in Our Time (4) II. Wick Lecture—3 hours; discussion—1 hour. Major political, economic, historical, and ideological changes in the global community since the 1970s. General Education credit: Contemporary Societies.

3B. Society Through Literature: Modern Europe (4) I. Wick Lecture—3 hours; discussion—1 hour. Readings and discussion concerning European experience as related to Russian revolution, two world wars, rise of fascism, Nazi holocaust, and the decline of Europe as the center of world politics. General Education credit: Civilization and Culture.

3C. Society Through Literature: Modern China (4) II. Gibbs Lecture—3 hours; discussion—1 hour. China's twentieth-century experience: national humiliation, invasion, isolation, oppression, and the overthrow of ancient values, as reflected in short stories, novels, poetry, and film. General Education credit: Civilization and Culture.

3D. Contemporary Societies: Speech, Privacy, and Conscience (4) II. The Staff Discussion—4 hours. Analysis of the constitutional rights of speech, privacy, and conscience as limits on majoritarian decision-making. Specific topics to be covered include pornography, "hate" speech, broadcast codes, book censorship, sexual and associational privacy, abortion, and euthanasia. General Education credit: Contemporary Societies.

3E. Contemporary Societies: Sociology (4) III. Hackett Lecture—2 hours; discussion—2 hours. Introduction to modern sociological research and theory utilizing material drawn from three topical areas: the development of gender identities, the social production of scientific and other forms of knowledge, and the social basis of racial, ethnic, and class bias. General Education credit: Contemporary Societies.

8. Colloquium (1), II, III. The Staff (N. McGuinness in charge) Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/NP grading only.)

8A. Special Topics in Natural Science and Mathematics (4) II, III. The Staff Lecture—3 hours; discussion—1 hour. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Nature and Science.

8B. Special Topics in Humanities (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Course varies with topic offered. Limited enrollment. May be repeated for credit. (P/NP grading only.)

8C. Special Topics in the Social Sciences (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Group study of a special topic in social sciences. Course varies with topic offered. Limited enrollment. May be repeated for credit. (P/NP grading only.)

9. Seminar (1), II, III. The Staff (N. McGuinness in charge) Lecture—1 hour. Lectures, films, and readings on the themes for the year. May be repeated for credit. (P/NP grading only.)

### International Agricultural Development

(Overleaf)

### Internal Medicine

See Medicine, School of

### International Agricultural Development

(Overleaf)
International Agricultural Development

Courses in International Agricultural Development (IAD)

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center in 1303 Hart Hall (916-752-2244).

Lower Division Courses

10. Introduction to International Agricultural Development (IAD) 10.1

Lecture—3 hours; discussion—1 hour. Theories, practices, and impact of agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. General Education credit: Contemporary Societies.

12. Internship (1-12) 12.1, 2 III. The Staff (Chairperson in charge).

Internship—3 hours. Prerequisite: consent of instructor. Supervised internship, off and on-campus, in community and institutional settings. (P/NP grading only.)

Upper Division Courses

101. Tropical Crop Agriculture (4) II. The Staff

Lecture—4 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C, and Soil Science 100 or Agronomy 100B. Management factors affecting plant agriculture and farming systems in the tropics. Crops are considered in relation to shifting cultivation, rice-based cropping systems, annual cropping, polycropping and monoculture of perennial species.


Lecture—3 hours, laboratory—3 hours; one all-day Saturday field trip. Animal Science 1C. Environmentally and economically sound methods are presented to meet objectives of limited resource animal agriculture system. Range systems, small farms, Third World systems and suburban enterprises are considered. (Same course as Animal Sciences 102.)

103. Social Change and Agricultural Development (4) III. The Staff

Lecture/discussion—4 hours. Prerequisite: introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technologic change in agriculture; theories of diffusion of innovation; social/cultural technology assessment. Offered in alternate years.

110. Agricultural Production Economics (4) I. The Staff

Lecture—4 hours. Prerequisite: upper division status and an introductory course in microeconomics (Economics 1A). Economic analysis of agricultural production in low income countries, from field-level data collection to national food policy. Emphasis is given to construction and use of Lorenz models in project evaluation.

111. Agricultural Marketing Systems (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division status and an introductory course in microeconomics recommended (Economics 1A). Economic analysis of agricultural marketing systems in low income countries, including the functions of transportation, storage, packaging, handling, grading and standardization, processing, and market news. Emphasis is given to evaluation of interventions in marketing systems to speed economic development.

141. Technology for Agriculture in Developing Regions (3) I. Chancellor (Agricultural Engineering).

Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Physics I and upper division standing. Equipment used in tropical agriculture. Man, animal, and engine-powered devices. Energy requirements, site-scope, costs, support infrastructure development, and productivity potentials. (Same course as Applied Biological Systems Technology 141.)

190. Proseminar in International Agricultural Development (1) I, II, III. The Staff

Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.)

191. Topics in International Agricultural Development (3) I, II, III. The Staff

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations—variable content. May be repeated for credit.

192. Internship (1-12) I, II, III. The Staff (Chairperson in charge).

Internship—3 hours. Prerequisite: consent of instructor. Supervised internship, off and on-campus, in community and institutional settings. (P/NP grading only.)

195. Field Study in Agricultural Development (3) III. The Staff

Lecture—6 hours total; seminars—6 hours total; field work—overnight trips to California (one 5-day visit) or Mexico (one eight-day visit). Students will incur travel expenses. Observation of agricultural development strategies and impact on rural communes. Discussion with farm/community staff members; organizational staff members. Study of farm commodities, institutions and experiences in dealing with agricultural development problems. International influence on United States agriculture. (P/NP grading only.)

196. Directed Group Study (1-6) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

Graduate Courses

200. Analysis and Determinants of Cropping Systems (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101, Agricultural Science and Management 150 (or comparable statistics course). Cropping systems as a function of farmer objectives, resource availability, environment, and yield potential: interactions among management strategies, resource use efficiency, and the agroecosystem; stability, diversity, and sustainability of cropping systems.

201. The Economics of Small Farms and Farming Systems (4) II. Jarvis

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics 100A. Economic perspective on small farm development establishes a basis for predicting farmers responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and rural welfare.

202. Social Systems and Agricultural Development (4) I. Orlove (Design), Brush (Applied Behavioral Sciences)

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division course work in anthropology, 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 science analysis to design and implementation of rural and agricultural policies and programs.

203. Management Systems for Agricultural Development (4) II. Wolf

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or 201 preferably, or 202; or consent of instructor. Contents of agricultural and rural development; strategies for program implementation; planning, staffing, and financing agricultural development, processes and structures of implementation; delega-
International Relations

(College of Letters and Science)

Program Director
Program Office, Social Sciences and Humanities Building
(916)752-3063

Committee in Charge
Michael R. Caputo, Ph.D. (Agricultural Economics)
Dennis J. Dingman, Ph.D. (Geography)
Yun Ozrunzhan, Ph.D. (Russian)
Emily O. Goodman, Ph.D. (Political Science)
Julie Nelson, Ph.D., Ed. (Economics)
Donald S. Rovoch, Ph.D. (Political Science)
Janet S. Smith, Ph.D. (Anthropology)
Clarence E. Young, Ph.D. (History)

The Major Program

Problems of security, human rights, energy and mineral resources, and the environment are increasingly confronted at a global level. The study of international relations has become an exciting and highly relevant interdisciplinary major.

The Program

Graduate students majoring in international relations require completion of introductory courses in political science, economics, geography and history. Upper division work is composed of a core of courses in economics and political science required of all majors, and an additional set of eight courses chosen from one of four clusters which encompass major topical areas in combination with regional emphases: I. World Trade and Development; II. International Organizations of the Third World; III. Global Resources and Environment; IV. World Politics. The major also requires fluency in English and a working knowledge (approximately 24 to 30 units of course credits or equivalent fluency) of one other modern language.

Programs, Internships, and Career Alternatives

One program of special interest to international relations majors is the Education Abroad Program, which provides insights into the life and culture of other countries. At UCLA, the international program assists students in obtaining legal, cultural, and business internships. In addition, the UC Davis Washington Center arranges internships in Washington, D.C. International relations graduates are prepared for employment in governmental agencies abroad (such as the Foreign Service), with state agencies, international or non-governmental organizations (such as the United Nations), foundations, and companies having 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.

Preparatory requirements

Before declaring a major in International Relations, students must complete the following courses with a combined grade point average of at least 2.50 (all courses must be taken for a letter grade):

- Economics 1A 1B 10 units
- Geography 10 3 units
- History 4C 4 units
- Political Science 3 3 units

A.B. Major Requirements:

Preparatory Subject Matter 24-55 units

Economics 1A 1B 10 units
Political Science 3
Geography 10 3

One course selected from Anthropology 212, Environmental Studies 30, Geography 2, History 4B, 9A, 9B, 10, 15, 17C, International Agricultural Development 10, Political Science 1, 2 3-4

*Course not offered this academic year.

International Agricultural Development

(A Graduate Group)

Janet D. Momen, Ph.D., Chair, Group Office, 1303 Hart Hall

Faculty

The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, Letters and Science, and the School of Veterinary Medicine.

Graduate Study

The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. Many of its faculty members have had international experience in development.

The philosophy guiding the program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirty different specializations are offered. In addition, to apply their specializations, graduates should be perceptive and understanding of people in developing nations and have a comprehensive understanding of how technological, social, economic, and political variables affect the development process. They should have insight into individual and group motivations and be able to discern ways to initiate change.

The program provides a multidisciplinary education designed to recognize these needs. It guides students to the kind of knowledge, skills, and abilities needed to stimulate, assist, or manage agricultural development and enhance rural life in developing countries. Students are prepared to accomplish technological and biological improvements in agricultural methods and to encourage social innovations where appropriate.

Graduate Advisor: Contact the Group Office.
188. Directed Group Study (1-5) I, II, III. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Undergraduates (1-5) I, II, III. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**Internship**

See Internship Program below; also UC Davis/ Washington Center

**Internship Program**

Lawrence B. Coleman, Ph.D., Director
Jeanne B. Shelby, Associate Director
The Internship and Career Center 2nd Floor, South Hall (916-752-2665)

**Program Areas**
- Agricultural and Environmental Sciences
  - Joe S. Stasak, Program Manager
- Education and Graduate Placement
  - Kathy Shull, Coordinator
- Engineering and Physical Sciences
  - Linda R. Hughes, Program Manager
- Health and Biological Sciences
  - Linda R. Hughes, Program Manager
- Liberal Arts
  - Lawrence B. Coleman, Program Manager

**Internship Experience**

The Internship and Career Center facilitates a campuswide internship program. All internships, both credit and non-credit, can be taken for Transcript Notation with completion of required evaluation reports. The notation briefly describes the nature and location of the internship experience. Questions pertaining to academic credit and Transcript Notation may be directed to the Internship and Career Center.

**Course Credit**. Internship courses (numbered 92 and 192) are available for credit on a variable-unit and Pass/Not Pass grading basis. A minimum of 12 units of 92 and 192 courses may be counted toward the 190-unit minimum required for graduation.

**Total Units for the Major**

80 recommended courses

One year of college Latin or a Romance Language.

Major Adviser: J. Cannon

**Minor Requirements**

Italian

(College of Letters and Science)
JoAnn Cannon, Ph.D., Program Director
Department Office, French Hall (916-752-0800)

**Faculty**

JoAnn Cannon, Ph.D., Professor
Dennis J. Dufiche, Ph.D., Professor
Gustavo Fossaroli, M.A., Lecturer
Juliana Schiessi, Ph.D., Associate Professor

Italian 273

The Major and Minor Programs

The major in Italian is intended to provide a solid language background which will enable the student to develop an appreciation for Italian language and culture.

The Program. The Italian program is small and geared to the individual needs of the student. 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. The Italian program actively participates in the Education Abroad Program, the International Internships Program, and the Summer Sessions International (Naples), all of which offer opportunities for travel and study in Italy.

Career Alternatives. 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 either 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.D.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.

A.B. Major Requirements:

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<tr>
<th>Unit Range</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>0-24</td>
<td>Preparatory Subject Matter</td>
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<tr>
<td>0-24</td>
<td>Depth Subject Matter</td>
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<tr>
<td>101-106</td>
<td>Italian 101 and 108</td>
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</tbody>
</table>
| 28         | Must include at least one course from each of the following literary periods: (a) Early Italian, (b) Renaissance and Baroque, (c) Eighteenth through Twentieth Centuries.
| 36-60      | Total Units for the Major |

**Honors Program**

One course chosen in consultation with major adviser

One course chosen from each of the following areas: (a) Early Italian Literature, (b) Renaissance and Baroque, and (c) Eighteenth through Twentieth Centuries. (One of the above courses may be taken for credit under 190 or by one course of literature in translation offered by the Italian Program.)

**Prerequisite Credit**. Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the Program Director.
Courses in Italian (ITA)

Lower Division Courses

Students studying high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian (5) II, III, Foscaini in charge Discussion—5 hours; laboratory—1 hour. Prerequisites: course 2 in a list of grammar and language skills.

2. Elementary Italian (5) II, III. Foscaini in charge Discussion—5 hours; laboratory—1 hour. Prerequisites: course 2 in a list of grammar and language skills.

3. Elementary Italian (5) II, III. Foscaini in charge Lecture/Discussion—5 hours. Prerequisites: course 2. Continuation of grammar and practice, and all of all language skills through cultural texts.

4. Intermediate Italian (3) II, III. Director in charge Lecture/Discussion—4 hours. Prerequisite: course 3 or the equivalent. Review of grammar and syntax through written exercises, and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first-year language course.

5. Intermediate Italian (3) I, II. Director in charge Lecture/Discussion—4 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only.)

6A. Italian Conversation (3) I, III. The Staff Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. (P/NP grading only.)

6B. Italian Conversation (3) II. The Staff Discussion—3 hours. Prerequisite: course 3A. Course designed to offer practice in speaking Italian. (P/NP grading only.)

9. Reading Italian (3) I, II, III. Director in charge Lecture/Discussion—3 hours. Prerequisite: course 3 or the equivalent. Reading and discussion of modern Italian prose, novel, short stories, creative, scientific and realistic writings. Introduction to contemporary Italian literature and culture, as well as a means of strengthening the student's command of the Italian language.

50. Studies in Italian Cinema (4) I, II. Cannon Lecture—2 hours; discussion—1 hour. Course offered in the fall semester. Introduction to the Italian cinema through its genres. Focus is on cinema as a reflection of and a comment on modern Italian history. Film will be studied as an artistic medium and as a form of mass communication. General Education credit: Civilization and Culture.

90X. Lower Division Seminar (1-2) I, II, III. The Staff Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Italian literature or culture such as Italian culture seen through film, Italian feminism, literature, or politics through shared readings, discussions, and writing assignments, or special activities such as film screening or laboratory work.

38. Directed Group Study (1-5) I, II. The Staff primarily intended for lower division students. (P/NP grading only.)

Upper Division Courses

91A. Advanced Conversation, Composition, and Grammar (4) I. The Staff Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

104. Italian Translation and Style (4) III. Dutschke Lecture/Discussion—3 hours; two research papers; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different historical periods. Analysis of linguistic problems and elements of style contained in the translation material.

105. Introduction to Italian Literature (4) II. The Staff Lecture/Discussion—3 hours; term paper. Prerequisite: course 101 or consent of instructor. Introduction to the study of the principal authors, work and movements of the Medieval, Renaissance, and Early Modern periods in Italy.

107. Survey of Italian Culture and Institutions (3) III. Foscaini Lecture—3 hours; term paper. Assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English.

112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4) I. Dutschke Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the works of St. Francis, Dante, Cavalcanti, Petrarca, the Sicilian School, the Sweet New Style Poets, and others. Offered in alternate years.

113. Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4) III. Dutschke. Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the development of the story of Hell to the sacred fire, in his preachers and Renaissance followers. Offered in alternate years.

114. Boccaccio, Decameron, and the Renaissance Novelle (4) II. Dutschke. Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the development of the short story in Italy, exemplified in Giovanni Boccaccio's Decameron, in his predecessors and Renaissance writers. Offered in alternate years.

115A. Studies in the Cinquecento (4) III. Schiassi Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Analysis of key texts from the Cinquecento, with focus on the Renaissance. The political and aesthetic legacy of humanism will be foregrounded in relation to authors such as Tintoretto, Machiavelli, Ariosto, Castiglione, and Tasso. Offered in alternate years.

115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino (4) III. The Staff Lecture/Discussion—3 hours; term paper. Prerequisites: course 115A. Continued examination into the loss of an ideal. Emphasis on the conflicts in Microwave and Tasso leading to Marino, with an excursion on Galileo's role in the formation of a modern literary tradition.

115C. Italian Drama from Machiavelli to the Enlightenment (4). I. Schiassi Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of comic and tragic forms as critical representations of their society and historical contexts. I.e. Machiavelli and the logic of power, Baroque dramatists in the service of counter-reformation Italy, Golden's comedies and the social consciousness of the Enlightenment secured in alternate years.

150. Early Modern Italian Lyric (4) I. Schiassi Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Examination of the poetic literature of the period. Consideration of the relation between gender and genre in such poets as Petrarca, Berno, dell'a Casa, Tasso, Marino, Gaspara Stampa, Hinricha Franco, Isabella di Moro. Offered in alternate years.

189. Italian Literature of the Eighteenth Century (4) I. The Staff Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Tiepolo, II, Baretta, Penni, Affieri, Vico, and. 

198. Italian Literature of the Nineteenth Century (4) II. The Staff Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Beveo to the present. Emphasis on the work of Savio, Livi, Moravia, Pas initiatives, and Vittorio. 

20A. Italian Literature of the Twentieth Century: The Novel (4) III. Cannon. Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Beveo to the present. Emphasis on the work of Savio, Livi, Moravia, Pas initiatives, and Vittorio.

21B. Italian Literature of the Twentieth Century: Poetry and Drama (4) I. Cannon Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Italian poetry with emphasis on Hermeticism, the theater of Luigi Pirandello and his role in the development of contemporary Italian drama.

31. Autobiography in Italy (4) I. Schiassi Lecture/Discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. The development of representations of selfhood with particular attention to gender conditions, the confessional tradition, and the problem of women's self-representation. Authors studied may include Petrarch, Tasso, Casanova, Affieri, Zvejkov, Sibilla Alemoro and Primo Levi. Offered in alternate years.

189. Italian Literature in English Translation: Boccaccio, Petrarch and the Renaissance (4) I. Dutschke Lecture/Discussion—3 hours; term paper. Prerequisite: Boccaccio and Petrarch and their relations to the Middle Ages and the Renaissance, the Renaissance, with particular attention to the works of Lorenzo de Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso.

150. Italian Literature in English Translation: Dante, Divina Comedy (4) I. Dutschke Lecture/Discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Reading of Dante Alighieri's Divine Comedy, through the otherworld realms of Inferno, Purgatory, and Paradise. General Education credit: Civilization and Culture.

114. Culture, Gender and the Italian Renaissance (4) II. Schiassi Lecture/Discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Critical analysis of the texts from the Italian Renaissance. Primary concern focuses on issues such as "the dignity of Man," education and gender politics; "high" and "low" culture and its relation to literary practice. General Education credit: Civilization and Culture.

142. Masterpieces of Modern Italian Narrative (4) III. Carone Lecture—1.5 hours; discussion—1.5 hours; term paper. Prerequisite: either English 3, Comparative Literature 2, or History 4C. Analysis of major works of Italian literature from unification of Italy in 1861 to present. Students will learn to use a rigorous method and concepts which guide literary scholarship. Consideration of works within European social and cultural context. Offered in alternate years. General Education credit: Civilization and Culture.

145. Special Topics in Italian Literature (4) I, II, III. The Staff (Director in charge) Lecture/Discussion—4 hours. Prerequisite: course 9 or consent of instructor. Study of special topics and themes in Italian literature such as modern literature, epic poetry, pre-twentieth century theater, fascism, futurism, women and literature, and the image of America, etc. May be repeated for credit when topic changes.
Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)
Robert G. Fiocchini, Ph.D., Chairperson of the Department
Jan W. Hopmans, Program Director, Hydrologic Science Unit
Randy J. Southard, Ph.D., Program Director, Soils and Biogeochemistry Unit
Bryan C. Weare, Ph.D., Program Director, Atmospheric Science Unit
Department Office, 151 Hoagland Hall (916-752-1406)

Faculty

Soils and Biogeochemistry Unit
Office: 151 Hoagland Hall (916-752-1406)
Caroline S. Bleached, Ph.D., Associate Professor
(Soil Science)
William H. Casey, Ph.D., Associate Professor
(Aquatic Geochemistry)
Randy A. Dahlgren, Ph.D., Assistant Professor
(Soil Mineralogy)
André E. Luttrell, Ph.D., Professor (Plant Nutrition)
James H. Richards, Ph.D., Associate Professor
(Plant Nutrition)
Dennis R. Rolston, Ph.D., Professor (Soil Science)
Kate M. Scow, Ph.D., Assistant Professor (Soil Science)
Wendy Kuhn Silk, Ph.D., Professor (Hydrologic Science)
Michael J. Singer, Ph.D., Professor (Soil Science)
Randal J. Southard, Ph.D., Associate Professor
(Soil Genesis/Morphology)
Robert Zasowski, Ph.D., Associate Professor (Soil Science)

Emeriti Faculty
Francis E. Broadbelt, Ph.D., Professor Emeritus
Richard G. Burau, Ph.D., Professor Emeritus
C.C. Delwiche, Ph.D., Professor Emeritus
Emanuel Epstein, Ph.D., Professor Emeritus
Gordon L. Huntington, Ph.D., Lecturer Emeritus
Donald N. Munns, Ph.D., Professor Emeritus
H. Michael Reisenauer, Ph.D., Professor Emeritus
Victor R. Rendig, Ph.D., Professor Emeritus
Harry O. Walker, Ed.D., Senior Lecturer Emeritus
Lynn D. Whitting, Ph.D., Professor Emeritus

Faculty

Atmospheric Science Unit
Office: 151 Hoagland Hall (916-752-1406)
Thomas A. Cahill, Ph.D., Professor (Atmospheric Science, Physics)
John J. Carroll III, Ph.D., Professor Emeritus
Robert G. Fiocchini, Ph.D., Professor (Environmental and Resource Sciences)
Richard D. Grofman, Ph.D., Professor (Atmospheric Science)
Terrence R. Nathan, Ph.D., Associate Professor
(Atmospheric Science)
Kyaw Thaw Paw, Ph.D., Professor (Atmospheric Science)
Roger H. Shaw, Ph.D., Professor (Meteorology)
Richard L. Snyder, Ph.D., Lecturer (Atmospheric Science)
Su-Tai Soong, Ph.D., Associate Professor
(Atmospheric Science)
Bryan C. Weare, Ph.D., Professor (Meteorology)

Emeriti Faculty
Kinsell L. Couison, Ph.D., Professor Emeritus

Japanese

See Chinese and Japanese

*Course not offered this academic year.*
Landscape Architecture

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Environmental Design.

The Major Program

Landscape architecture is the planning and design of outdoor settings and systems of the built and natural environment.

The Program. The curriculum balances creativity and visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences.

Preparatory Requirements. Students are admitted to the landscape architecture major only after submitting a portfolio for review and selection by the faculty. Contact the Environmental Design Advising Center or the Landscape Architecture major advisor for further information.

Career Alternatives. Graduates may find jobs in private landscape architectural firms or public agencies and corporations employing landscape architects.

B.S. Major Requirements:

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

UNITs

English Composition Requirement...0-8

See College requirement

Preparatory Subject Matter...50-59

Biological sciences (Biological Sciences 1A, 1B): 4-5

Chemistry (Chemistry 2A, 10): 4-5

Physics (Physics 1A, 1B, 10): 3-4

Two-dimensional design (Art 16, Design 21, Engineering 4): 3-4


Earth sciences (Geography 1, Geology 1, Soil Science 10): 3

Economics (Economics 1A, 1B, Agricultural Economics 147): 4-5

Computer science (Computer Systems and Environment 21, Engineering 5, Computer Science Engineering 10, 40): 3-4

Mathematics (Mathematics 16A, 36, Statistics 13, Agricultural Systems and Environment 12): 3-4

Social science (Anthropology 2, Geography 2, 5, Psychology 1, 16, Sociology 1): 3-5

Humanities elective...3

Depth Subject Matter...70-74

Introduction to landscape architecture (Landscape Architecture 40): 3

Landscape architecture studio: introduction, recreational open space, site planning (Landscape Architecture 111, 112, 113): 12

Landscape graphic communication (Landscape Architecture 121): 4

Advanced introduction to landscape architecture (Landscape Architecture 122): 4

Introduction to landscape architecture, site engineering, construction details and drawings (Landscape Architecture 131, 132, 133, 134): 15

History of landscape architecture (Landscape Architecture 140): 4

Introduction to environmental plants (Environmental Horticulture 105): 2

Arboriculture (Environmental Horticulture 133): 4

Plant selection for environmental design (Landscape Architecture 155): 3

Landscape planting design (Landscape Architecture 156): 4

Landscape analysis and planning and urban and community design (Landscape Architecture 161, 182): 8

Senior project in landscape architecture (Landscape Architecture 188): 16

Proseminars on selected topics (Landscape Architecture 190): 3

Internship (Landscape Architecture 192): recommended.

Breadth Subject Matter...17-21

Resource science credits two upper-division courses with approval of adviser: 8-10

Ecology (Environmental Studies 100, 110, Botany 117, Entomology 104, Zoology 114A, 114B, 125): 3-5

Environmental awareness (Psychology 144): 4

Related disciplines elective: 4

Course to emphasize a discipline peripheral to landscape architecture (Environmental Biology and Management 110, 116, 122, 127, Environmental Studies 126, 161, 171, Agricultural Economics 18, Civil and Environmental Engineering 1, Design 1): 9

Total Units for the Major...180

Major Advisor. S. McNeill.

Advising Center is located in 152 Walker Hall (916-752-1165).

Graduate Study. Refer to the Graduate Studies section in this catalog.

Courses in Landscape Architecture (LDA)

Lower Division Courses

11. Landscape Studio: Introduction (4). The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 21 or the equivalent. Graphic representation of landscape architectural designs. Emphasis will include sketching, perspective, rendering techniques, sheet layout, lettering and type use, and color use.


Studio—8 hours; two all-day field trips. Prerequisite: course 22. Landscape architectural communication explored through the computer. Includes computerized drafting, drawing, rendering, and photorealistic simulation.

40. Introduction to Landscape Architecture (3). J. Schenkner

Lecture—3 hours. History, theory, philosophy, techniques and applications of landscape architecture and the analysis, planning, design, and management of outdoor spaces. General Education credit: Civilization and Culture.

Upper Division Courses

111. Intermediate Landscape Architecture Studio 1 (4). T. Thayer and Owens

Studio—8 hours; two all-day field trips. Prerequisite: courses 11, 23, 30, and junior standing in landscape architecture. Studio projects focusing on site analysis and site planning, including the siting of structures, design of circulation systems, outdoor facilities and open spaces. Emphasis on energy-conserving and ecologically responsive design.

112. Intermediate Landscape Architecture Studio 2 (4). I. Schenkner and Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 111. Studio projects focus on visual, spatial, aesthetic, and symbolic characteristics of site design. Emphasis on relationship between form and meaning.

113. Intermediate Landscape Architecture Studio 3 (4). Ill. McNeil and Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 112. Introduction to regional landscape analysis techniques and methods. Studio projects in the analysis, planning, and design of intermediate-scale and large-scale landscapes.

120. Advanced Computer Applications (4). S. Summer

McNeil

Studio—8 hours; two all-day field trips. Prerequisite: course 23. Studio work using computer-aided design, geographic information systems, and other advanced computer programs.

122. Advanced Communication for Landscape Architects (4). Ill. Francis

Studio—8 hours; two all-day field trips. Prerequisite: courses 23, 116, and 121. Advanced study of landscape architecture, including studio projects, selected topics. Includes preparation of proposals, reports, audio-visual production, and mixed-media presentations. Limited enrollment.

131. Landscape Architecture: Materials and Detailing (4). J. McCulley

Studio—8 hours; two all-day field trips. Prerequisite: courses 11, 23, and 24. This course introduces the basic knowledge of materials and decorative elements used in landscape architecture, including the factors that influence selection, bearing, and placement.

132. Landscape Construction: Site Engineering (4). Ill. McCulley

Studio—8 hours; two all-day field trips. Prerequisite: course 131. Topographic and construction grading in landscape architecture: drainage plans, grading plans, spot elevations, road alignment, sections and profiles, and cut and fill calculations. Limited enrollment.


Studio—8 hours; two all-day field trips. Prerequisite: course 132. Advanced study of materials and methods in landscape construction. Emphasis on drainage and irrigation systems, foundations, and roof design.


Studio—8 hours; two all-day field trips. Prerequisite: course 133. Legal and professional aspects of landscape architecture, including the development of con-
113. Senior Project in Landscape Architecture (4) II. Owens
Studio—6 hours. Prerequisite: senior standing in Landscape Architecture major. Projects will focus on a comprehensive architectural design, analysis, communication, or research. Limited enrollment. Required of all landscape architecture majors. (P/NP grading only.)

113B. Senior Project in Landscape Architecture (4) II. Owens
Studio—8 hours. Prerequisite: course 195A and senior standing in Landscape Architecture. Projects will focus on a critical area of landscape architectural design, analysis, communication, or research. Limited enrollment. Required of all landscape architecture majors. (P/NP grading only.)

117. Tutoring in Landscape Architecture (1-3) I, II. The Staff
Tutoring—3—5 hours. Prerequisite: consent of instructor. Tutoring in landscape architecture courses. (P/NP grading only.)

118. Directed Group Study in Landscape Architecture (1-5) I, II. The Staff (Master Adviser in charge)
Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

119. Special Study for Advanced Undergraduates in Landscape Architecture (1-5) I, II, III. The Staff (Master Adviser in charge)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Theory and Philosophy of the Designed Environment (4) Seminar—4 hours. Prerequisite: course 140 or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. One semester is devoted to a survey of the theory of design, while the other is devoted to the practice of design. The course is intended for students who are interested in the design of the physical environment of urban and rural landscapes. (P/NP grading only.)

202. Methods in Design and Landscape Research (4) II. McKee Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor. Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor. Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor.

204. Case Studies in Landscape Design and Research (4) II. The Staff Laboratory—6 hours. Prerequisite: consent of instructor. Case studies in landscape design and research have as their primary goal the exposure of the student to real-world, designed-environment situations where creative activity and basic research is the primary goal. Offered in alternate years.

210. Advanced Landscape Architecture Studio (4) III. Schenk Laboratory—4 hours. Prerequisite: course 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity and/or basic research is the primary goal. Advanced landscape problems will be utilized at the site, urban or rural scale. Offered in alternate years.

220. Public Space and Culture (3) III Francis Seminar—3 hours. Prerequisite: course 182 or the equivalent; graduate standing or consent of instructor. Explores the public environment of cities including their streets, parks, and squares. Public life and culture of American cities is examined and design responses to these environments are evaluated. Typology is used to identify spaces. Offered in alternate years.

240. Rural Landscape Planning and Design (3) II. McKee Seminar—3 hours. Prerequisite: course 151 or the equivalent; graduate standing or consent of instructor. Addresses physical planning issues facing rural farms, ranches, subdivisions, commercial zones, and small communities in the face of challenges of economic and social change. Concern is with runaway growth, shrinking populations, shifting economies, and lack of public funding or consensus. Offered in alternate years.

250. Technology and Sustainable Landscape (3) III. Thayer Seminar—3 hours. Prerequisite: course 184 or the equivalent; graduate standing or consent of instructor. Explores the relationship between technology and landscape quality. Typology of technologies, landscape adaptations is presented and impacts of these technologies is discussed. Emphasizes a theoretical understanding of technological change and a practical approach to sustainable technologies. Offered in alternate years.

280. Landscape Conservation (3) III. The Staff Seminar—3 hours. Prerequisite: consent of instructor for prerequisite courses; graduate standing or consent of instructor. Focus is on land-planning, design, and management techniques to further the goal of resource conservation. Examines current critical theory in the establishment and management of conservation areas. Offered in alternate years.

290. Graduate Seminar in Landscape Architecture (2) I, II, III. The Staff Seminar—2 hours. Prerequisite: graduate standing and consent of instructor. Seminar on selected topics in landscape architecture research, planning, design, communication, and education. May be repeated for credit. (S/U grading only.)

297. Practicum in Landscape Architecture (1-10) I, II, III. The Staff Independent study—1—10 hours. Prerequisite: graduate standing and consent of instructor. Opportunity for students to work directly in the field with academics or other professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only.)

298. Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (S/U grading only.)

299. Directed Individual Research for Graduate Students (1-5) I, II, III. The Staff Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Latin
See Classics

Law, School of

Law, School of

Bruce A. Wolk, J.D., Dean
Rex R. Perczchbacher, J.D., Associate Dean (Academic Affairs and Research)
Antonia E. Bernhard, J.D., Assistant Dean (Student Affairs)
George S. Grossman, LL.B., M.S.L.S., Director (Law Library)
Dean's Office, 1011 Martin Luther King, Jr. Hall (916-752-0243)

Faculty
Vickram Amarn, J.D., Acting Professor
John D. Aver, J.D., LL.M., Professor
Antonia E. Bernhard, J.D., Lecturer
Alan E. Brownstein, J.D., Professor
Discussion—3-2 hours. Legal concepts which apply to actions brought by litigants who seek relief for injury. Irremedial and unintentional invasions of personality and property. Analysis of civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. (Deterred grading only, pending completion of sequence.)

205. Constitutional Law I (4) II. Brownstein, Gerson
Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, course treats judicial, review, jurisdiction, standing doctrine, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in course 218, of procedural and substantive constitutional rights and the limits they place on governmental action. Economic substantive due process, procedural due process, and rights of privacy and personal autonomy will also be considered.

206. Criminal Law (3) S. Feeney, Johns. Poulos
Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and provide defenses and individual liability for major criminal offenses.

207. Legal Research I (1) I. Bernhard
Discussion—Laboratory—1 hour. Description of the variety of sources of law and secondary authority, instruction in their location and use. Graded on basis of weekly self-teaching research drills. No final examination.

208. Legal Writing (2) II. Bernhard, Johns
Lecture—2 hours. Instruction in the form and substance of legal writing. A variety of law-related documents will be discussed and drafted. An experience in oral advocacy will be included. Graded on the basis of the writing and advocacy assignments. No final examination.

Second and Third Year Courses

Courses in Instruction.

First Year Courses

200. Introduction to Law (1) Perschbacher
Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, the predominant system in its practical operation, the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (SU grading only.)

201. Property (4) I. Dobris, Lewis
Discussion—4 hours. Study of doctrines and concepts of property law with emphasis on real property. Course coverage includes the estates in land (senium, the land covenant relationship, conveyancing, and private and public) and use control.

202A-202B. Contracts (3-3) I. Gandara, Imminkinlal
Discussion—3-3 hours. Course examines the sorts of promises that are enforceable and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjudges— or fails to adjust—to changing social demands. (Desired grading only, pending completion of sequence.)

203. Civil Procedure (5) I. Amar, Johnson, Oakley
Discussion—5 hours. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Among the topics covered are the relation between federal and state courts; the power of courts over persons, property, and subject matter (jurisdiction); the process of claiming and parties; preparation for trial through pleading, discovery, and pretrial: devices for resolving actions and issues before trial and the functions of judge and jury; and the finality of the trial court's disposition.

204A-204B. Torts. [3-2] J. Kuritz, Odd. II. Johns, Juenger
Discussion—3-2 hours. Legal concepts which apply to actions brought by litigants who seek relief for injury. Irremedial and unintentional invasions of personality and property. Analysis of civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. (Deterred grading only, pending completion of sequence.)

205. Constitutional Law I (4) II. Brownstein, Gerson
Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, course treats judicial, review, jurisdiction, standing doctrine, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in course 218, of procedural and substantive constitutional rights and the limits they place on governmental action. Economic substantive due process, procedural due process, and rights of privacy and personal autonomy will also be considered.

206. Criminal Law (3) S. Feeney, Johns. Poulos
Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and provide defenses and individual liability for major criminal offenses.

207. Legal Research I (1) I. Bernhard
Discussion—Laboratory—1 hour. Description of the variety of sources of law and secondary authority, instruction in their location and use. Graded on basis of weekly self-teaching research drills. No final examination.

208. Legal Writing (2) II. Bernhard, Johns
Lecture—2 hours. Instruction in the form and substance of legal writing. A variety of law-related documents will be discussed and drafted. An experience in oral advocacy will be included. Graded on the basis of the writing and advocacy assignments. No final examination.

Second and Third Year Courses

The second- and third-year courses fall into subject areas as shown here:

(a) General courses: 209, 212, 217, 222, 226, 239, 240, 244, 250, 254, 258, 259, 266, 267, 268, 271, 280, 286, 292, 296
(c) Constitutional Law: 218, 289
(d) Criminal Law: 237, 264, 276, 296
(e) Labor and Employment Relations Law: 251, 255, 260, 279
(f) Family Law: 225, 294, 272, 273
(i) Public Law: 231, 236, 261, 293
(j) Skills and Litigation: 211, 219, 263, 278, 297, 412, 410, 412, 413, 414, 415
(k) Taxation: 220, 238, 247
(m) Clinical Programs: 400, 402, 430, 440, 450, 455, 462, 470, 480

209. Alternative Dispute Resolution—Techniques and Practices (2)
Discussion—2 hours. Course focuses on the theory of alternative dispute resolution (ADR). History and evolution of alternative to the legal system for resolution of disputes. Particular emphasis given to understanding the distinction between: (a) binding arbitration, (b) non-binding arbitration, (c) statutory arbitration, (d) contractual arbitration, (e) mediation, (f) private judging, and (g) mediation. Examines the question of whether or not to use a form of alternative dispute resolution and if such selection is made, tactics and strategies that may be applicable. Second portion of the course is clinical. Students will be expected to participate in various forms of alternative dispute resolution procedures. Case scenarios developed by the instructors to encourage (but not required) to attend ADR proceedings with the instructors in connections with their practice. Guest presentations from arbitrators and judges engaged in private judging. Limited enrollment.

210. Business Reorganizations (2)
Discussion—2 hours. Prerequisite: course 243 recommended. Focus is on businesses trying to survive when they are in substantial debt, exploring the structure of relief available under Chapter 11 of the Bankruptcy Code. Focus is on the goals of a troubled debtor and the strategies or options available to meet them.

211. Negotiation and Dispute Resolution (2) I-II.
Discussion—2 hours. Course teaches negotiation and mediation skills and theories. Students will do five or more practice negotiations to develop skills, perception, and personal style. Class discussion and theory development are based on these exercises. Limited enrollment.

212. Financial Information and the Law (3)
Ayer Discussion—3 hours. Prerequisite: students must have more than two semesters of accounting will not be admitted, except with consent of instructor. Reading and evaluating financial documents—balance sheets, income statements, etc., with the purpose of learning what they tell, and fail to tell, about the value of an enterprise. A few weeks of study on the mechanics of accounting, but focus primarily will be on the job of the lawyer in helping clients to prepare and use material of this sort. Consideration of what investors and creditors expect out of financial documents. Responsibilities of the client, and the lawyer in furnishing documents to regulators. The liability of preparers (including lawyers) for overlooked deficiencies in disclosure documents.

213. Business Organizations I (3)
Discussion—3 hours. Focus on the legal problems of a business entity owned by a few persons, each of whom may seek to play an active role in the enterprise. Included within the survey are the problems of the “close corporation” and the alternatives to incorporation for persons in other corporate forms. Topics include the sole proprietorship, general and limited partnerships and joint ventures. Related agency concepts are integrated into this material.

214. Business Organizations II (3)
Discussion—3 hours. Focus on the public issue corporation. Both statutory and judge-made legal principles of state corporate law, and federal regulation of the corporation will be studied. Corporate governance and the proxy voting system, insider trading, suits against corporations, regulation of the sale of securities and distribution of dividends, and the merger and acquisition of corporations will be covered.

215. Employment Law (2) I. Avery
Discussion—2 hours. Prerequisite: students must have more than two semesters of accounting will not be admitted, except with consent of instructor. Reading and evaluating financial documents—balance sheets, income statements, etc., with the purpose of learning what they tell, and fail to tell, about the value of an enterprise. A few weeks of study on the mechanics of accounting, but focus primarily will be on the job of the lawyer in helping clients to prepare and use material of this sort. Consideration of what investors and creditors expect out of financial documents. Responsibilities of the client, and the lawyer in furnishing documents to regulators. The liability of preparers (including lawyers) for overlooked deficiencies in disclosure documents.

216. Commercial Law: Article 5 (3)
Discussion—3 hours. Focus on the public issue corporate. Both statutory and judge-made legal principles of state corporate law, and federal regulation of the corporation will be studied. Corporate governance and the proxy voting system, insider trading, suits against corporations, regulation of the sale of securities and distribution of dividends, and the merger and acquisition of corporations will be covered.

Course not offered this academic year.
224. Consumer Transaction (3) Discussion—3 hours. Study of selected consumer law problems, including a survey of state and federal regulatory efforts. Course coverage may include the following: common law and statutory approaches to fraudulent or deceptive practices, disclosure of information, consumer credit regulation, equal credit opportunity legislation, quality standards, enforcement by the creditor, consumer remedies, and attorney fees for representing consumers.

225. Maritime Property (3) I. Bruch Discussion—3 hours. The California community property system including rights of spouses and treatment of property during marriage; characterization, valuation, and division of property following termination of marriage by divorce or death; and premarital contractual agreements. Also covered are nonmarital cohabitation, creditor's rights, and spousal support.

226. Mass Media Law (2) Discussion—2 hours. Course will survey legal issues associated with the mass media. Topics covered will include legal problems of news media and news gathering; the regulation of broadcasting, free press/fair trial, and cable television, and the effect of the new technologies.

227. Criminal Procedure (3) I. Feeney; II. Parnas Discussion—3 hours. The police function: arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineups, the exclusionary rule, and the due process of trial court. Consideration of selected problems in business planning.

228. Business Planning (3) Discussion—3 hours. Prerequisite: courses 220, and either courses 213 and 214 or course 215. Consideration of selected problems in business planning.

229. Commercial Real Estate Transactions Seminar (3) Seminar—3 hours. Planning, negotiating, and drafting involved in commercial real estate transactions. Students work on a series of transactions that might include a purchase/sale, a lease, a loan construction, a joint venture transaction. Students learn to determine client objectives, to develop a transaction structure to achieve these objectives, and to prepare documents involved in the transaction.

230. International Law and World Order (2) Seminar—2 hours. Examines the challenges posed to international law by the end of the cold war, including implications for international organization, collective security, international environmental safeguards, democratization, theories of international law, and related topics. Satisfies advanced legal writing requirement.

231. Legislative Process (3) I. Sallerino Discussion—3 hours. Covers the fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; the legislative investigatory power; lobbying; legislative-executive relations; and the legislature's constitutional powers and limitations.

232. Real Estate Finance (4) I. Rubin Discussion—4 hours. Examination of the problems involved in the acquisition, financing, and development of real estate, and of lender remedies and debtor protections in the event of debtor default. Stresses the practical application of California legal doctrines.

233. Refugee Law Seminar (2) I. Johnson Seminar—2 hours. Focus will be law concerning the admission of refugees into the United States. Detailed study of the Refugee Act of 1980, the major piece of legislation dealing with the admission of refugees into the country, the international law that fueled passage of the Act, and the various regulations promulgated by the Attorney General implementing the law. Analysis of the implementation of the Refugee Act and examination of charges that the immigration bureaucracy is subverting the purpose of the law. Focus on some topical refugee issues.

234. Family Law Practice (3) Seminar—3 hours. Prerequisite: course 225; course 272 recommended concurrently. Combined seminar and clinic to provide marital/legai counseling under the direct supervision of the instructor. Clinical participation required twice during semester. Students also participate in weekly 2-hour seminar which will cover a wide range of topics pertaining to family law practice. Limited enrollment. (SU grading only.)

235. Administrative Law (3) I. Gandara Discussion—3 hours. Study of federal law related to administrative agencies. Topics include administrative due process, agency adjudication, rulemaking, delegation of authority, standing, and judicial review. Students will become current with the Federal Administrative Procedure Act and the 1981 Model State Administrative Procedure Act.

236. Securities Regulation (3) I. Hillman Discussion—3 hours. Prerequisite: course 215 or consent of instructor. Focus on the Securities Act of 1933 and the Securities Exchange Act of 1934. Topics covered include domestic and international public offerings, registration statements, exemptions from registration, secondary offerings, market regulation, liability provisions, the definition of a security, enforcement of the securities act, responsibilities of securities lawyers, and transactional securities fraud. Particular attention is devoted to problems of small issuers of securities.

238. Business Tax (4) II. Raskind Discussion—4 hours. Prerequisite: course 220. The owners of partnerships and subchapter S corporations (pass-through entities) are taxed on items of income, deduction, and loss that are classified on their item by the holding entity. Corporations and shareholders are subject to income tax at both the entity and shareholder levels. This course examines the identity, organization, operation, and dissolution of pass-through entities in terms of the income tax impact of these transactions. Also examined are the formation, capitalization, operation, and liquidation of regular corporations subject to the double taxation regime of subchapter C of the Internal Revenue Code.

239. Individual Responsibility and the Law (2) I. Ayer Discussion—2 hours. Consideration of what it is to be a "good lawyer." Issues such as "zealous advocacy," professional detachment, and professional expertise, and the prevailing norms on these topics. Understanding how these norms affect society, the client, and the lawyer. While these are issues of "public policy," we will approach the standpoint of individual choice and responsibility, focusing on ways to reconceptualize the demands of the profession and one's own demands. (SU grading only.)

240. Elections and Political Campaigns (2) I. Feeney Discussion—2 hours. Course covers constitutional, statutory, administrative and case law aspects of federal and state elections, including laws relating to primaries, general elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest. Satisfies advanced writing requirement. Limited enrollment.

241. Regulated Industry Seminar (2) I. Fessler Seminar—2 hours. The social, political, technological and economic forces impacting the regulation of traditional public utility industries. Regulated private monopolies that were classically insulated from the pressures of competition are currently being restructured to accommodate and encourage competition at various levels of the supply and distribution chain. As the social contract is altered, the use of public and private monopolies to pursue redistributive social goals is rapidly being undermined by the constraints of competitive market forces and the unwillingness of firms deprived of regulatory protection to provide services that are not cost effective on a stand-alone basis. The resulting conflicts pose substantive and procedural challenges to regulators and individuals who would act as advocates in an administrative setting. Each student will prepare and present a paper on a topic approved by the instructor. Satisfies advanced legal writing requirement.
249. Comparative Law (2) I. Davis
Discussion—2 hours. Comparison of methods and sources of law; background and structure of the principal civil codes; analysis and study of problems arising in international transactions.

250. Jurisprudence (2) I. Oakley
Seminar—2 hours. Course deals with the philosophy of adjudication. Considers the nature of legal interpretation and the relationship between justice and law, with special attention to the problem of how judges should decide hard cases where the content of the law is unclear. Examines the extent to which a judge's personal convictions about justice affect decisions about the legal rights of the parties in a law suit? Does it matter if the judge is interpreting precedent rather than legislation? What are the limits of a general and synthetic nature will be followed by a detailed study of particular problems and theories of adjudication. Grading will be based on active class participation and an original paper. Limited enrollment.

251. Labor Law (3) II. West
Discussion—3 hours. Survey of the legislative, administrative, and judicial regulation of labor relations. Focus on the historical development of labor law, the scope of national legislation, union organization and recognition, the negotiation and administration of collective bargaining agreements, legality of strikes, picketing, boycotts, and employer interference with employees' efforts to organize.

252. International Litigation and Arbitration (3) II. Juenger
Discussion—3 hours. Current developments in international law, conflict of laws, private procedure, arbitration and comparative law in the context of transactions and disputes that cut across national boundaries. Topics covered include jurisdiction, the enforcement of judgments, the relative merits of arbitration, international discovery and international choice of law questions.

253. Products Liability (3) II. Hogan
Discussion—3 hours. Civil action for harm to the consumer resulting from dangerous and defective products.

254. American Legal History (2) I. Bartosic
Seminar—2 hours. Historical study of the relationship between legal change and social and political movements. Between 1953 and 1969, the Warren Court made enormous changes involving civil rights, civil liberties, criminal procedure, and state relations and legislative apportionment. These legal developments occurred in the midst of the McCarthy period and the Civil War; the civil rights struggle, the anti-war movement, the black power movement and rock and roll, the beginning of the space age, the Great Society legislative program and economic prosperity. What is the relationship between legal change and social and political development? Focus on the modern Civil Rights Movement and assessment of the influence of law, lawyers, lower courts, and the Movement itself on the Court and the elected branches of government. Emphasis on the need to understand law in its social and historical context. Satisfies advanced legal writing requirement. Limited enrollment.

255. Pension and Employee Benefit Law (3) II. Walk
Discussion—3 hours. Federal regulation and taxation of private pensions and employee benefits. The course will focus on the Employee Retirement Security Act of 1974 (ERISA) and will deal with such topics as coverage, vesting, social security funding, spousal interests (both during marriage and after divorce), retiree health and welfare plans, and preemption of state law. Fiduciary problems will also be examined. Irrespective of corporate takeovers and plan investments. Problems surrounding plan terminations will also be considered, including bankruptcy issues. Pension Benefit Guarantee Corporation insurance, and the issue of asset reversion to employers in the case of overfunded plans.

256. Land Use Planning and California Environmental Quality Act (2) I. Taylor
Discussion—2 hours. An assessment of the administrative and judicial applications of land planning and development. Topics include zoning, general plans, and related environmental and local government regulations. In addition, course will analyze the role of the California Environmental Quality Act and its application to California land use law.

257. Foreign Relations Law (3)
Discussion—3 hours. Course is based on course 217 or consent of instructor. Seminar covers subjects such as the war power, the treaty power and executive agreements, arms sales and military assistance, the recognition power, the negotiation power, the scope of the approach power, and the concept of international activities, and other separation-of-powers issues generated by the interaction of international law and constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

258. Professional Responsibility (1) II. Perschbacher
Discussion—1 hour. Study of ethical duties and responsibilities under the American Bar Association Code of Professional Responsibility, the Model Rules of Professional Conduct, and the Code of Judicial Conduct. Required of all students for graduation. (SU grading only.)

259. Feminist Legal Theory Seminar II. The Staff
Seminar—2 hours. Readings selected from the field of feminist legal theory and examination of the relationship between theory and legal practice in support of women's rights. Students required to help lead class discussions and write a research paper, which will satisfy the advanced legal writing requirement. Limited enrollment.

260. Employment Discrimination (3) I. West
Discussion—3 hours. Examination of federal law prohibiting employment discrimination based upon race, religion, sex, national origin, age, and sexual orientation. Course will focus on Title VII of the Civil Rights Act of 1964, and include coverage of Art. 1981, Art. 1983, the Equal Pay and Age Discrimination Acts. California fair employment laws will also be discussed.

261. Local Government (2)
Seminar—2 hours. Issues arising from two relationships: that between cities and higher levels of government, and that between cities and the people who live within their boundaries. Topics include: 1) state and federal preemption of local laws; 2) state and federal authority to restrict cities' freedom of speech; 3) city efforts to control the character of a community; 4) citizens' ability to sue cities for violations of constitutional and statutory rights; and 5) the political influence of zoning and land use policy. Local anti-trust and environmental regulation may also be covered. Class participation and a required original paper will satisfy the advanced legal writing requirement. Limited enrollment.

262. Antitrust (3) I. Gavurts
Discussion—3 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

263. Trial Practice (3) I. II. Fracchia
Discussion—2 hours; laboratory—2 hours. Prerequisite: course 219 (may be taken concurrently). Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory will be held on Tuesday, Wednesday, or Thursday evening. Limited enrollment. (SU grading only.)

264. Water Law (3) II. Dunning
Discussion—3 hours. Property rights in surface waters, including riparian, appurtenant and federal reserved rights; water administration institutions, including the federal reclamation program; the law of interstate waters and property rights in ground water. Emphasis on executive determination and implementation. Limited enrollment.

265. Natural Resources Law (2)
Seminar—2 hours. An exploration of the origin, contemporary applications and potential of the public trust doctrine. Limited enrollment.
278. Complex Litigation (3) J. Johnson
Discussion—3 hours. Study of issues that frequently arise in large, complex litigation involving multiple parties and multiple claims. The class treats in depth topics introduced in the first-year civil procedure course, with emphasis on its interrelationship to other substantive and procedural topics. Topics include complex party joinder, multidistrict federal court litigation, motion practice and sanctions, class actions litigation, discovery and "discovery abuse," including privilege, work and product claims, judicial management and settlement of litigation, and preclusion (collateral estoppel and res judicata). Not all topics will necessarily be covered in any one semester.

279. Juvenile Justice Process (2) Discussion—2 hours. Legal and philosophical bases of a separate juvenile justice process; police investigation, apprehension, and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile corrections. Major emphasis is on the role of counsel at each phase of the process. Guest speakers and field trips. Advanced legal writing requirement may be satisfied at the discretion of the instructor.

280. Pretrial Skills (3) Discussion—3 hours. Not open to students who have completed course 297. Course uses a series of role-playing exercises and class discussions to introduce students to a set of non-trial skills basic to the practice of law. The course concentrates on client interviewing and counseling, but will also include exercises in witness interviewing, negotiation, drafting of pleadings, discovery plans, and discovery documents. It is an expanded version of the client counseling course. Limited enrollment.

279. Public Sector Labor Law (2) Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Application of private sector labor law doctrines to the public sector. Emphasis is on the four California public sector statutes and the impact of constitutional law on public employees. Class presentation and seminar paper will satisfy advanced legal writing requirement.

280. Advanced Legal Writing Seminar (2) Seminar—2 hours. How to write a variety of legal documents in plain English. Writing exercises and outside readings will be assigned weekly. Each student will complete an individual writing project in lieu of final examination. The writing project will satisfy the law school's advanced legal writing requirements. Limited enrollment. (SU grading only.)

282. Environmental Law (2) Gándara Discussion—2 hours. Prerequisite: course 235. Introduction of regulation of the energy sector. Topics to be covered include regulation of natural monopolies, regulation of electricity and natural gas, legal aspects of the development of conventional and alternative energy sources, and environmental dimensions of energy development and regulation.

283. Remedies (3) I. Amar Discussion—3 hours. Study of common law remedies: damages, specific performance, injunctions, and restrictive covenant relief. Focus of course will be on the efficiency, fairness, and practicality of the alternative remedies available to the practitioner and the court.

284. Advanced Criminal Procedure (3) Discussion—3 hours.Prerequisite: course 225, 230 or 272, or consent of instructor. Examination in depth of important current issues in the fields of family and marital property law. Heavy emphasis on law reform, including study and direct observation of the legislative process. Each student will select one issue for development and presentation in the seminar. A research paper or draft bill and supporting analysis is required. The grade on the paper will count as additional unit credit may be arranged with consent of instructor to satisfy the legal writing requirement.

274. Intellectual Property (3) I. Oddi
Discussion—3 hours. Study of the protection of intellectual property. The course has an international dimension. Among the topics considered are trade secrets, patents, trademarks, misleading and false advertising, and copyright.

*Course not offered this academic year.*
paper will satisfy the advanced legal writing requirement.

295. Securities Regulation II (2)
Discussion—2 hours. Prerequisite: course 213 or 215, or consent of instructor; course 236 recommended. Principal focus is the Securities Exchange Act of 1934 and the regulation of securities markets. Topics include the evolution of securities markets, market efficiency, continuous reporting, institutional investors, shareholder voting and going-private transactions, regulatory failures of securities professionals, responsibilities of securities lawyers, transactional securities fraud, and enforcement of the securities acts.

296. Copyright and Entertainment Law (3) II. Kurtz. Discussion—2 hours. Prerequisite: course 213. Students will develop a detailed consideration of the law of copyright, with emphasis on its application to motion pictures, music, television, and theater. The rest of course will involve a study of other legal problems in the entertainment industry, including misappropriation, protection of titles, characters, group names, siogns, and the rights of privacy and publicity.

297. Dispute Resolution and Lawyers (2) II. Smith Discussion—2 hours. Students who have taken course 236 will have the opportunity to enroll in this course. Course uses a series of role-playing exercises and class discussions to introduce students to a set of non-trial skills basic to the practice of law. Exercises include lawyering, negotiation, arbitration, mediation, and limited enrollment.

298. Group Study (1-4) II. The Staff. Groups of students (not fewer than 4 or more than 10) with common interest in studying a stated legal problem may plan and conduct their own research and seminar program, subject to the following regulations: (1) the program may extend over no more than two semesters; (2) the plan for the program and the list of members of the group must be submitted to Dean's Office at least 4 weeks prior to opening of the semester in which the program is to begin; (3) the three-member faculty board will be appointed for each group, which will be authorized to approve or disapprove the program and the amount of credit sought; (4) changes in the program or in membership of the group must be approved by the faculty board and normally will be approved only prior to the semester involved; (5) group members must conduct a weekly seminar session to be arranged by them; (6) each member of the group must submit an individual paper or an approved alternative made out of the seminar and faculty board. (SU grading basis only unless the group requests letter grades in advance.

299. Research in Legal Problems (1-4) II. The Staff. Students may receive credit for individual research projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be submitted by the supervising faculty member in advance of the semester in which it is to be undertaken; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (SU grading only). In exceptional cases, with prior approval of a professor and an associate dean, students may arrange for directed research in foreign and international legal problems by working abroad under the direction of the student and a foreign law faculty member. (SU grading only).

Professional Courses

410A. Appellate Advocacy (Moot Court) (1-1) I. Program includes classroom instruction in appellate procedures and the advocacy skills and participation in the moot court program. Participants in 410A work on three oral advocacy problems and argue six times before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competition. Limited enrollment. (SU grading only)

410B. Appellate Advocacy (Moot Court) (1) II. Prerequisite: course 410A. Continuation of course 410A. Participants in 410B research and write an appellate brief and argue the case twice before a three-judge panel of the United States Court of Appeals for the Sixth Circuit. Limited enrollment. (SU grading only)

412. Carr Intraschool Trial Advocacy Competition (1) I. The Staff. Competition—1 hour. Named after the late Justice Frances Carr, this competition is open to second- and third-year students. A preliminary round is followed by quarter-finals, semi-finals, and a final round. Students participate in a single case presided over by judges end critiqued by experienced attorneys. Limited enrollment. (SU grading only)

413. Interschool Competition (1-3) I. II. The Staff. Prerequisite: consent of appropriate faculty adviser. Participation in interschool moot court and lawyering skills competitions. Enrollment is limited to students actually representing the School in the interschool competitions. Competition must be authorized by the appropriate faculty adviser. The faculty adviser may choose to certify credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement. (SU grading only)

414. Moot Court Board (1) I. II. The Staff. Prerequisite: course 410A-410B. Members of Moot Court Board may receive one credit for each semester of service on the board, up to a maximum of two. Credit awarded only after certification by Moot Court Board and approval of the faculty advisers to Moot Court Board. Limited enrollment. (SU grading only)

415. Trial Practice Honors Board (1) I. II. The Staff. Members of the Trial Practice Honors Board administrate the Francis Carr competition. Members are nominated by their individual Trial Practice I adjutants. Students receive one credit for serving on the Board, awarded upon approval of the faculty adviser. (SU grading only)

416. Law Review Writer (1-2) I and/ or II. Writing of an editorial opinion law review article under the editorial supervision of editors of the Law Review. Minimum of 40 hours contribution to the Law Review. Credit may be obtained only upon achieving status as a member of the Law Review, which requires that the student have made substantial progress toward completing an editorial article. Credit may be obtained only after certification by the Editor-in-Chief of the Law Review and approval of the faculty advisers to the Law Review. One unit of credit is earned in the first semester. Two units are earned upon completion of an editorial draft. (SU grading only)

417. Law Review Editor (2) I. II. The Staff. Editors must have completed at least one editorial article and must perform editorial duties requiring a substantial time commitment. Credit awarded only after certification by the Editor-in-Chief of the Law Review and approval of the faculty adviser to the Law Review. Students may receive four credits over two semesters for service as an editor. (SU grading only). In exceptional cases, students may petition to participate for one semester, receive two credits, (SU grading only). Deferred grading only on a case-by-case basis as a result of the sequence.

418. EnviroLaw (1) I. II. Dunham The Editor-in-Chief of EnviroLaw receives one credit for each semester of service. Only one person may receive this credit in any one semester. (SU grading only)

419. Advanced Writing Project (1-4) I. II. The Staff. Completion of a writing project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. Writing project must be an individual work of rigorous academic effort of at least 20 typewritten, double-spaced pages, excluding footnotes. Project may take any of several forms, for example, a paper, a brief, a memorandum of law, an opinion, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). Advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirement. Number of units for the writing project shall be approved by the supervising professor and will depend upon the scope of the writing effort. (Graduating seniors may elect to take the course on an S/U or letter-grade basis at the supervising professor's discretion)

420. Civil Rights Clinical Program (2 to 6 or 12) I. Johns Clinical Program. Prerequisite: prior or concurrent enrollment in course 267 and 219. Provides practical experience in providing legal services to indigent clients who have filed civil rights actions in the United States District Court for the Eastern District of California. Students will work on clinic cases under the supervision of the clinic director and supervising attorney. (SU grading only)

425. Judicial Clinics (2 to 6 or 12) I. II. Jordan Clinical Program. Prerequisite: relevant substantive and procedural coursework. Students may arrange individual judicial clerkship clinical programs with state and federal judges or their choice with the approval of the Clinical Committee and under the supervision of individual faculty members. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for individual Clinicals (course 420). (SU grading only)

430. Criminal Program in Federal Taxation (2-6) I. II. Simmons Criminal—2.6 hours. Prerequisite: course 220. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. Journals and attendance at group meetings are required. (SU grading only)

440. Immigration Law Clinic (2 to 6 or 12) I. Smith. Clinical Program. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4 and maximum is 12. Each unit assumes four hours per week, including participation in the seminar, conference, and case research and development. Students who have completed course 292 may take the clinic for a minimum of 2 units. Limited enrollment. (SU grading only)

450. Legislative Process Clinical (2-4) I. Dunham. Clinical Program. Prerequisite: prior or concurrent enrollment in course 231 or 210, or consent of instructor. Provides students with practical experience in the operation of a legislature or a legislative committee. The major function of the program is to enable students to become familiar with the legislative give and take realities of making laws, as contrasted with their interpretation and enforcement. Journals are required. (SU grading only)

455. Environmental Law Clinical (2-6) I. Dunham. Clinical Program. Practical experience in environmental law. Students will under the direct supervision of a government or private lawyer engaged in some form of environmental law work for a minimum of 8 office hours per week. Students will also be required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience. (SU grading only)

460. Clinical Program in Employment Relations (2 to 6 or 12) I. II. West. Clinical Program. Prerequisite: prior or concurrent enrollment in course 251 or 260 or consent of instructor. Practical experience in employment relations: private and public sector labor law and employment discrimination. Students will work under the direct supervision of a government or private lawyer and will have the opportunity to participate in a range of activities associated with their specialization with emphasis on observation and participation in actual investigation, interviewing, drafting of pleadings, and attendance at hearings. Weekly journals and attendance at monthly small group meetings are required. (SU grading only)

*Course not offered this academic year.*
Linguistics

(College of Letters and Science)

Steven G. Lapointe, Program Director
Program Office, 922 Sproul Hall (916-752-9933)

Committee in Charge
Wilbur A. Benware, Ph.D. (Linguistics)
Diane Brentari, Ph.D. (Linguistics)
Patrick Farrell, Ph.D. (Linguistics)
Steven G. Lapointe, Ph.D. (Linguistics)

Martha Macri, Ph.D., (Anthropology, Native American Studies)
Maria I. Manolli-Manca, Ph.D. (French)
Almerindo E. Ojeda, Ph.D. (Linguistics)
Mary Schleppegrell, Ph.D. (Linguistics)
Lenora A. Timm, Ph.D. (Linguistics)
Maximo Torreblanca, Ph.D. (Linguistics)

Faculty
Wilbur A. Benware, Ph.D., Professor
Diane Brentari, Ph.D., Assistant Professor
Nina F. Dronkers, Ph.D., Assistant Adjunct Professor
Patrick Farrell, Ph.D., Assistant Professor
Jeffrey King, Ph.D., Adjunct Associate Professor (Psychology)
Steven G. Lapointe, Ph.D., Associate Professor
Debra L. Long, Ph.D., Assistant Professor (Psychology)

Martha Macri, Ph.D., Assistant Professor (Anthropology, Native American Studies)
Maria I. Manolli-Manca, Ph.D., Professor (French)
Barbara J. Merino, Ph.D., Associate Professor (Education)
Almerindo E. Ojeda, Ph.D., Associate Professor
Winfried Schleifer, Ph.D., Professor (English)
Mary Schleppegrell, Ph.D., Assistant Professor
Janet S. Smith, Ph.D., Associate Professor (Anthropology)
Lenora A. Timm, Ph.D., Professor
Maximo Torreblanca, Ph.D., Professor
Carolyn F. Well, Ph.D., Lecturer (Anthropology)
Karen A. Watson-Gegeo, Ph.D., Professor (Education)

Emeriti Faculty
David O. Omsted, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus
Gwendolen Schwabe, M.A., Senior Lecturer Emerita

The Major Program

The discipline of linguistics encompasses a broad spectrum of knowledge about human language. Linguistics focuses on theories of language, description of contemporary languages, and the study of language change through time. It also has important applications within many other disciplines such as anthropology, biology, communications, education, language teaching, literature, philosophy, psychology, and sociology.

The Program. An introductory lower division course provides students with basic concepts and some of the methods needed to analyze language in a systematic way. Upper division courses probe more deeply into specific areas of language structure, language use, and the relationship of language to other realms of human activity.

Career Alternatives. Majors in linguistics find practical outlets for their linguistic training in various areas of employment: for example, in the computer science industry, in teaching English as a second language, in foreign language teaching; in elementary and secondary level bilingual-bicultural programs; in missionary work; in bilingual-bicultural curriculum development (for example, in publishing houses); in legal work; in speech therapy; or as lexicographers (for dictionaries). At these types of employment share an interest in persons skilled in the analysis of language, spoken and written—linguistics equips its students with just such skills.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>108</td>
<td>English 1 (Survey)</td>
<td>4</td>
</tr>
<tr>
<td>109</td>
<td>English 2 (Survey)</td>
<td>4</td>
</tr>
<tr>
<td>149</td>
<td>Modern Languages</td>
<td>4</td>
</tr>
<tr>
<td>199</td>
<td>Introduction to Linguistics</td>
<td>4</td>
</tr>
</tbody>
</table>


The student should note that a number of these courses have prerequisites. Since it is usual to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.

Total Units for the Major: 50-72

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

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Introduction to Linguistics</td>
<td>4</td>
</tr>
<tr>
<td>202</td>
<td>Language Structure</td>
<td>4</td>
</tr>
<tr>
<td>203</td>
<td>Language Change</td>
<td>4</td>
</tr>
<tr>
<td>204</td>
<td>Language Use</td>
<td>4</td>
</tr>
</tbody>
</table>


The student should note that a number of these courses have prerequisites. Since it is usual to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.

Total Units for the Minor: 24

Graduate Study. The Linguistics Graduate Group offers study and research leading to the M.A. degree. The student must: satisfactorily complete the course work; pass an oral examination; write and defend a thesis. The student may elect to complete the requirements either through an examination only or through an oral examination and a thesis.

Graduate Adviser: A. E. Ojeda

Courses in Linguistics (LIN)

1. Introduction to Linguistics (4) I, II, III, Brentari, Farrell, Timm, Benware, Lapointe, Ojeda,


5. Advanced American Sign Language (6) I, II,

6. Intermediate American Sign Language (5) I, II,


11. Advanced American Sign Language (6) I, II,

12. Intermediate American Sign Language (5) I, II,


17. Advanced American Sign Language (6) I, II,

18. Intermediate American Sign Language (5) I, II,
49. Special Study for Undergraduates (1-6) I, II, III. The Staff (Director in charge) Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

50. Languages of the World (4) I. Bennewe, Tirm Lecture—3 hours. Discussion/lab—1 hour. Prerequisite: course 1 or Anthropology 4 recommended. Survey of the world's languages, their classification, distribution, and interrelationships; structural diversity; many of the traits of human languages; sign languages, pidgins/creoles, "universal" languages, endangered languages, and languages of global significance. General Education credit: ESL; students at 200 level. (P/NP grading only.)

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge) Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

100. Historical Linguistics (4) III. Bennisw Lecture—3 hours. Discussion—1 hour. Prerequisite: course 139. Description and methods of the historical study of synchronic and diachronic fact, structural change, morphological change, syntactic change, semantic change.

102. Historical Linguistics (4) III. Bennisw Lecture—3 hours. Discussion—1 hour. Prerequisite: course 139. Description and methods of the historical study of synchronic and diachronic fact, structural change, morphological change, syntactic change, semantic change.

109. Phonetics (4) I. Brentari Lecture—3 hours. Discussion—1 hour. Prerequisite: course 1. Introduction to articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

113. Language, Gender and Society (4) I. Tirm Lecture—3 hours. Discussion—1 hour. Prerequisite: course 1. Investigation of real and putative (stereotypical) sex-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. General Education credit: Contemporary Societies.

115. Chicano Sociolinguistics (4) I. Tirm Lecture—3 hours. Term paper. Prerequisite: course 1 and Spanish 3, or the equivalent. Topics covered include the linguistic features of Chicano Spanish, English code-switching, regional and social diversity in Chicano Spanish, Chicano English, the acquisition of bilingualism, language choice and use, attitudes about Spanish and English, Spanish language maintenance and shift, Chicano bilingualism and education. Offered in alternate years.

116. The Spanish Language in the United States (4) I. Terrellbana Lecture—3 hours. Term paper. Prerequisite: Spanish 203 or the equivalent, and course 1 or Spanish 139. Linguistic features of the varieties of the Spanish language spoken throughout the United States: phonology, morphology, syntax, vocabulary. The major focus is the relationship between United States Spanish and other varieties of Spanish, within a historical framework.

120. Semantics (4) I. Ojeda Lecture—3 hours. Term paper. Prerequisite: course 1 or the equivalent. Theory and research on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage.

135. Introduction to Psycholinguistics (4) III. Lapointe Lecture—3 hours. Discussion—1 hour. Prerequisite: course 1 or course 139, 140 recommended. Introduction to the psychological issues relating to language and to the implications of research in psychology for linguistic theory.

139. Language Development (4) I. Lapointe Lecture—3 hours. Discussion—1 hour. Prerequisite: course 1 or consent of the instructor. Theory and research on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage.

140. Grammatical Analysis (4) I. Farrell, Lapointe Lecture—3 hours. Discussion—1 hour. Prerequisite: Introduction to syntactic analysis; survey of the syntactic and semantic phenomena in natural languages. Emphasis will be on developing skills and data analysis, rather than on investigating formal aspects of the theoretical framework to be employed.

142. Morphology (4) III. Lapointe, Farrell Lecture—3 hours. Discussion—1 hour. Prerequisite: course 139, 140. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components.

144. Introduction to Phonological Theory (4) III. Bohland Lecture—3 hours. Discussion—1 hour. Prerequisite: course 139. Introduction to contemporary phonological theory, with emphasis on asosegmental, metrical, and lexical theory.

150. Introduction to Syntactic Theory (4) II. Farrell, Lapointe Lecture—3 hours. Discussion—1 hour. Prerequisite: course 140. Introduction to syntactic theory, primarily through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, argumentation and theory building.

159. Current Theories of Syntax (4) III. Ojeda, Farrell, Lapointe Lecture—3 hours. Discussion—1 hour. Prerequisite: course 165. Examination of major contemporary theories of syntax.

170. Language Universals and Typology (4) II. The Staff Lecture—3 hours. Term paper. Prerequisite: course 165 (may be taken concurrently). Investigation into common features of all human languages and the classification of languages in terms of their structural features; theories of universal grammar; detailed discussion of a non-Western language and parallel comparison with English.

172. Language Structures (4) II. The Staff Lecture—3 hours. Term paper. Prerequisite: courses 102, 139, 140. In-depth study of the structure of a particular language or languages of a particular language family or area. May be repeated for credit.

175. Biological Basis of Language (4) III. Drakeners Lecture—3 hours. Discussion—1 hour. Prerequisite: course 1 or consent of instructor. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain.

192. Internship in Linguistics (1-12) I, II, III. The Staff (Timm in charge) Internship—1-36 hours; two written reports. Prerequisite: course 1 or the equivalent. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) I, II, III. The Staff (Director in charge) Individual study—1-5 hours. Special major or minor subject study under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Linguistics (1-4) I, II, III. The Staff (Chairperson in charge) Lecture—1-4 hours. Prerequisite: upper division standing, consent of instructor, and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: senior standing in Linguistics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (P/NP grading only.)

Graduate Courses


209. Advanced Phonetics (4) II. Brentari Lecture—3 hours. Discussion—1 hour. Prerequisite: course 109. Exploration of the physiological basis of speech articulation and an introduction to acoustic phonetics. Offered in alternate years.
Linguistics (A Graduate Group)

Steven G. Lapointe, Ph.D., Chairperson of the Group
Office, 922 Sprout Hall 916-752-9933/1219
Faculty. The Group includes faculty from eight depart-}
ments in the College of Letters and Science.
Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. degree. There are two tracks within the program, one concentra-
ting on applied linguistics and TESOL, and the other on general linguistics. Within the general lin-
guistics track, the following areas are emphasized: (a) grammatical analysis and theory in syntax, morphol-
ytics, and phonology, (b) sociolinguistics, (c) psycholinguistics and neurolinguistics, and (d) lang-
guage description (contemporary or historical) of a particular language or group of languages.
In general, the M.A. in Linguistics at UCSD is intended to serve as preparation for advanced graduate study at the Ph.D. level, as a supplement to studies in related fields, or as an analysis of theory/research on L2 acquisition. Topics include: contrast of L1/L2 acquisi-
tion; current theories of L2 such as the natural order and input hypotheses, as well as effects of individual variation, cognition, motivation on L2; research design and basic statistical analyses.

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. Major Books of the Contemporary World: The Struggle for Freedom
5. Fairy Tales, Fables and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and their Transformations
9. The Short Story and Novel
10A-N. Master Authors of World Literature
11. Introduction to Women Writers
12. Dramatic Literature
13. Introduction to Poetry
14. The Spiritual Quest
15. Man and the Natural World
16. Ethnic Minority Writers in World Literature
17. Literature of China and Japan
18. Writing Nature: 1750 to the Present
19. Women Writers
20. Gender and Interpretation
21. Thematic and Structural Study of Literature
22. Literary Theory and Criticism
23. Critical Reading and Analysis
24. The Grotesque
25. The Literature of the City
26. Myth in Literature
27. Literature of the Americas

Requirements. The requirements for the two tracks differ. The track in general linguistics falls under the Plan I set of requirements. Thirty units of upper divi-
sion and graduate course work above and beyond the prerequisite courses listed under Preparation (above) must be completed. A thesis is required. The track in applied linguistics and TESOL operates under either Plan I or Plan II. The Plan I requirements are the same as those listed above. Under Plan II, thirty-six units of upper division and graduate course work above and beyond the prerequisite courses are required, and at the end of the course work student must pass a written comprehensive examination. Students in both tracks must pass a foreign language reading examination.

Graduate Adviser. A.E. Ojeda (Linguistics).

Literature in Translation

The following courses are open to students through-
out the campus. The readings can be in English. Refer
to departmental listing for the course description.

Chinese
10. Modern Chinese Literature (in English)
11. Great Books of China
12. Introduction to the Literature of China and Japan
13. Twentieth-Century Chinese Fiction (in Eng-
lish)
14. Western Influences on Twentieth-Century Chinese Literature (in English)
15. Chinese Poetry (in English)
16. Traditional Chinese Fiction (in English)
17. Poetry of China and Japan (in English)
18. Repics in Chinese Literature (in English)
19. Great Writers of China: Texts and Context (in English)

Classics
140. Homer and Ancient Epic
141. Greek and Roman Comedy
142. Greek and Roman Novel
143. Greek Tragedy
Management, School of

142C. New German Cinema: From Oberhausen to the Present

Italian

139B. Boccaccio, Petrarch and the Renaissance

Italian Literature in English Translation: Dante, Divine Comedy

Japanese

10. Modern works of Japanese literature in English

Introduction to Traditional Japanese Culture

50. Introduction to the Literature of China and Japan

101. Japanese Literature in Translation: The Early Period

102. Japanese Literature in Translation: The Middle Period


104. Modern Japanese Literature: War and Revolution

105. Modern Japanese Literature: Hero and Anti-Hero

106. Japanese Culture through Film

107. Modern Japanese Autobiographies (in English)

108. Poetry of China and Japan

Native American Studies

181A. Native American Literature (the novel and fiction)

181B. Native American Literature (non-fiction works by native authors)

181C. Native American Literature (traditional literature and poetry)

188. Special Topics in Native American Literary Studies

Russian

41. Survey of Nineteenth-Century Russian Literature

42. Survey of Twentieth-Century Russian Literature

44. Children's Literature in Russia

121. Nineteenth-Century Russian Prose

122. Twentieth-Century Russian Prose

126. The Russian Theater

130. Contemporary Russian Culture

131. Literature of Revolution

132. Nature and Culture in the Soviet Union

140. Dostoevsky

141. Tolstoy

150. Russian Culture

151. Soviet Writers and Censorship

154. Russian Folklore

166. Representations of Sexuality in Russian Literature

Spanish

149. Latin-American Literature in Translation

Management, School of

Robert H. Smiley, Ph.D., Dean
School Office, 106 AOB 4 (916-752-7382)

Faculty

Peter Algert, Ph.D., Assistant Professor
Brad Barber, Ph.D., Assistant Professor
Nicole W. Biggart, Ph.D., Professor (Management, Sociology)
George Bittingmayer, Ph.D., Associate Professor
David B. Bunch, Ph.D., Assistant Professor
Richard P. Castanias, Ph.D., Associate Professor
Peter Clark, Ph.D., Professor

Masako Darrough, Ph.D., Associate Professor
Scott Davis, Ph.D., Assistant Professor
Richard C. Dorf, Ph.D., Professor (Management, Electrical and Computer Engineering)
Paul D. Griffith, Ph.D., Professor
Michael Hagerty, Ph.D., Associate Professor
John Lyon, Ph.D., Assistant Professor
Michael Maher, Ph.D., Professor
Alexander F. McCalla, Ph.D., Professor (Management, Economics)
Donald Palmer, Ph.D., Associate Professor
David M. Rocke, Ph.D., Professor
Jerome J. Suran, B.S., Ph.D. (non.), Senior Lecturer
(Management, Electrical and Computer Engineering)
Donald M. Topics, Ph.D., Professor
Chin-Ling Tsai, Ph.D., Associate Professor
Gary M. Walton, Ph.D., Professor (Management, Economics)
David Woodruff, Ph.D., Assistant Professor

Courses in Management (MG)

Lower Division Courses

11A. Elementary Accounting (4) I. Darrough Lecture—3 hours; discussion—1 hour. Basic concepts of accounting: Interpreting and preparer financial statements; understanding accounting principles. (Former course Economics 11A.)

11B. Elementary Accounting (4) II. Darrough Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Product costing; using accounting information for decision making; planning and performance evaluation. (Former course Economics 11B.)

Upper Division Course

100. Introduction to Financial Accounting (3) J. Lyon Lecture—3 hours. Prerequisite: no prior knowledge of accounting is required. Course is open to all upper division undergraduates and graduate students, except those in the Graduate School of Management. Introduction to the concepts, methods, and uses of accounting and financial reporting. Preparation of financial statements, including balance sheet and statements of income and cash flow, as well as their analysis by investors and managers.

Graduate Courses (Core Courses)

The core courses are being revised subject to approval by the Graduate Council. For further information, contact the Graduate School of Management.

200A. Financial Accounting (3) J. Lyon Lecture—3 hours. Prerequisite: graduate student. Introduction to the concepts and objective: underlying the preparation of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statements, presentation of the usefulness of financial statements in the analysis of a corporation's operations. Not open for credit to students who have completed former course 201A.

200B. Managerial Accounting (3) I. Maher Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Information managers should be familiar with effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations. Not open for credit to students who have completed former course 201B.

201A. The Individual and Group Dynamics (3) J. Palmer Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of Instructor. Examine basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building. Not open for credit to students who have completed former course 202.

*Course not offered this academic year.
2018. **Organizational Structure and Strategy** (3) II. Bigger Lecture—4 hours; group projects, experiential exercises. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Analyzes structural properties of organizations including differentiation and vertical and horizontal integration. Alternative structural arrangements including functional, divisionalized, matrix, and hybrid structures. Relationship between environment, structure, and strategic objectives. Organization life cycles and change. Not open for credit to students who have completed former course 203.

202A. **Markets and the Firm** (3) I. Bittlingmayer Lecture—3 hours; group projects, experiential exercises. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Examines the interaction of consumers, firms, and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied. Not open for credit to students who have completed former course 204.

202B. **Business, Government, and the International Economy** (3) II. Clark Prerequisite: course 202A or 402A or consent of instructor. Examines the influence of government and international institutions on business. Topics include distribution of income, business cycles, inflation, and interest rates, the federal debt, monetary policy, and international trade and finance. Not open for credit to students who have completed former course 206.

203A. **Data Analysis for Managers** (3) I. Tsai Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analysis techniques to problems in marketing, finance, operations, and public policy. Not open for credit to students who have completed former course 210A.

203B. **Forecasting and Managerial Research Methods** (3) II. Rocke Lecture—3 hours. Prerequisite: course 203A or 403A or consent of instructor. Advanced statistical methods for managerial decision making, regression analysis, time series analysis and forecasting, design and analysis of experiments, quality management. Application of these methods to marketing, finance, accounting, production, operations, and public policy. Not open for credit to students who have completed former course 206.

204. **Marketing Management** (3) III. Davis Lecture—3 hours. Prerequisite: graduate standing and the satisfactory completion of an intermediate-level course in price theory and statistics; or undergraduate with an undergraduate introductory course in marketing; or consent of instructor. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementation, control systems, consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales. Not open for credit to students who have completed former course 206.

205. **Financial Theory and Policy** (3) III. Alger Lecture—3 hours. Prerequisite: graduate student and course 204A or 404A, 202A or 402A, and 204A or 403A. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure of the firm, dividend policy, leveraged buyouts, mergers and acquisitions, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derive securities, asset portfolios, investment policy, and corporate finance. Not open for credit to students who have completed former course 207.

206. **Decision Making and Management Science** (3) III. Burch Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment. Not open for credit to students who have completed former course 211.

207. **Management Information Systems** (3) II. Topkis, Woodford Lecture—3 hours. Prerequisite: graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations. Computer hardware and software aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security. Not open for credit to students who have completed former course 209.

(Second-Year Courses)

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.


216. **Middle-level Management: Budgets, Controls, and Ethics** (3) I. The Staff Lecture—3 hours. Prerequisite: undergraduate degree. Performance measures, budgetary controls and ethical principles of middle managers, levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants.

220. **Public Budgeting and Finance** (3) The Staff Lecture—3 hours. Principles of government in a mixed economy and democratic society; economics and politics of taxation and resource allocation; inter-governmental financial relations; budgeting activities of local governments.

223. **Power and Influence in Management** (3) Palmer Seminar—3 hours. Prerequisite: consent of instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence, power over subordinates, the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics.

224. **Human Resource Management** (3) Biggart Lecture—3 hours. Problems of recruiting, training, motivating, compensating, and separating workers in contemporary organizations. Topics include design of incentive systems, career management, professionalization, turnover, worker burnout, organizational deviance, and current issues such as affirmative action and the unionization of public employees.

225. **Labor Relations** (3) The Staff Lecture—3 hours. Prerequisites: courses 210A and 210B or the equivalent. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector. Methods covered include statistical quality control techniques such as cost control charts and acceptance sampling reliability, and graphical tools.

229. **Global Strategy** (3) Biggart Lecture—3 hours. Examines recent restructurings in the world economy including the European Economic Community, East Asian economies of Japan, Taiwan, and South Korea, and changes in Eastern Europe. Discussion of the proposed Free Trade Pact between the U.S., Canada, and Mexico.

232. **Urban Policy and Planning** (3) The Staff Lecture—3 hours. Analysis of public policy in an urban setting, focusing on the decision-making process of such policies. Topics include urban spatial structure, growth-management policies, housing, transportation, environmental quality, local government finance, and urban planning.

233. **Regulation and Policy in Agriculture** (3) The Staff Lecture—3 hours. Implications for management of regulation and public policy on agricultural production choices, 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.

241. **Management Policy and Strategy** (3) G. Hager, Hagerty Lecture—3 hours. Prerequisite: first-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurement, and incentives which make up the organization of an real "client" organizations, in the private and public sectors, are assigned to student teams as the subjects of study.

241. **Strategic Decision Making** (3) Bunch Lecture—3 hours. Development of analytic skills for evaluating decisions and solving problems in various managerial settings. Emphasis is on problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

244. **New and Small Business Ventures** (3) Dori Lecture—3 hours. Emphasizes starting a new business venture or managing a small, ongoing business during its formative stages. The business plan, legal forms, financial considerations, the management team, the entrepreneur. Students develop a detailed business plan.

245. **International Marketing** (3) II. Haggerty Lecture—3 hours. Prerequisites: graduate student and course 204. Teaches marketing strategy and tactics applied across national borders. Includes lectures and cases on import/export, joint ventures, off-shore subsidiaries, national government involvement, international financial management, and currency exchange. Includes methods of market research and competitor intelligence in diverse cultures.

246. **Negotiation and Team Building** (3) III. Hagerty Lecture—3 hours. Prerequisites: courses 202 and 205. Teaches basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brain-storming to extend Pareto frontier.

248. **Marketing Strategies** (3) Haggerty Lecture—3 hours. Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing plans for applications to problems in private and public sector marketing.

249. **Marketing Research** (3) Haggerty Lecture—3 hours. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making public and private sector marketing decisions. Course covers collection of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.
250. Technology Management (3) Suran

251. Management of Innovation (3) Dorf

252. Production and Operations Management (3) Woodruff
Lecture—3 hours. Explores methods of increasing operational efficiency in producing and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as simulation, simulation systems analysis, queuing, and network models.

260. Financial Management (3) Castanias
Lecture—3 hours. Focuses on planning, acquiring, and managing a company’s financial resources. Includes financial planning, financial aspects of mergers and other forms of reorganization, analysis of investment, financial, and dividend policy; and theories of optimal capital structure.

261. Investment Analysis (3) Barber
Lecture—3 hours. Examines modern asset pricing theory and the implications of that theory for the analysis and management of stocks, bonds, and other financial securities. Factors influencing the value of stocks, bonds, options, warrants, and other securities are discussed from the perspective of a portfolio fund manager.

262. Money and Security Markets (3) Bittlingmayer
Lecture—3 hours. Examines how money and securities markets are organized and how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government’s role in improving capital markets, approaches to assessing changes in regulation in specific markets.

263. Options and Futures Markets (3) Barber
Lecture—3 hours. Studies the behavior of options and futures markets; how public agencies, businesses, others use options and futures; the nature of various strategies involving options, commodity, financial futures contracts. Price determination in options and futures markets is also examined.

264. Business Taxation (3) Blumenfeld
Lecture—3 hours. Emphasizes the impact of business taxation on investment, production, and financial decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.

265. Theory of Financial Decision Making (3) Castanias
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Theory of financial decision making.

266. International Finance (3) Castanias
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

267. The National and International Economy (3) Clark
Lecture—3 hours. Prerequisite: familiarity with basic macroeconomic concepts is required. Completion of an introductory course in macroeconomics is sufficient. The United States, and the linkage of the U.S. economy to the economies of the rest of the world through the exchange rate and international trade.

268. Management Communications (3) Kennedy
Lecture—3 hours. Theories, strategies, and skills necessary for effective communication in management. Students will learn to improve their business writing, and will deliver business presentations orally.

269. Case Studies in Corporate Finance (3) Barber
Lecture—3 hours. Prerequisite: course 201A, 207. Financial issues facing firms with a need to raise capital in financial markets. Unique case format uses case studies to analyze decisions which firms face.

270. Corporate Financial Reporting (3) Griff
Lecture—3 hours. Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policy makers.

271. Accounting and Budgeting for Management Control (3) Castanias
Lecture—3 hours. Examines concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

272. Evaluation of Financial Information (3) Griff
Lecture—3 hours. Studies how investors, creditors, others use accounting and other information in making financial investment decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed.

273. Accounting and Reporting for Governmental and Nonprofit Entities (3) Finan
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation and accounting for entities such as hospitals, universities, and welfare agencies.

274. Auditing, Internal Control, and Public Accounting (3) Lyon
Lecture—3 hours. Concentrates on role of the independent public accounting firm as auditor and consultant, from the perspective of an enterprise manager. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also given to current issues confronting the accounting profession.

275A-275B. Seminar in Finance and Accounting (3) III–III. Castanias, Barber, Lyon
Seminar—3 hours. Prerequisite: Economics 200A–200B or 200E% and course 201A. Seminar and projects in the theory of finance and accounting, and relevant empirical evidence. Seminar emphasizing the reading and discussion of academic articles.

276. Real Estate, Finance, and Development (3) II. The Staff
Lecture—3 hours. Prerequisite: course 201A and 207. Focus on single-family attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending.

280. Data and File Management (3) Topkis
Lecture—3 hours. Concepts of information storage and retrieval on digital computers. Emphasis on file structures and their uses within organizations; applications from both public and private sector.

281. Systems Analysis and Design (3) Woodruff
Lecture—3 hours. Emphasis on design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation.

283. Optimization Theory and Applications (3) Topkis
Lecture—3 hours. Introduces applied optimization theory. Examines linear, nonlinear, discrete, and dynamic programming; optimality conditions; transport, networks, and large-scale systems; and computer implementation. Applications are made to problems in private and public management.

*Course not offered this academic year.
Mathematics

(College of Letters and Science)

Henry L. Alder, Ph.D., Chairperson of the Department
Joel Hass, Ph.D., Vice-Chairperson of the Department (Graduate Matters)
Angela Y. Cheer, Ph.D., Vice-Chairperson of the Department (Undergraduate Matters)
Department Office, 565 Kerr Hall (9-66-752-8287)

Faculty

Henry L. Alder, Ph.D., Professor, Academic Senate Distinguished Teaching Award
David W. Ammon, Ph.D., Professor
David J. Basky, Ph.D., Assistant Professor
Carlos R. Borges, Ph.D., Professor
Robert J. Buck, Ph.D., Associate Professor
Gulfob D. Chakravartty, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Angela Y. Cheer, Ph.D., Associate Professor
Doyle C. Crutler, Ph.D., Professor
James P. Diederich, Ph.D., Professor
Allan L. Edelston, Ph.D., Professor
Alice Fialowski, Ph.D., Associate Professor
Dimitri B. Fuchs, Ph.D., Professor
Janko Gravner, Ph.D., Assistant Professor
Joel Hass, Ph.D., Associate Professor
John K. Hunter, Ph.D., Professor
Kurt Keim, Ph.D., Professor
Arthur J. Krener, Ph.D., Professor
Yingqiong Li, Ph.D., Assistant Professor
E. O. Milton, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Mitschko Mise, Ph.D., Professor
Washek P. F. Pfeffer, Ph.D., Professor
E. Gurneck Puckett, Ph.D., Associate Professor
Jeremy D. Quati, Ph.D., Assistant Professor
G. Thomas, Ph.D., Professor
Albert Schwarz, Ph.D., Professor
Evelyn M. Silvia, Ph.D., Professor, Academic Senate Distinguished Teaching Award
David M. Sklut, Ph.D., Assistant Professor
J. Blake Temple, Ph.D., Professor
Abigail Thompson, Ph.D., Associate Professor
Craig A. Tracy, Ph.D., Professor
Howard J. Wiener, Ph.D., Professor
Roger J. B. Wets, Ph.D., Professor

Emeriti Faculty

Hubert A. Arnold, Ph.D., Professor Emeritus
George A. Baker, Ph.D., Professor Emeritus
Dallas D. Banks, Ph.D., Professor Emeritus
Donal C. Benson, Ph.D., Professor Emeritus
Albert D. Buxton, Ph.D., Professor Emeritus
Curtis M. Fulton, Ph.D., Professor Emeritus
Robert D. Glaz, Ph.D., Professor Emeritus
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Melven R. Kerne, Ph.D., Professor Emeritus
Gary J. Kurovsky, Ph.D., Professor Emeritus
Dave G. Mead, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Donald A. Norton, Ph.D., Professor Emeritus
Sherman K. Stein, Litt.D., (Hon.), Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Robert W. Stringell, Ph.D., Professor Emeritus

The Major Programs

Mathematics is the study of abstract structures, finance, change, and the interrelations of these concepts. It is also the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus, students plan an upper-division program in consultation with a faculty adviser. This individualized program can lead to a graduate study in pure or applied mathematics, to elementary or secondary level teaching, or to other professional careers. Mathematics is not only a special interest such as computer science, statistics, or applied mathematics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in addition to teaching. For instance, operations research, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

A.B. Major Requirements:

Preparatory Subject Matter: 37-41
Mathematics 10A, 10B, 10C: 4
Mathematics 21A, 21B, 21C: 22
Mathematics 22B: 22
Computer Science Engineering 30 or Engineering 5: 3
Mathematics 9A, 9B, 9C: 3
Additional non-Mathematics courses chosen from natural sciences: 8
Core Requirements: 36
Mathematics 127A, 127B: 8
Mathematics 149A, 149B, or 150A, 150B: 8
Choose one Track from the following two: 16
Track 1: Secondary Teaching
Mathematics 115A: 3
Mathematics 141: 3
Additional upper division units: 10
Track 2: General Mathematics
Additional upper division units: 16
Total Units for the Major: 73-77

B.S. Major Requirements:

Preparatory Subject Matter: 30-41
Mathematics 12 (or high school equivalent): 0-3
Mathematics 21A, 21B, 21C, 21D, 22A, 22B: 22
Computer Science Engineering 30 or Engineering 5: 3-4
Physics 9A, 9B, 9C (Tracks 1 and 2 only): .12
Physics 9A (Track 3 only): .4
Statistics 13, 30, or 102 (Track 4 only): .3
Core Requirements: 45
Mathematics 108: 4
Mathematics 127A, 127B: 8
Choose one Track from the following four: .33
Track 1: Preparation for Graduate Study in Mathematics
Mathematics 1270: 4
Mathematics 150A, 150B, 150C: 12
One course from Mathematics 125, 126, 147, 148: 3
Additional upper division units: 14
Recommended: Mathematics 118A, 118B, 119, 125, 126, 141, 147, 185A, 185B.

*Course not offered this academic year.

Track 2: Applied Mathematics
Mathematics 150A, 150B: 3
Mathematics 157: 3
Two courses from Mathematics 128A, 128B, 129C: 6
Additional upper division units: .6
Recommended: Mathematics 118A, 118B, 118C, 119, 145, 168, 185A, 185B, Statistics 131 or Mathematics 131A, Computer Science Engineering 110, 122, up to 6 units of courses outside of mathematics department related to area of interest.

Track 3: Mathematics for Secondary Teaching
Mathematics 115A: 3
Mathematics 141: 3
Mathematics 149A, 149B: 8
Additional upper division units: 19

Track 4: General Mathematics
Mathematics 149A, 149B: 8
Additional upper division units: .8
Total Units for the Major: 75-86

Recommended Language Preparation.

Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Depth Subject Matter Requirements.

Certain mathematically oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 36- or 45-unit requirement with prior departmental approval. In general, 192, 194, 197TC, 198, and 199 courses are not appropriate for application towards this requirement; and any exceptions must be approved by the Department's Undergraduate Program Committee.

Qualifying Examination.

Among the prerequisites for taking Mathematics 12, 16A, 21A, 21AH, 36, and 63 is a passing score on the Qualifying Examination, and, in the cases of all the above courses except Mathematics 12, a passing score on the examination's trigonometric component. This examination is to be taken on this campus. Students are responsible for finding out their scores, which will be announced within 72 hours of the examination, at the Learning Skills Center, and for retaining the printout of their scores. Students who do not pass the examination will be administratively dropped from the courses mentioned above. Dates and times when the examination is offered are posted at the Mathematics Department.

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 advisor, one of the tracks as suggested by the advisor, 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 advisor immediately upon arrival.

Major Advisors.


Assistant in planning an undergraduate major program in mathematics should be obtained from a major advisor. In addition, students seeking information pertaining to the application of mathematics in the biological or social sciences or computer science may contact the appropriate special area advisor.

Students desiring preparation towards an A.B. degree for secondary teaching or general mathematics, or a B.S. degree for graduate study, biological sciences,
physical sciences, secondary teaching, or general mathematics should consult an undergraduate adviser.

Prerequisite Credit. No student may repeat a course, if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

**Minor Program Requirements:**

<table>
<thead>
<tr>
<th>UNITS</th>
<th>Mathematics</th>
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<tbody>
<tr>
<td>20</td>
<td>Upper division units in mathematics (exclusive of Mathematics 192, 197TC, 198, 199)</td>
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<tr>
<td></td>
<td>Three of these units could be from Mathematics 36.</td>
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</table>

Teaching Credential Subject Representative. G.T. Salles. See also under Teacher Education Program.

Graduate Study. The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

**Courses in Mathematics (MAT)**

**Lower Division Courses**

B. Elementary Algebra (no credit). The Staff. Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $45.)

C. Trigonometry (no credit). I, II. The Staff. Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $30.)

D. Intermediate Algebra (no credit). I, II. The Staff. Lecture—3 hours. Basic concepts of algebra, designed to prepare the student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $15.)

12. Precalculus (3) I, II, III. The Staff. Lecture—3 hours. Prerequisite: Two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on Precalculus Qualifying Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open to students who have completed any of courses 16A, 16B, 16C, 21A, 21B, or 21C with a C- or better.

(Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses.)

16A. Short Calculus (3) I, II, III. The Staff (Chairperson in charge). Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination and its trigonometric component. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open to students who have received credit for course 21A.

16B. Short Calculus (3) I, II, III. The Staff (Chairperson in charge). Lecture—3 hours. Prerequisite: course 16A or 21A. Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open to students who have received credit for course 21B.

16C. Short Calculus (3) I, II, III. The Staff (Chairperson in charge). Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open to students who have received credit for course 21C

21A. Calculus (4) I, II, III. The Staff. Lecture/discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 12, and obtaining required score on Precalculus Qualifying Examination and its trigonometric component. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extremas of a function. Differentials. L'Hopital's rule. Only two units of credit will be allowed to students who have credit for course 16A. (Not open to students who have completed any of courses 16A, 16B, 16C, 21A, 21B, or 21C.)

21A.H. Honors Calculus (4) I, II. The Staff. Lecture/discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A.

21AL. Emerging Scholars Program Calculus Workshop (2) I, II. The Staff. Workshop—6 hours. Prerequisite: concurrent enrollment in course 21A. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extremas of a function. Differentials. L'Hopital's rule. Only two units of credit will be allowed to students who have credit for course 16A. (Not open to students who have completed any of courses 16A, 16B, 16C, 21A, 21B, or 21C.)

21BH. Honors Calculus (4) I, II. The Staff. Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21A or 21AH. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C.

21BL. Emerging Scholars Program Calculus Workshop (2) I, II. The Staff. Workshop—6 hours. Prerequisite: course 21A or 21AH. Concurrent enrollment in course 21B. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Applications, arc length, average of a function, improper integrals, surface of revolution. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)

21CL. Emerging Scholars Program Calculus Workshop (2) I, II. The Staff. Workshop—6 hours. Prerequisite: course 21B or 21BH. Concurrent enrollment in course 21C. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems.

21CH. Honors Calculus (4) I, II. The Staff. Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21B or 21BH. More intensive treatment of material covered in course 21C.

21CL. Emerging Scholars Program Calculus Workshop (2) I, II. The Staff. Workshop—6 hours. Prerequisite: course 21B or 21BH. Concurrent enrollment in course 21C. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.)


22A. Linear Algebra (3) I, II, III. The Staff. Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms.


36. Fundamentals of Mathematics (3). The Staff. Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open to students who have received credit for course 108. Recommended for non-math majors.

63. Ideas from Mathematics (3) I, II. The Staff. Lecture—3 hours. Prerequisite: obtaining required score on Precalculus Qualifying Examination. In-depth treatment of some mathematical ideas, selected from all branches of mathematics, and their applications. Concepts, techniques of rigorous proofs and problem solving emphasized. Intended for students who wish to explore some deeper aspects of mathematics. Not open to students who have taken course 108.

71A-71B. Explorations in Elementary Mathematics (3-3) I, II. The Staff (Chairperson in charge). Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. (Deferred grading only, pending completion of sequence.)

80. Elementary Problem Solving Seminar (1) I, II, III. The Staff (Chairperson in charge). Seminar—1 hour. Prerequisite: high school mathematics. Students solve and present solutions to challenging and interesting problems in elementary mathematics at their own pace.

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

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

**Upper Division Courses**

108. Introduction to Abstract Mathematics (4) I, II, III. The Staff. Lecture/discussion—4 hours. Prerequisite: course 21B or consent of instructor. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics arguments.

114A. The Theory of Convex Sets (3) I, II. The Staff. Lecture—3 hours. Prerequisite: courses 21C, 22A, 108; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in alternate years.

115A. The Theory of Numbers (3) I, II. Aider. 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) I, II. Aider. Lecture—3 hours. Prerequisite: course 108. Euler function, Mobius function, congruences, primitive roots, quadratic reciprocity law. Offered in alternate years.

*Course not offered this academic year.*
115C. The Theory of Numbers (3) II. Alder
Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in alternate years.

116. Metric Differential Geometry (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 22A, 210, or consent of instructor. Vector analysis, curves and surfaces, curvature, theorems. Offered in alternate years.

118A. Partial Differential Equations: Elementary Methods (3) I. The Staff
Lecture—3 hours. Prerequisite: course 118A, Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions, partial differential equations in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations.

118C. Partial Differential Equations: Eigenfunction Expansions (3) I. The Staff
Lecture—3 hours. Prerequisite: course 118B. Green's functions for one-dimensional problems and Poisson's equation; Fourier Transforms; Green's Functions for time dependent differential equations, and Laplace transform and solution of partial differential equations.

119A-119B. Ordinary Differential Equations and Dynamical Systems (3-3) II-III. The Staff

121A. Advanced Calculus for the Sciences (3) I. The Staff
Lecture—3 hours. Prerequisite: courses 21D, 22A, 22B. Functions of a single real variable; power series, convergence, continuity, differentiation, integration, interchange of limiting procedures, Fourier series, integral transforms. Intended primarily for students majoring in science and engineering.

121B. Advanced Calculus for the Sciences (3) II. The Staff
Lecture—3 hours. Prerequisite: course 121A. Functions of several real variables; continuity, differentiation, implicit functions, integration, calculus of variation, vector calculus, elementary single complex variable theory. Intended primarily for students majoring in science and engineering.

125. Introduction to Mathematical Logic (3)
Krom
Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in alternate years.

126. Introduction to the Theory of Sets (3) III. The Staff
Lecture—3 hours. Prerequisite: course 127A or 150A. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in alternate years.

127A-127B-127C. Advanced Calculus (4-4-4) I, II, III-III, I. The Staff
Lecture/discussion—4 hours Prerequisite: courses 21D, 22A, 108. Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

128A. Numerical Analysis (4) I. The Staff
Lecture—3 hours; term project. Prerequisite: course 21C; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Error analysis, approximation, interpolation, numerical differentiation and integration.

128B. Numerical Analysis in Solution of Equations (4) II. The Staff
Lecture—3 hours; term project. Prerequisite: course 21C and 22A; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems; Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems.

128C. Numerical Analysis in Differential Equations (4) III. The Staff
Lecture—3 hours; term project. Prerequisite: courses 22A and 22B, and a knowledge of a programming language such as Pascal, FORTRAN or BASIC. Difference equations, operators, numerical solution of ordinary and partial differential equations.

131. Methods of Mathematical Probability (4) I. The Staff
Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics; discrete, continuous distributions; random variables; joint, marginal, conditional densities; transformation; expectation; sums and moments; inequalities; laws of large numbers; central limit law; probability models via conditioning; tables. Students who have taken Statistics 131A may not receive credit for this course.

132A-132B. Introduction to Stochastic Processes (3-3) III-IV. The Staff
Lecture—3 hours. Prerequisite: course 131 or Statistics 131A, Markov Chains, Poisson processes, birth and death processes, renewal theory, queuing theory, Brownian motion, stationary processes. Course 132B is offered in alternate years.

141. Euclidean Geometry (3) III. The Staff
Lecture—3 hours. Prerequisite: course 108. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries.

145. Combinatorial Mathematics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 108. Combinatorial methods using basic graph theory counting methods, generating functions, and recurrence relations.

147. Topology (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 108, 127A. Basic notions of point-set and combinatorial topology. Offered in alternate years.

149A-149B. Topics in Discrete Mathematics (4) II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: course 22A and 108. Coding theory and counting theory and the algebraic concepts needed in their development.

150A-150B-150C. Introduction to Abstract Algebra (4-4-4) I, II, III. The Staff (Chairperson in charge)
Lecture/discussion—4 hours. Prerequisite: course 108. Basic concepts of groups, rings, and fields. Emphasizes the techniques used in the proofs of the ideas (Lemmas, Theorems, etc.) developing these concepts. Develops precise thinking, precise writing, and the ability to deal with abstraction.

150. Mathematical Foundations of Database Theory, Design, and Performance (3)
Dedrich
Lecture—3 hours. Prerequisite: course 106 and familiarity with one high-level computer language. The relational model; relational algebra; relational calculus; normal forms; functional and multivalued dependences; Separability. Cost and benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU interactive operations.

154. Mathematical Foundations of Fifth Generation Computing (3) II. Milton
Lecture—3 hours. Prerequisite: course 108 and a modern high-level computer language. Study of the use of logic and knowledge, based systems. Resolution and non-resolution deduction, forward and backward deduction systems, logic programming, symbolic integration, problem solving strategies, functions in search strategies, mathematical treatment of uncertainty in expert systems.

167. Linear Algebra and Applications (3) I, II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 22A. Introduction to linear algebra: linear equations, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors. Applications to physics, engineering, economics, biology and statistics.

168. Mathematical Programming (3) III. The Staff
Lecture—3 hours. Prerequisite: courses 21C, 21D or consent of instructor. Methods of mathematical programming: line search programming, simplex method. Basic properties of unstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization.

169. Special Topics: Pure and Applied Mathematics (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: course 22A and 22B, or consent of instructor. Special topics from various fields of pure and applied mathematics, such as: analysis, algebra, applied mathematics, geometry, topology, computer science, logic, history. May be repeated for credit in different subject area.

185A. Functions of a Complex Variable with Applications (3) II. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 21D. Complex number systems, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

185B. Functions of a Complex Variable with Applications (3) III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 185A or consent of instructor. Analytic functions, elementary functions, and their mappings properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. Offered in alternate years.

190. Advanced Problem Solving Seminar (1) III. Weiner
Seminar—1 hour. Prerequisite: two years of college mathematics. Students solve and present solutions to challenging and unusual problems at the board. The problems require a background in most second-year university mathematics.

192. Internship in Applied Mathematics (1-3) I, II, III. The Staff (Chairperson in charge)
Internship: final report: Prerequisite: upper division standing; project approved by faculty sponsor prior to enrollment. Supervised work experience in applied mathematics. May be repeated for credit for a total of 10 units.

194. Undergraduate Thesiss (3) I, II, III. The Staff
Prerequisite: consent of instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated with consent of Vice Chairperson.

197C. Tutoring Mathematics in the Community (1-5) I, II, III. The Staff (Chairperson in charge)
Seminar—1-2 hours; laboratory—2-4 hours. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education which involve the development of techniques for mathematics instruction and tutoring on an individual or small group basis. (P/N grading only.)

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

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

Graduate Courses

201A-201B-210C. Analysis (4-4-4) I, II, III. The Staff (Chairperson in charge)

*Course not offered this academic year.*

Mathematics 291
201A. Topics in Geometry (3) I. The Staff (Chairperson in charge)

201B. Topics in Algebra (3) I. The Staff (Chairperson in charge)

201C. Topics in Analysis (3) III. The Staff (Chairperson in charge)

215A-215B-215C. Topology (4-4-4) I-III. The Staff (Chairperson in charge)

218A-218B. Partial Differential Equations (3-3) II-III. The Staff

221A-212B. Mathematical Fluid Dynamics (3-3) II. The Staff

222A-222B-222C. Numerical Solution of Differential Equations (3-3-3) I-II. The Staff

225A-225B-225C. Probability Theory (3-3-3) I-I II. The Staff

226A. Optimization I (3) I. The Staff

226B. Optimization II (3) III. The Staff

226A. Optimization I (3) I. The Staff

226B. Optimization II (3) III. The Staff

228A. Control Theory and Algorithms (3) I. The Staff

261A-261B. Lie Groups and Their Representation (3-3) I-II. The Staff

280. Topics in Pure and Applied Mathematics (3) I, II, III. The Staff

290. Seminar (1)-6 I, II, III. The Staff (Chairperson in charge)

299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)

Professional Course

390. Methods of Teaching Mathematics (3) I, II, III. The Staff

390A. Optimization I (3) I. The Staff

390B. Optimization II (3) III. The Staff

390A. Optimization I (3) I. The Staff

390B. Optimization II (3) III. The Staff

*Course not offered this academic year.
Medical Microbiology
See Medicine, School of

Medical Pharmacology and Toxicology
See Medicine, School of

Medicine
See Medicine (School of); and Medicine and Epidemiology (Veterinary Medicine)

Medicine, School of
Gerald S. Lazarus, M.D., Dean of the School
James J. Castles, M.D., Executive Associate Dean
John R. Elliott, Assistant Dean
F. William Blaisdell, M.D., Acting Assistant Dean
Lindy Kumagai, M.D., Assistant Dean
Ernest L. Lewis, M.D., Associate Dean
Frank J. Loge, M.B.A., Associate Dean
Brian O'Neill, M.D., Assistant Dean
Donal A. Walsh, Ph.D., Associate Dean
Office of Medical Sciences 1C (916-752-0331)

Faculty
Deborah S. Ahlin, M.D., Associate Professor (Radiology)
Mark Agius, M.D., Associate Professor (Neurology)
Timothy Albertson, M.D., Ph.D., Professor (Internal Medicine, Pharmacology)
Robbie Allen, M.D., Assistant Professor (Internal Medicine)
Eugenio Amparo, M.D., Associate Professor (Radiology)
Ezra A. Amsterdam, M.D., Professor (Internal Medicine)
Thomas Anders, M.D., Professor (Psychiatry)
Mark Anderson, M.D., Assistant Professor (Diagnostic Radiology)
Russell Andrews, M.D., Assistant Professor (Neurological Surgery)
Joseph Antognini, M.D., Assistant Professor (Anesthesiology)
Thomas Aoki, M.D., Professor (Internal Medicine)
C. Robert Ashmore, Ph.D., Professor (Physical Medicine and Rehabilitation)
Catherine Babcock, M.D., Assistant Professor (Radiology)
Huong Bui, M.D., Assistant Clinical Professor (Internal Medicine)
Peter Barglow, M.D., Professor (Psychiatry)
Sue Barton, Ph.D., Assistant Clinical Professor (Family Practice)
Felix Battistella, M.D., Assistant Professor (Surgery)
Kathleen Baynes, Ph.D., Assistant Professor (Neurology)
Blaine L. Beanum, Ph.D., Professor (Medical Microbiology and Immunology)
Carol Beatty, M.D., Assistant Professor (Radiology)
James J. Beaumont, Ph.D., Associate Professor (Internal Medicine)
Dennis J. Beckley, M.D., Associate Professor (Neurology)
Mahamad Benbarka, M.D., Assistant Professor (Internal Medicine)
John R. Benfield, M.D., Professor (Surgery)
William F. Benneke, Ph.D., Professor (Biological Chemistry)
Henry Bennett, Ph.D., Associate Professor (Anesthesiology)
Daniel R. Benson, M.D., Professor (Orthopaedic Surgery)
Ramon Berguer, M.D., Assistant Professor (Surgery)
Herbert Berkoff, M.D., Professor (Surgery)
Edmund M. Bernauer, Ph.D., Professor (Physical Medicine and Rehabilitation)
Klea D. Bertakis, M.D., Professor (Family Practice)
William Birdsong, M.D., Assistant Clinical Professor (Obstetrics and Gynecology)
F. William Blaisdell, M.D., Professor (Surgery), Academic Senate Distinguished Teaching Award
Nina Boe, M.D., Assistant Professor (Obstetrics and Gynecology)
James E. Bogdan, M.D., Professor (Neurological Surgery)
Hugo G. Bogren, M.D., Professor (Radiology, Internal Medicine)
William J. Bommer, M.D., Professor (Internal Medicine)
H. William Bonekat, M.D., Assistant Clinical Professor (Internal Medicine)
Ann Bonham, Ph.D., Assistant Professor (Internal Medicine, Pharmacology)
John Boone, Ph.D., Associate Professor (Diagnostic Radiology)
Barbara Botelho, M.D., Assistant Professor (Pediatrics)
Constance Bowe, M.D., Assistant Professor (Neurology)
Stephen Boyers, M.D., Associate Professor (Obstetrics and Gynecology)
E. Morton Bradbury, Ph.D., Professor (Biological Chemistry)
James Brandt, M.D., Assistant Professor (Ophthalmology)
William Brant, M.D., Associate Professor (Diagnostic Radiology)
Eileen Brathen, R.N., D.N.S.C., Assistant Adjunct Professor (Internal Medicine)
Joseph Britton, M.D., Assistant Clinical Professor (Internal Medicine)
Hilary Brodie, M.D., Ph.D., Assistant Professor (Otolaryngology)
Cherie Brown, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
Tommaso Brodelt, M.D., Assistant Professor (Internal Medicine)
Thomas Bullen, M.D., Assistant Clinical Professor (Pediatrics)
Michael Buenocono, M.D., Ph.D., Assistant Professor (Obstetrics and Gynecology)
Margaret S. Burns, Ph.D., Adjunct Professor (Ophthalmology)
Peter M. Cala, Ph.D., Professor (Human Physiology)
Edward J. Calahan, Ph.D., Professor (Family Practice)
Rodney Camp, M.D., Assistant Clinical Professor (Internal Medicine)
Robert D. Cardiff, M.D., Ph.D., Professor (Pathology), Academic Senate Distinguished Teaching Award
George H. Cardinet III, D.V.M., Ph.D., Professor (Physical Medicine and Rehabilitation)
Richard C. Carlsten, Ph.D., Professor (Human Physiology)
James R. Carlson, Ph.D., Associate Professor (Pathology, Internal Medicine)
Gregory Carter, M.D., Assistant Professor (Physical Medicine and Rehabilitation)
James J. Castles, J.R., M.D., Professor (Internal Medicine)
R. Jeffrey Chang, M.D., Professor (Obstetrics and Gynecology)
Michael W. Chapman, M.D., Professor (Orthopaedic Surgery)
Bahram Chehrazi, M.D., Professor (Neurological Surgery)
Anthony Cheung, Ph.D., Adjunct Professor (Pathology)
Richard A. Choate, M.D., Ph.D., Professor (Otolaryngology)
Brian Cong, M.D., Assistant Professor (Radiology)
Michael Choy, M.D., Assistant Professor (Pediatrics)
Thomas Chu, M.D., Assistant Professor (Ophthalmology)
Donald T. Chuang, Ph.D., Professor (Pharmacology)
Terry L. Coates, M.D., Assistant Professor (Radiology)
Kendall Cramm, D.V.M., Associate Adjunct Professor (Surgery)
Stuart H. Cohen, M.D., Associate Professor (Internal Medicine)
Steven Colquhoun, M.D., Assistant Professor (Surgery)
Caroline Connelly, Ph.D., Assistant Adjunct Professor (Surgery)
Matthew H. Connors, M.D., Associate Professor (Pediatrics)
Martha Cordon, M.D., Assistant Professor (Otolaryngology)
Michael Costa, M.D., Assistant Professor (Pathology)
Carroll E. Cross, M.D., Professor (Internal Medicine, Human Physiology)
Fitz-Roy E. Curry, Ph.D., Professor (Human Physiology)
Satya Dandekar, Ph.D., Associate Adjunct Professor (Internal Medicine)
Robert C. Davidson, M.D., Associate Professor (Family Practice)
Russell F. Davis, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
Kristen Day, M.D., Assistant Professor (Family Practice)
Sally J. DeNardo, M.D., Professor (Internal Medicine, Radiology)
Thomas A. Depner, M.D., Professor (Internal Medicine)
Robert W. Derlet, M.D., Associate Professor (Internal Medicine)
Ralph del Vecchio White, M.D., Professor (Urology)
Elaine DiFederico, M.D., Assistant Clinical Professor (Obstetrics and Gynecology)
Robert Dimond, M.D., Assistant Professor (Pediatrics)
Joseph Dominguez, M.D., Assistant Professor (Anesthesiology)
Paul J. Donald, M.D., Professor (Otolaryngology)
Nina Dronkon, Ph.D., Assistant Adjunct Professor (Neurology)
Jonathan Ducore, M.D., Associate Professor (Pediatrics)
Andrew Duckworth, M.D., Assistant Professor (Internal Medicine)
Martin Edelman, M.D., Assistant Professor (Internal Medicine)
Robert Ellon, M.D., Professor (Neurology)
John H. Eiselle, M.D., Professor (Anesthesiology, Human Physiology)
William G. Ellis, M.D., Professor (Pathology, Neurology)
Allen C. Enders, Ph.D., Professor (Human Anatomy)
Richard K. Entinkin, Ph.D., Associate Adjunct Professor (Physical Medicine and Rehabilitation, Pharmacology)
Kent L. Erickson, Ph.D., Professor (Human Anatomy)
Robert Foy, Ph.D., Associate Professor (Neurology)
Irwin Feinberg, M.D., Professor (Psychiatry)
Robert Friedlich, Ph.D., Assistant Adjunct Professor (Neurology)
Linda Ferris, M.D., Assistant Professor (Orthopaedic Surgery)
Nancy Field, M.D., Assistant Professor (Obstetrics and Gynecology)
Faith T. Fitzgerald, M.D., Professor (Internal Medicine)
Paul G. Fitzgerald, Ph.D., Associate Professor (Human Anatomy)
Neal Fleming, M.D., Ph.D., Assistant Professor (Anesthesiology)
Mark P. Fletcher, M.D., Associate Professor (Internal Medicine)
Neil M. Flynn, M.D., Professor (Internal Medicine)

*Course not offered this academic year.*
Michael D. McGinn, Ph.D., Associate Adjunct Professor (Otolaryngology)
Robert McLaren, M.D., Assistant Professor (Orthopaedic Surgery)
Stanley Meister, Ph.D., Professor (Cell Biology and Human Anatomy)
Jeanne Menink, R.N., Lecturer (Family Practice)
Carol Meredith, Ph.D., Assistant Adjunct Professor
Ayala Mergia, Ph.D., Assistant Adjunct Professor (Pathology)
Thurman A. Meyer, M.D., Professor (Pediatrics)
Thomas J. Myers, M.D., Associate Professor (Internal Medicine, Pathology)
Clara Mae, M.D., Professor (Clinical Pathology, Internal Medicine)
Jay M. Miletich, M.D., Associate Professor (Pediatrics)
Anne E. Missavage, M.D., Assistant Professor (Surgery)
Connie Mitchell, M.D., Assistant Professor (Internal Medicine)
H. David Moxe, M.D., Assistant Professor (Orthopaedic Surgery)
Paul Moe, Ph.D., Professor (Physical Education)
Elizabeth Moore, Associate Professor (Radiology)
Peter Moore, M.B.B.S., Associate Professor (Anesthesiology)
Walter Morgan, M.D., Associate Professor (Clinical Family Practice)
James Morrison, Ph.D., Associate Professor (Psychiatry)
Thomas L. Morrison, M.D., Professor (Psychiatry)
Lawrence Morse, M.D., Assistant Professor (Ophthalmology)
Dan Mungas, Ph.D., Assistant Adjunct Professor (Community and International Health)
Jerome Murphy, M.D., Assistant Professor (Pediatrics)
Tautora Nakada, M.D., Professor (Neurosurgery)
Steve T. Nakajima, M.D., Assistant Professor (Obstetrics and Gynecology)
William Nemecek, M.D., Assistant Professor (Diagnostic Radiology)
Thomas Nesbitt, M.D., Assistant Professor (Family Practice)
Dorsey Nishio, M.D., Assistant Clinical Professor (Internal Medicine)
Thomas E. Nordahl, M.D., Ph.D., Assistant Professor (Psychiatry)
Robert E. North, M.D., Associate Professor (Internal Medicine)
James Nucovo, M.D., Assistant Professor (Family Practice)
Martin O'Grady, Ph.D., Assistant Professor (Human Physiology)
Lois F. O'Grady, M.D., Professor (Internal Medicine), Academic Senate Distinguished Teaching Award
Richard H. O'Reilly, M.D., Professor (Obstetrics and Gynecology, Pathology)
Steven Olson, M.D., Assistant Professor (Orthopaedic Surgery)
Claude Organ, M.D., Professor (Surgery)
James W. Overstreet, M.D., Ph.D., Professor (Human Anatomy, Obstetrics and Gynecology)
John M. Palmer, M.D., (Otolaryngology)
Edward Panaceck, M.D., Associate Professor (Internal Medicine)
Dachling Pang, M.D., Professor (Neurological Surgery)
Demos L. Papaganis, M.D., Ph.D., Professor (Medical Microbiology and Immunology)
Conrad Papas, M.D., Assistant Professor (Neurological Surgery, Professor (Urology)
Jenny Park, M.D., Assistant Professor (Pediatrics)
Mark Parr, M.D., Associate Professor (Pediatrics)
Andrew Parsons, M.B.G.B.S., Assistant Professor
Gibbe H. Parsons, M.D., Professor (Internal Medicine)
Edith Perez, M.D., Assistant Professor (Internal Medicine)
Richard Perez, M.D., Assistant Professor (Surgery)
William Peve, M.D., Assistant Professor (Surgery)
Steven Phillips, M.D., Assistant Professor (Neurology)
Theodore Phillips, M.D., Professor (Surgery)
David J. Phinney, M.D., Ph.D., Associate Professor (Internal Medicine)
Neville P. Pimstone, M.D., Professor (Internal Medicine)
Marc Pollock, M.D., Assistant Professor (Surgery)
Virginia C. Poitier, M.D., Assistant Professor (Radiology)
Ernesto Politi, Ph.D., Professor (Pediatrics)
Jerry Powell, M.D., Associate Professor (Internal Medicine)
Thomas F. Provine, M.D., Associate Professor (Neurology)
Carmie Puckett, M.D., Associate Professor (Neurology)
George T. Rab, M.D., Professor (Orthopaedic Surgery)
Lawrence Rabinowitz, Ph.D., Professor (Human Physiology)
Robert Reif, M.D., Associate Professor (Neurology)
Bruce Reed, Ph.D., Assistant Adjunct Professor (Neurology)
Stanley B. Reich, M.D., Professor (Radiology)
Debra Reilly, M.D., Assistant Professor (Surgery)
John A. Reitan, Ph.D., Professor (Anesthesiology)
Michael P. Remler, M.D., Professor (Neurology)
Eugene M. Rennick, Ph.D., Professor (Human Physiology)
Carol Richman, M.D., Associate Professor (Internal Medicine)
David P. Richman, M.D., Professor (Neurology)
Mary Ripson, M.D., Assistant Professor (Surgery)
Dick L. Robbins, M.D., Professor (Internal Medicine)
John A. Robbins, M.D., Associate Professor (Internal Medicine)
Gary Roberts, M.D., Assistant Clinical Professor (Internal Medicine)
Lynden Robertson, Ph.D., Associate Adjunct Professor (Neurology)
Cynthia Robinson, M.D., Assistant Professor (Internal Medicine)
Juan J. Rodriquez, M.D., Professor (Orthopaedic Surgery)
Patrick Romano, M.D., Assistant Professor (Internal Medicine)
Nicholas Rosemich, M.D., Assistant Professor (Psychiatry)
Carl J. Rosenquist, M.D., Professor (Radiology)
Alan M. Roth, M.D., Professor (Ophthalmology, Pathology)
Frederick Royce, M.D., Assistant Professor (Pediatrics)
Christine Rozen, M.D., Assistant Professor (Community and International Health)
Robert B. Rucker, Ph.D., Professor (Biological Chemistry)
Douglas Rudtall, M.D., Assistant Clinical Professor (Internal Medicine)
Bora Rubner, M.D., Professor (Pathology)
Michael Rusnak, M.D., Assistant Professor (Anesthesiology)
John Rutledge, M.D., Associate Professor (Internal Medicine)
Amir Salawati, M.B.B.C.A., Professor (Anesthesiology)
Steven J. Samuel, Ph.D., Associate Professor (Internal Medicine, Obstetrics and Gynecology)
Saul Schaefer, M.D., Associate Professor (Internal Medicine)
Marc A. Schenker, M.D., Professor (Internal Medicine)
Thomas W. Schleich, Ph.D., Adjunct Professor (Chemistry)
Barbara Schneeman, M.D., Professor (Internal Medicine)
Ivan Schwab, M.D., Professor (Ophthalmology)
Robert J. Sciblski, Ph.D., Associate Professor (Medical Microbiology and Immunology)
Robert P. Sciblski, Ph.D., Professor (Human Physiology, Neurology, Ophthalmology)
Sidney A. Scudder, M.D., Assistant Professor (Hematology, Oncology)
James A. Seibert, Ph.D., Associate Professor (Radiology)
Craig W. Senders, M.D., Associate Professor (Otolaryngology)
Mark Servis, M.D., Assistant Professor (Psychiatry)
Masuji Sawai, M.B.B.S., Associate Professor (Neurology)
Azad A. Sheikh, M.B.B.S., Assistant Professor (Pediatrics)
David Shelton, M.D., Assistant Professor (Diagnostic Radiology)
Allan D. Selden, M.D., Professor (Internal Medicine)
Karen A. Sigrist, Ph.D., Associate Adjunct Professor (Neurology)
Joseph Silva, M.D., Professor (Internal Medicine)
Lloyd Silver, M.D., Associate Professor (Obstetrics and Gynecology)
Elizabeth M. Smithwick, M.D., Professor (Pediatrics)
J. Stuart Snodgrass, M.D., Professor (Internal Medicine)
Robert C. Stadnik, M.D., Professor (Radiology)
Larry G. Stark, Ph.D., Professor (Pharmacology)
Charles L. Stebbins, Ph.D., Associate Professor (Internal Medicine, Pathology)
David Steinberg, M.D., Assistant Professor (Orthopaedic Surgery)
Judith Stern, Ph.D., Professor (Internal Medicine)
Frazier Stovell, M.D., Assistant Professor (Internal Medicine)
Thomas Stevens, M.D., Professor (Surgery)
Margaret S. Stewart, Ph.D., Professor (Psychiatry)
Dennis Stewart, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
Charles Stice, M.D., Assistant Clinical Professor (Obstetrics and Gynecology)
Anthony R. Stone, M.D., Associate Professor (Urology)
Dennis Stone, M.D., Professor (Pediatrics)
Amir Swena, M.D., Assistant Clinical Professor (Family Practice)
Arthur Swistock, M.D., Assistant Professor (Internal Medicine)
Glen T. Sylvestre, Ph.D., Associate Professor (Orthopaedic Surgery)
Jonah Sylves, M.D., Assistant Professor (Otolaryngology)
Michael Syvane, Ph.D., Professor (Medical Microbiology and Immunology)
Robert M. Szabo, M.D., Associate Professor (Orthopaedic Surgery)
Robert C. Tal, Ph.D., Associate Adjunct Professor (Neurology)
Jeffrey R. Tanji, M.D., Associate Professor (Family Medicine)
Raymond J. Tepilow, M.D., Professor (Pathology)
Suzanne Teuber, M.D., Assistant Professor (Internal Medicine)
Seth Thaler, M.D., Associate Professor (Surgery)
R. Steven Tharratt, Assistant Professor (Internal Medicine)
Jennifer V. Theis, D.V.M., Ph.D., Professor (Medical Microbiology and Immunology)
Laura Timmerman, M.D., Assistant Professor (Orthopaedic Surgery)
James V. Total, M.D., Assistant Professor (Medical Microbiology and Immunology)
Kevin Tracy, M.D., Assistant Clinical Professor (Pediatrics)
Robert R. Trout, Ph.D., Professor (Biological Chemistry)
John D. Trollford, M.D., Professor (Obstetrics and Gynecology)
Frederick Tuck, Ph.D., Professor (Biological Chemistry)
Walter Trudel, M.D., Professor (Internal Medicine)
Brian Tsang, M.D., Assistant Clinical Professor (Anesthesiology)
Samuel Turner, M.D., Assistant Clinical Professor (Anesthesiology)
Judith L. Turgeon, Ph.D., Professor (Human Physiology)
Catherine Vaness, Ph.D., Assistant Adjunct Professor (Obstetrics and Gynecology)
David Vera, Ph.D., Assistant Adjunct Professor (Anesthesiology)
Zakadon Vera, M.D., Associate Professor (Internal Medicine)
Vijaya K. Vijayan, M.D., Ph.D., Professor (Human Anatomy, Neurology)
Amparo Villasante, M.D., Assistant Professor (Internal Medicine)

*Course not offered this academic year.
Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also the School of Medicine section in the front portion of this catalog.

Courses in the School of Medicine

Curriculum for the School of Medicine

The curriculum for the M.D. degree at the University of California, Davis School of Medicine is a four-year program to provide comprehensive training for the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research. While the first two years emphasize the basic science basis of medicine, the student is exposed even from the onset to questions of patient management, the crucial transition from the entry pregraduate training into the clinical training of the final two years.

The first-year program is for three quarters, beginning in the Fall. The basic sciences (anatomy, physiology, biochemistry, histology, endocrinology, neurosciences, immunology, general pathology) are blended with social sciences (the behavioral aspects of medicine), and students are introduced to the art of communication with patients and emergency medicine. The second-year program is for four quarters, but with the Summer Quarters abbreviated to six weeks. The Summer Quarters provides a transition between basic and clinical sciences with the presentation of systematic pathology, and courses on the integumentary system and reproductive system. In the remaining three quarters, the students complete their training.

In the fourth year of the M.D. curriculum, flexibility is built in to allow students to begin to individualize their medical career. Twenty-four weeks of flexible clerkships include four weeks of neurology and neurosurgery, four weeks of ambulatory care, and sixteen weeks of clinical electives. Each student is required to take two-week clerkships in physical medicine and rehabilitation, ophthalmology, otolaryngology, and a two-week required experience in responsibilities of medical practice (medical ethics, jurisprudence, medical economics). The fourth year curriculum also allows for twelve weeks of undesignated time.

To satisfy the M.D. degree program, the student must successfully complete the required course work and clerkships. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute these courses with electives of equal credit. In addition to the fourth-year elective program available, there is some opportunity for selecting electives during the first two years, in particular during the interim period between the first and second years.

Coordination with other Advanced Degree Programs

The curriculum for the M.D. degree provides flexibility and encourages coordination with other advanced degree programs (Ph.D., M.S., M.A., and M.P.H.). These programs have common faculty members and draw upon the considerable expertise of the entire campus faculty. In addition, the UC Berkeley School of Public Health offers an M.P.H. program in conjunction with the M.D. program.

School of Medicine administrators enthusiastically support students interested in pursuing advanced degree programs. The dual-degree program for the M.D./Ph.D. is designed to train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care. Students are encouraged to seek degrees in any of the campuswide Ph.D. programs, including those in social sciences and humanities. The UC School of Medicine awards two competitive fellowships each year to students enrolled in the M.D./Ph.D. program.

First-Year Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Biological Chemistry 410A, molecular and cell biology</td>
<td>4.5</td>
</tr>
<tr>
<td>Family Practice 400A, introduction to patient evaluation</td>
<td>2</td>
</tr>
<tr>
<td>Cell Biology and Human Anatomy 400, developmental, gross and radiologic anatomy</td>
<td>3.5</td>
</tr>
<tr>
<td>Psychiatry 401, medicine and the mind</td>
<td>2</td>
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</tbody>
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Second-Year Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Pathology 410B, General Systemic Pathology</td>
<td>7.5</td>
</tr>
<tr>
<td>Obstetrics and Gynecology/Pediatrics 420, reproduction/generics/periatology</td>
<td>2</td>
</tr>
<tr>
<td>Dermatology 420, integumentary system</td>
<td>2</td>
</tr>
<tr>
<td>Internal Medicine 400A, physical diagnosis</td>
<td>1</td>
</tr>
</tbody>
</table>

Quarter IV: Summer

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>Medical Microbiology 4803, pathogen microbiology</td>
<td>6.5</td>
</tr>
<tr>
<td>Internal Medicine 420A, hematopoietic and lymphocytic system studies</td>
<td>2.5</td>
</tr>
<tr>
<td>Orthopaedic Surgery 420, musculoskeletal system</td>
<td>2.5</td>
</tr>
<tr>
<td>Medical Pharmacology and Toxicology 400A, Principles of Pharmaco A</td>
<td>2.5</td>
</tr>
</tbody>
</table>

*Course not offered this academic year.
Community and International Health/Internal Medicine 402, epidemiology/community health/occupational medicine ...........................................2.5
Internal Medicine 400B, physical diagnosis ....................................2
Quarter VI: Winter
Medical Pharmacology and Toxicology 400B, Principles of Pharmacology (5 cr.) .................................................................4
Internal Medicine 420C, respiratory system ..................................4
Internal Medicine 420D, cardiovascular system ..........................3.5
Neurology 420C, clinical neurosciences ......................................3.5
Psychiatry 403, psychopathology .................................................3.5
Psychiatry 402, human sexuality ..................................................1
Internal Medicine 400C, physical diagnosis ...............................2
Quarter VII: Spring
Internal Medicine 420F, metabolic-regulatory system .................3.5
Internal Medicine 420B, gastrointestinal system ..........................3
Internal Medicine/Biological Chemistry 419, basic and clinical nutrition .................................................................2
Internal Medicine 420C, nephrology ..............................................4
Internal Medicine 400D, physical diagnosis ...............................2
NOTE: The Third and Fourth-year programs are currently undergoing changes and may be implemented in the Summer, 1994.

Medical Sciences (MDS; core courses)

Third-Year Required Courses

Professional Courses

430. Required Surgery Clerkship (13 cr.) I, II, III, IV
The Staff
Clinical activity—full time (eight weeks); lecture—8 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Restricted to medical students. Course consists of eight weeks of general surgery specialties and four weeks of orthopaedics or urology. Core material is presented through seminars and lectures and reading assignments involving the workup and care of the surgical patient.

431. Medicine Clerkship (13 cr.) I, II, III, IV
Course Committee
Clinical activity—full time (12 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two 6-week periods; direct patient care situations under guidance of full-time or volunteer faculty members. Nights and weekend on-call. Completion of 24 full-write-ups on patients for whom students are on special responsibility.

432A, Obstetrics-Gynecology Clerkship (13 cr.) I, II, III, IV
Course Committee/Chairperson
Clinical activity—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Obstetrician/gynecologist/gynecologic experience in delivery room, nursery ward, operating room, clinics. One-third of time spent in gynecology, two-thirds of time in perinatology. Obstetrics, neonatology, and continuing care of fetus-neonate emphasized in perinatal period. Seminars and conferences throughout period.

432B. Pediatric Clerkship (12 cr.) I, II, III, IV
Course Committee/Chairperson
Clinical activity—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Four 4-week periods, one in inpatient rotation (UCD Medical Center or Travis AFB) and one in ambulatory experiences (UCD Medical Center). Assumption of appropriate patient care responsibilities; participation in conferences/rounds; and seminars during ambulatory rotation.

433. Clinical Clerkship in Psychiatry (12 cr.) I, II, III, IV
Course Committee/Chairperson
Clinical activity—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Students assigned to various mental health clinical settings following an orientation program. Focus on treatment of psychiatric problems encountered by physician in practice. Diagnostic, therapeutic, and interpersonal skills emphasized.

Fourth-Year Required Courses

440. Responsibilities of Medical Practice (5 cr.) I, II, III, IV
Davidson and staff
Lecture/discussion—60 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address nonbiological components of the patient-physician relationship (medical ethics, medical jurisprudence, medical economics, alcoholism and drug abuse, etc.) and critically explore social, ethical and cultural issues arising in medical practice. (SU grading only.)

Fourth Year Required Courses

Responsibilities of medical practice ........................................2 weeks
Physical Medicine and Rehabilitation clerkship .........................2 weeks
Ear, Nose and Throat/Otolaryngology clerkship ..........................4 weeks
Fourth Year Flexible Clerkships
Neurology and/or Neurosurgery .............................................4 weeks
Ambulatory Care .....................................................................4 weeks
Clinical Selectives .................................................................16 weeks
The fourth-year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.).

Other Medical Sciences Courses (MDS)

Professional Courses

401. Applications of Computers to Medical Practice (2 cr.) I, II, III, IV
Hunley
Autotutorial—1 hour. Prerequisite: enrollment in medical school. Proficiency in computer applications relates to practice of medicine, with emphasis on e-mail, literature searching, faxes, and computerized medical record. Course given on line, at home or in lab; time and place determined by student. (SU grading only.)

450. Introduction to UCD Medical Center (1 cr.) I, II, III, IV
The Staff
Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (SU grading only.)

480. Insights In Clinical Research (1 cr.) I, II, III, IV
Walsh
Lecture—1 hour. Prerequisite: medical students in good standing, as determined by consent of instructor. Round discussions on acute and chronic disease, as well as techniques for research. Open to all students. Consent of instructor required. (SU grading only.)

499. Directed Studies (0 cr.) I, II, III, IV
O'Driscoll
Independent study; 40 hours minimum. Prerequisite: individual directed studies in extended preparation for National Board Examination, Part I, and/or as required by Promotion Board. Independent studies to review material from Years I and II in the curriculum in preparation for taking National Board examinations. Consent of instructor required. (SU grading only.)

445. Medicine Literature Review (1 cr.) I, II, III, IV
Walsh
Discussion—3-3.5 hours. Prerequisite: medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study. Topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A completed paper on the selected topic will be required. (SU grading only.)

Departmental Courses:

Anesthesiology (ANE)

Upper Division Course

192. Internship in Anesthesiology (1-12) I, II, III, IV
The Staff
Internship—3 to 12 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work experience in anesthesia and related fields. (PFP grading only.)

Professional Courses

460. Anesthesiology Clinical Clerkship (3-18 cr.) I, II, III, IV
Lambert in charge
Full-time clinical activity (3 full days per week). Prerequisite: third- and fourth-year medical students. Provides experience in total anesthetic management including application of physiologic and pharmacologic principles to preoperative, operative and postoperative management of patients. Considers pharmacology of drugs used and identifies all principles of anesthesiology.

463. Medical and Surgical Pain Management (2 cr.) I, II, III, IV
Eckel Jr.
Clinical activity—20 hours; lecture-discussion—1 hour. Prerequisite: medical students in good standing, as determined by consent of instructor. Round discussions on acute and chronic disease, as well as techniques for research. Open to all students. Consent of instructor required. (SU grading only.)

498. Individual or Group Study (1-5 cr.) I, II, III, IV
Esleev and staff
Discussion—5 hours; laboratory—2-10 hours. Prerequisite: seniors and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

499. Anesthesiology Research (4-18 cr.) I, II, III, IV
Grady and staff
Laboratory—12-54 hours. Prerequisite: third- and fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and laboratory research. (SU grading only for medical students.)

Biological Chemistry (BCM)

Lower Division Course

92. Internship in Biological Chemistry (1-12) I, II, III, IV
The Staff
Internship—3-36 hours; final report. Prerequisite: consent of instructor. Supervised work experience in biological chemistry and related fields. (PFP grading only.)

Upper Division Courses

192. Internship in Biological Chemistry (1-12) I, II, III, IV
The Staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (PFP grading only.)

198. Group Study (1-5) I, II, III, IV
The Staff
Prerequisite: consent of instructor. For undergraduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (PFP grading only.)
Graduate Courses

208. Prostaglandins/Lipoxigenases and Related Lipids (3) I. Zbinden (Dermatology)

214. Molecular Medicine (1) I. Hanley
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemical relation to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relev.

216. Protein Structure (3) II. Bentzak
Lecture—3 hours. Prerequisite: Biology 210A or consent of instructor. Course designed to acquaint students at graduate level with currently applied techniques employed in determination of protein struct.

217. Molecular Genetics of Fungi (3) II. Holland
Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A, Botany 119; Plant Pathology 130, 215X; Microbiology 215 recommended. Advanced treatm.

222. Mechanisms of Translational Control (2) II. Hershey
Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 201C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eucaryotic cells, with emphasis on mamm.

236. Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth.

239. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

410A. Molecular and Cell Biology (4.5) I. Matthews, Holland
Lecture—5 hours. Basic biochemistry of proteins and nucleic acids is presented, followed by molecular genetics, regulation of gene expression, enzymes and structural proteins. Applications to clinically relevant systems are emphasized, particularly sickle cell anem.

410B. Cell Biology and Metabolism (3.5) II. Trat.
Lecture—4 hours (for 9 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Trat. on which will be transport of small mole.

411. Molecular Medicine (1) I. Hanley
Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemical relation to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical rele.

412. Introduction to Clinical Nutrition (3) II. Halsted
Lecture—5 hours; discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. The course emphasizes nutrient homeostasis and regulation and current perspectives on the role of nutrition in disease. Format is party lectures, party discussion/case study.

497T. Tutoring in Biological Chemistry (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Tutoring—3 to 15 hours. Prerequisite: advanced standing and consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Group Study (1) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff
Prerequisite: medical students with consent of instructor. (SU grading only.)

Cell Biology and Human Anatomy (CHA)

Upper Division Courses

101. The Gross and Microscopic Structure of the Human Body (4)
Lecture—4 hours. Prerequisite: Biological Sciences 1A or 10; Physiology 2-2L or Biological Sciences 1B recommended. A study of the gross and microscopic structure of the human body with emphasis on funct.

101L. The Gross and Microscopic Structure of the Human Body (2)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101 must be taken concurrently. Laboratory will be taught from sections, models and slides to give students the opportunity to learn structure from direct experience.

192. Internship in Morphology (1) I, II, III, IV. The Staff
Internship—3 to 36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some laboratory practice and reading related to the project of internship. Experience of supervised internship in research laboratories of members of the department. (P/N grading only.)

197T. Tutoring in Cell Biology and Human Anatomy (1) I, II, III, IV. The Staff
Prerequisite: completion of course 101 with a grade of B or better and consent of instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (SU grading only.)

198. Directed Group Study (1) I, II, III, IV. The Staff
Discussion—1 to 10 hours. Prerequisite: consent of instructor. Directed reading, discussion, and laboratory experience on selected topics. (P/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P/N grading only.)

Graduate Courses

200. Gross Anatomy (8) I. Erickson
Lecture—3.5 hours; discussion—1 hour; laboratory—10.5 hours. Prerequisite: student status and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint students with structural relationships through dissection and lecture and to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

202. Human Microscopic Anatomy (5) II. Fitzgerald
Lecture—3 hours; laboratory—6 hours. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Emphasizes morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of selected material at the light microscopic and ultrastructural levels.

203. Neurobiology (6) III. Vijayan
Lecture—5 hours; laboratory—3 hours. Prerequisite: consent of instructor. Gross and microscopic anatomy of the central nervous system; motor and sensory pathways; neurophysiology, and cognitive functions.

250. Biology of Neuroglia (2) III. Vijayan
Lecture—discussion—1.5 hours. Prerequisite: consent of instructor. The properties and functions of non-neur.

262. Fertilization and Gamete Literature Critique (1) I, II, III. Meisel
Discussion—1 hour. Prerequisite: consent of instructor. Critical evaluation of current journal articles dealing with cell biology, genetics, and fertilization. Selected papers will be presented and discussed in detail by students and faculty. May be repeated for credit. (SU grading only.)

284. Advanced Group Study (1) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

295. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

400. Developmental, Gross, and Radiologic Anatomy (9) I. Erickson and staff
Lecture—6 hours; laboratory—12 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Integrated presentation of developmental, gross, and radiologic anatomy. Four students are assigned to a cadaver and dissect the entire body. Embryology and radiology are correlated with the dis.

402. Human Microscopic Anatomy (5) II. Fitzgerald and staff
Lecture—3 hours; laboratory—6 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Examines the normal microscopic structure of the basic cells, tissues, and organs of the
body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of section material at the light microscopic and ultrastructural levels.

403. Neurobiology (S) III. Vlajcan Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Physiology 403.)

487T. Tutoring in Human Anatomy (1-5) I, II, III, IV. The Staff Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (SU grading only.)

498. Advanced Group Study (1-12) I, II, III, IV. The Staff Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

Clinical Psychology (CPS)

Graduate Course

290. Research (1-12) I, II, III, IV. Steward Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (SU grading only.)

Community and International Health (CMH)

Lower Division Course

92. Internship in Community Health (1-12) I, II, III, IV. The Staff Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.)

Upper Division Courses

101. Perspectives in Community Health (3) S. Gilmour Lecture—3 hours. Prerequisite: undergraduate standing. Covers community health perspectives, responsibilities, roles and professional activities of various health care disciplines in the community; provides students with perspectives on preventive medicine in society.

160. Health Education (1-5) I, II, III, IV. The Staff (Student Health Center) Lecture—1-3 hours; laboratory—5-15 hours. Prerequisite: consent of instructor. Preparation for field work in the field of health education. Planning and presentation of programs on health issues. Peer counseling in the areas of sexuality and alcohol/drug abuse. (P/NP grading only.)

180. Aging and Health (3) S. Gilmour Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. Emphasis on nature and determinants of health in the elderly. Current social and personal strategies for enhancing and maintaining health and well-being.

192. Internship in Community Health Practice (1-12) I, II, III, IV. The Staff Internship—3-36 hours. Prerequisite: upper division and graduate students; consent of instructor. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.)

194. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kamagata and staff Clinical activity—3-15 hours; written report. Prerequisite: upper division student standing. The undergraduate student gains active participation in the medical aspects of community health clinics, gains knowledge of their organization, administration, and problem solving capabilities of these primary care facilities. (P/NP grading only.)

195. Internship in Community Health Care (1) I. Kizer Lecture/discussion—1 hour. Prerequisite: one or more courses in community health, health policy, sociology, or international relations recommended. A forum for learning about current health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. May be repeated for credit. (Same course as course 495.) (P/NP grading only.)

198. Study in Community and International Health (1-5) I, II, III, IV. The Staff Prerequisite: graduate standing and consent of instructor. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.)

199. Research in Community and International Health (1-5) I, II, III, IV. The Staff Prerequisite: undergraduate standing; consent of instructor. Students will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, health care systems, and health demography. (P/NP grading only.)

Graduate Courses

230. Wilderness and Expedition Medicine (3.5) I. Kizer Lecture/discussion—15 hours; laboratory—5 hours (over a 2-week period). Prerequisite: graduate student in health or course with consent of instructor. Review of major medical problems that occur in wilderness and backcountry settings, including hypothermia and frostbite, heat illness, animal attacks, arthropod and reptile envenomation, high altitude illness, diving and marine medicine, and wilderness rescue. (Same course as course 430.)

294. Practicum in Community Health Clinics (1-5) I, II, III, IV. Kamagata Clinical activity—15 hours. Prerequisite: open to all first- or second-year medical students, or graduate students with consent of instructor. Students are assigned to clinical settings which demonstrate ethnically diverse urban/rural or cultural aspects of community health care. The student, through active participation in health care delivery, is able to relate conceptual with practical aspects of primary health care. (SU grading only for graduate students.)

298. Study in Community and International Health (1-5) I, II, III, IV. The Staff Prerequisite: graduate student in good academic standing and consent of instructor. Study and experience for graduate students in any number of areas in community and international health. (SU grading only.)

299. Research in Community and International Health (1-5) I, II, III, IV. The Staff Prerequisite: undergraduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, health care systems, and health demography. (SU grading only for graduate students.)

Professional Courses

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Haan Lecture—7.5 hours for 4 weeks; discussion—1.5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamental principles of epidemiology and clinical study design, including measures of morbidity, mortality, and risk. Occupational medicine component covers the evaluation of occupational illness, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system. (Same course as Internal Medicine 421.)

430. Wilderness and Expedition Medicine (3.5) I. Kizer Lecture/discussion—15 hours (for two weeks); laboratory—5 hours (for two weeks). Prerequisite: fourth-year medical student; other graduate students in health or life sciences with consent of instructor. Review of major medical problems that occur in wilderness and backcountry settings, including hypothermia and frostbite, heat illness, animal attacks, arthropod and reptile envenomation, high altitude illness, diving and marine medicine, and wilderness rescue. (Same course as course 230.)

455. Multidisciplinary Clinical Preceptorship (4.5) I. The Staff Clinical activity—full time (3 weeks). Prerequisite: second-year student in good academic standing. Students will be introduced to basic principles of geriatric health care and provided with opportunities for clinical observation and experience in a variety of facilities that serve older adults. Multidisciplinary nature of geriatrics will be emphasized. (SU grading only.)

460. Geriatrics in Community Health (6-12) I, II, III, IV. Gilmore Discussion—4 hours; clinical activity—full time (4-8 weeks) clinical setting and community needs assessment. Prerequisite: fourth-year medical student. Opportunity to participate in state-of-the-art geriatric programs ranging from well elderly to severe aged. Sites include Yolo, Sacramento, and Mariposa counties.

461. Clerkship in Community Health Group Practice (3-9) I, II, III, IV. The Staff Clinical activity—full time (2-6 weeks). Prerequisite: third- or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (SU grading only.)

465. Community Health Preceptorship (3-18) I, II, III, IV. The Staff Clinical activity—full time (2-12 weeks). Prerequisite: fourth-year medical students. Provides the opportunity, at the California Department of Health Services, to participate in ongoing investigations of current public health problems, i.e., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer’s disease, and smoking and tobacco use control.

480. Senior Partnership (1-3) I. Gilmour Clinical activity—3 hours. Prerequisite: first- or second-year medical student with consent of instructor. Introduction to concepts of geriatric health care. Students are matched with elderly from the community for a project on health and aging; field experiences in clinical geriatrics; attendance at SOM lectures concerning geriatrics or the elderly. (SU grading only.)

495. International Health Care (1) I. Kizer Lecture/discussion—1 hour. Prerequisite: medical student in good academic standing and consent of instructor. A forum for learning about current health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. May be repeated for credit. (Same course as course 185.) (SU grading only.)

498. Study in Community and International Health (1-5) I, II, III, IV. The Staff Prerequisite: medical students in good academic standing and consent of instructor. Study and experience for medical students in any number of areas in community and international health. (SU grading only.)

499. Research in Community and International Health (1-5) I, II, III, IV. The Staff Prerequisite: medical students in good academic standing and consent of instructor. Study and experience for medical students in any number of areas in community and international health. (SU grading only.)
control, international health, health policy, occupational and environmental health, health promotion and wellness, women’s health, and health demographics. (SU/UG grading only.)

Dermatology (DER)

Upper Division Courses

19A. Internship in Cutaneous Biology (1-4) I, II, III, IV. Illustrator
Internship—12 hours; final report. Prerequisite: consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. (P/NP grading only.)

199. Special Study in Cutaneous Biology (1-4) I, II, III, IV. The Staff (in charge)
Prerequisite: advanced undergraduate standing and consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research, or a combination. (P/NP grading only.)

Graduate Course

299. Research in Cutaneous Biology (1-12) I, II, III, IV. The Staff (in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (SU/UG grading only.)

Professional Courses

420. Integrated System (2) IV. Huntley and staff
Lecture/discussion—4 hours (for 6 weeks). Prerequisite: consent of the Editorial Committee on Student Evaluation and Promotion. Covers cell biology, pathology, and physical diagnosis of the skin and is designed to prepare medical students for clinical service. Recognition of normal variations, and common or important dermatological conditions is emphasized. Patient demonstrations of select conditions are included.

460. Dermatology Clinical Clerkship (6) I, II, III, IV. Huntley
Clinical activity—40 hours for four weeks (inpatient/outpatient service). Prerequisite: completion of three years of medical school; or consent of instructor. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UCD Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

480. Insights in Dermatology (1-3) I, II, III, IV. Huntley
Clinical activity—9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (SU/UG grading only.)

486. Special Topics in Clinical Dermatology (1-6) I, II, III, IV. The Staff (Huntley in charge)
Independent study—3-18 hours. Prerequisite: medical students with consent of instructor. Individualized study of special topics in clinical dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (SU/UG grading only.)

499. Research in Cutaneous Biology (1-12) I, II, III, IV. The Staff (in charge)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (SU grading only.)

Family Practice (FAP)

Lower Division Course

92C. Health Science Clinic Practicum (2) I, II, III, IV.
Field work—in clinic setting. Prerequisite: consent of instructor. Field experience to expose lower division students to primary care including: patient history and physical examinations, health promotion and disease prevention; diagnosis and treatment of episodic, acute and chronic illness; basic laboratory testing; and appropriate referral and follow-up. (P/NP grading only.)

Upper Division Courses

192A. Internship in Family Practice (1-12) I, II, III, IV. Davidson
Internship—336 hours. Prerequisite: upper division standing and consent of instructor. Work experience supervised in a primary care practice. (P/NP grading only.)

192C. Health Science Clinic Practicum (2) I, II, III, IV. Arends
Field work—in clinic setting. Prerequisite: upper division standing and consent of instructor. Field experience to introduce upper division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of episodic, acute and chronic illness; basic laboratory testing; and appropriate referral and follow-up. (P/NP grading only.)

195. Health Care to Underserved Populations (1) II. Nesbit
Lecture—1 hour. Prerequisite: sociological, political science, or applied behavioral science background recommended, or experience in medical school. Discusses socio-cultural perspectives of underserved population in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinical perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. (P/NP grading only.)

Graduate Courses

Clinical activity—8-28 hours. Prerequisite: enrollment in the Master's Track of the FNP Certificate Program. Provides opportunity to acquire the skills and knowledge necessary to diagnose and treat patients of all ages in an ambulatory care setting under the supervision of a preceptor. (P/NP grading only.)

Seminar—1 hour. Prerequisite: enrollment in course 240 and in the Master's Track of the FNP Certificate Program. Course accompanies course 240 and provides a small group forum for students to explore role development and clinical management issues based on nursing theories and research. (P/NP grading only.)

252A. Nurse Practitioner Role Development (1) I. Hess
Seminar—1 hour. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Prerequisite: opportunity to discover strategies for promoting role development and role satisfaction via discussions of pertinent issues, theory and research.

252B. Nurse Practitioner as Leader (1) I. The Staff
Seminar—1 hour. Prerequisite: course 252A and enrollment in the Master's Track of the FNP Certificate Program. Prerequisite: opportunity to discover strategies for promoting role development and role satisfaction via discussions of pertinent issues, theory and research.

264. Psychosocial Concepts and Issues in Primary Care (1) I. Hess, De Amicis
Seminar—1 hour. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Examination of relevant psychosocial concepts and issues as related to primary care practice. Review of relevant research and theories related to psychosocial aspects of care of individuals in family-oriented primary care.

265A. Health Maintenance/Prevention (2) I. De Amicis
Lecture—2 hours. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Focuses on the health and wellness of individuals throughout the lifespan. Critical analyses of nursing interventions in health promotion and maintenance based on nursing and other theoretical frameworks and research data are emphasized.

266B. Family Nursing Theory (2) III. The Staff
Lecture—2 hours. Prerequisite: course 266A and enrollment in the Master's Track of the FNP Certificate Program. Exploration of family theories as related to advanced primary care nursing practice.

266C. Family Nursing Interventions (2) I. Lavoque
Lecture—2 hours. Prerequisite: course 266A and enrollment in the Master's Track of the FNP Certificate Program. Course integrates family theoretical and therapeutic concepts to focus on nursing assessment and intervention strategies for family problems in health and illness.

266D. Community Assessment and Intervention (2) II. Trolinger
Lecture—2 hours. Prerequisite: course 266C and enrollment in the Master's Track of the FNP Certificate Program. The relationship between advanced primary care nursing practice and community is explored. Community assessment and intervention strategies appropriate for the family nurse practitioner are presented.

Professional Courses

The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant Program.

Clinical activity—9-40 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Course students spend 8-40 hours per week with an approved physician preceptor in patient care to develop clinical skills necessary to assess and manage patients with common medical problems seen in primary care and long-term care facilities.

341A-341B-341C-341D. Advanced Clinical Preceptorship for FNP/PA Students (3-12) I-II-III-IV. Moser
Clinical activity—6-40 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program, and course 340A-340B-340C. Student spends 8 to 40 hours per week in an approved clinical setting to build on clinical skills in primary care learned in course 340A-340B-340C. Assessment and management of patients with complex and multiple problems. (P/NP grading only.)

343A-343B-343C-343D-343E-343F. Inpatient Clinical Experience for FNP/PA Students (5-5-5-5-5-5) I, II, III, IV. The Staff
Clinical activity—160 hours per quarter. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program; successful completion of course 340A-340B-340C; and enrollment in the inpatient setting in Family Practice, Surgery, and medical/surgical subspecialty electives at UCDMC and/or affiliated institutions. Designed to expose the FNP/PA program student to inpatient management; acquisition of FNP/PA role in inpatient setting. (P/NP grading only.)

345. Clinical Geriatrics (5) III. Trolinger
Clinical activity—15 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Course students spend 15 hours per quarter on an inpatient clerkship in the inpatient setting in Family Practice, Surgery, and medical/surgical subspecialty electives at UCDMC and/or affiliated institutions. Designed to expose the FNP/PA program student to inpatient management; acquisition of FNP/PA role in inpatient setting. (P/NP grading only.)

350. Ethics and Trends in Health Care for FNP/PA Students (2) III. Trolinger
Lecture/discussion—2 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Course students spend 2 hours per quarter discussing and reviewing the process and policies for ethical decision-making in patient care. These issues, trends, and processes will be related to the role of the Family Nurse Practitioner.

352A-352B. Professional Development of the Physician Assistant (1-1) I. The Staff
Lecture/discussion—1 hour. Prerequisite: registered student in the Physician Assistant Program. Study of
the role of the physician assistant and its historical evolution, and of the organizational responsibilities and legal considerations.

354A-354B-354C. Fundamentals of Primary Health Care for FNPP/PA Students (5-5-4) I-II-III.
The course:
  Lecture/discussion—4-5 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary health care.

355A-355B-355C. Advanced Principles of Health Care for FNPP/PA Students (4--4--4) I-II-III. The course:
  Lecture/discussion—4 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program; course 354A-354B-354C. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings.

356. Pharmacology for FNPP/PA Students (4) II. The course:
  Lecture/discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Principles of pharmacokinetics and pharmacodynamics, the classifications of drugs and representative drugs within each class, and application of these principles to pediatric and geriatric patients, and to pregnant or lactating women.

360A-360B-360C. Ethics and Trends in Health Care for FNPP Students (1-1-1) I-II-III. Mentink and staff.
  Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. The student will learn about trends and ethics in health care, and review process and professional decision-making in patient care. These issues, trends and processes will be related to the role of the Family Nurse Practitioner.

362A-362B Professional Development of the Nurse Practitioner (1-1) I-II. The course:
  Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner Program. Study of the role of the nurse practitioner and its historical evolution, and of the organizational responsibilities and legal considerations.

364A-364B-364C-364D. Behavioral Science for FNPP/PA Students (2-2-2-1) I-II-III-IV. The course:
  Lecture/discussion—2-1-2-1 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patients’ concerns and counseling skills to assist them to gain insight and reach their own solutions, of behavior modification concepts and techniques.

  Lecture/discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Study of family dynamics, growth and development, health care in all age groups including concerns in pediatrics and geriatrics, health promotion and disease prevention, and cultural and community needs and concerns.

399. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. Davidson.
  Prerequisite: consent of instructor. Flexibility to develop and pursue research and clinical interests to enhance education in Family Practice. (P/NP grading only.)

Professional Courses

  Lecture/lab—4-4-4 hours total; clinical activity—8 hours total; conference or laboratory—4-4 hours total. Using a problem-based format and simulated patients each student will practice dealing with communication problems and learn basic physical examination skills through small group interactions. A continuous preceptorship and introduction to emergency medicine will also be offered. (Deferred grading only, pending completion of sequence.)

  Preceptorship—part-time (one 4-hour day per week; 10 weeks) or full-time (40-hour week per 1.5 units; 4 to 6 weeks). Prerequisite: medical students with consent of instructor. Student preceptor in family physician’s office as part of introduction to clinical medicine.

402. Introductory Medical Spanish (2) II, III. Metzel.
  Lecture/discussion—2 hours. Prerequisite: restricted to medical students in good standing. Teaches the vocabulary needed to conduct a basic history and physical examination in Spanish. (SU grading only; deferred grading only, pending completion of sequence.)

407. Davis Community Clinic (2) I, II, III, IV. Tanji.
  Clinical activity—5-6 hours. Prerequisite: second-year medical student in good academic standing. Students learn to diagnose and treat common medical problems as seen at a community clinic, under the direct supervision of a physician. (SU grading only.)

404A-404B-404C-404D-404E-404F-404G-404H. Primary Care at Clinica Tepati (3-3-3-3-3-3-3-3) I-II-III-IV-Arevalo.
  Clinical activity—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training session/lecture—four 1-hour sessions; first- and second-year (full-time) medical students with consent of instructor; pre-application processed. Exposure to episodic and acute disease; learn physical examination and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (SU grading only.)

  Clinical activity—full time (4 or 5 weeks). Prerequisite: site selection. Students spend time in ambulatory medicine experience in family practice setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care practitioners.

  Clinical activity—full time (4 or 5 weeks). Prerequisite: site selection. Students spend time in ambulatory medicine experience in family practice setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care practitioners.

  Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing. Students spend full time in outpatient clinic settings in family practice, orthopaedic surgery, physical education, internal medicine, and a community private practice. Students learn principles and practice of sports medicine from a primary care perspective.

  Clinical activity—full time (3 days per week). Prerequisite: completion of third year of medical school or medical student with consent of instructor. Preceptorship with primary care physicians in a variety of settings. Involvement in direct patient care and daily activities under supervision of physician-preceptor.

463. Selected Readings in Family Practice (1-3) I, II, III, IV. The course:
  Discussion—3-27 hours. Prerequisite: medical students in good academic standing. Increase understanding of family practice through assigned reading and thorough discussion with faculty member.

  Clinical activity. Prerequisite: completion of third year in medical school. Visit a family practitioner in a foreign country (arranged in advance by Department) and accompany and participate in clinical activities of preceptor and analyze and report characteristics of the practice.

  Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor. Third-year students may elect to enroll for second half of spring quarter. Involvement in comprehensive primary medical care of patients in a family setting and observe the team approach to health care.

490. Insights in Family Practice (1-3) I, II, III, IV. The Staff.
  Clinical activity—3 to 9 hours; required readings. Prerequisite: first and second-year medical students in good academic standing; consent of instructor. Exposure to family practice in outpatient clinical setting. Three to nine hours per week spent with a community physician-preceptor who is a member of the clinical faculty, (SU grading only.)

496. Directed Group Study in Family Practice (1) I, II, III, IV. The Staff.
  Discussion—3-37 hours. Prerequisite: medical students with consent of instructor. Directed study on selected topics related to primary care and family medicine; independent study; visits to and written analysis of selected innovative health care programs. (SU grading only.)

  Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (SU grading only.)

Human Physiology (HPH)

Upper Division Courses

192. Internship in Human Physiology (1-12) I, II, III, IV. The Staff (Curry in charge).
  Internship—3-39 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Curry in charge).
  To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics related to human physiology. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Curry in charge).
  Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.)

Graduate Courses

200. Human Physiology (6) I, Curry, Renkin, and staff.
  Lecture—48 hours total; discussion—12 hours total. Prerequisite: graduate standing and consent of instructor. General cellular and organ system physiology, including neural, cardiovascular, respiratory, gastrointestinal and urinary systems in the human. Lectures concurrent with course 400B; research/discussion and laboratory/demonstration sessions, and examinations separate.

210. Advanced General Physiology (3) I, Curry, Callahan.
  Lecture—3 hours. Prerequisite: Physiology 100B; Biochemistry 101B; Chemistry 107B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue level. Offered in alternate years in a family setting.

231. Renal Physiology (3) I. Rabinowitz.
  Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of bio-
logical transport, fluid and electrolyte homeostasis, comparative renal physiology, and pathophysiology of the kidney in man. Offered in alternate years.

250. Circulatory Transport and Fluid Exchange (3) I, II, III
Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112, 113 and 114, or courses 400, 403 and 418, or the equivalent; or consent of instructor. Lectures, assigned reading and discussion of principles of microcirculatory exchange; blood, interstitial fluid and lymph dynamics; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in alternate years.

280. Pulmonary Function Evaluation (4) I, II, III, Cross
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 402.)

285. Peripheral Circulation (3) III, Gray/O'Donnell
Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 111A, 113, or course 200 and consent of instructor. Lectures and critical analysis of papers on peripheral vascular function, including: structural function and pressure/flow relationships, innervation, receptor pharmacology, endothelial and smooth muscle interactions, signal transduction, ion transport, permeability, paracrine mediators and disease mechanisms. Offered in alternate years.

290. Group Study (1-5) I, II, III, IV. The Staff (Curry in charge)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12) I, II, III, IV. The Staff (Curry in charge)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400. Human Physiology (8) II. Curry, Rennik, and staff
Lecture—6 hours; laboratory—6 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. General, cellular and systemic physiology of cardiovascular, respiratory, gastrointestinal and urinary systems.

403. Neurobiology (5) III. Vijayan, Carlson, Watson
Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human brain in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as 410.)

418. Mammalian Endocrinology and Homeostasis (4.5) III. Tureno and staff
Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles that regulate homeostasis, especially in organisms with several sites of action, mechanisms, and mineralostatic endocrinology. (Same course as Biological Chemistry 418.)

480. Pulmonary Function Evaluation (4) I, II, III, Cross
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 280.)

497T. Tutoring in Human Physiology (1-5) I, II, III, IV. Curry
Tutoring—3 to 15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (S/U grading only.)

498. Directed Reading and Group Study (1-4) I, II, III, IV. Curry and staff
Discussion—2 to 8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology (S/U grading only.)

499. Research (1-6) I, II, III, IV. Curry and staff
Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.)

Internal Medicine (IMD)

Lower Division Courses

92. Internship (1-6) I, II, III, IV. Last
Internship—3 to 12 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship in internal medicine and related fields. (F/N grading only.)

98. Directed Group Study (1-2) I, II, III, IV. Last
Seminar—1 to 2 hours. Prerequisite: lower division standing and consent of instructor. Directed group study in medicine and related fields. (F/N grading only.)

99. Undergraduate Research in Medicine: Molecular and Cellular Biology (1-3) I, II, III, IV. Last
Prerequisite: consent of instructor. (F/N grading only.)

Upper Division Courses

192. Internship in Internal Medicine (1-12) I, II, III, IV. The Staff
Internship—3 to 36 hours; final report. Prerequisite: upper division standing. Supervised work experience in internal medicine and related fields. (F/N grading only.)

198. Internship (1-2) I, II, III, IV. Last
Seminar—1 to 2 hours. Prerequisite: consent of instructor. Directed group study in medicine and related fields. (F/N grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: upper division standing; consent of instructor. (F/N grading only.)

Professional Courses

401A-401B-401C-401D. Physical Diagnosis
Practicum B (8) I, II, III, IV. Bonkast
Fieldwork—2 hours; lecture—1 hour; laboratory/discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. Provides students with an overall framework for performance of a history and physical exam; with identification of abnormal physical findings. (Deferred grading only, pending completion of sequence.)

419. Introduction to Clinical Nutrition (3.5) II, II, II, II, II, II, IV. Haiden, Kincaid, Hopper, and staff
Lecture—5 hours; lecture/discussion—5 to 12 hours; laboratory/discussion—5 hours (for 4 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. A 28-hour course that integrates basic and clinical concepts of human nutrition. The course emphasizes nutrient homeostasis and regulation and current perspectives on the role of nutrition in disease. Format is partly lectures, partly discussion/case study. (Same course as Biological Chemistry 419.)

420A. Hematology (4) I. MacKenzie
Lecture—4 hours (for five weeks); laboratory—6 hours; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Topics include the structure and function of blood cells, thrombosis, immunity, and the identification of common laboratory tests and are staffed by clinical hematoogists.

420B. Gastrointestinal System (3.5) III. Zeldis
Lecture/discussion—36 hours (over a 4-week period). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic gastrointestinal physiologic principles and the pathophysiologic basis of gastrointestinal and hepatic disorders, with case discussions and symposia presented to exemplify basic principles.

420C. Respiratory System (4) II. Lillington
Lecture—38 hours; discussion—10 hours (48 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Respiratory physiology and small group case discussions of respiratory pathophysiology. Includes review of certain clinical aspects of respiratory anatomy, physiology and pathology: introduction to diagnostic procedures; and description of the major respiratory diseases.

420D. Cardiovascular System (3.5) II. Laslett and staff
Lecture—28 hours; discussion—8 hours (36 hours total). Prerequisite: medical student and consent of Committee on Student Evaluation and Promotion; or graduate student in Animal Physiology 113, Human Physiology 200, or the equivalent, and consent of instructor. Introduction to principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system, including ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. Lectures and small Evaluation and Promotion. Funded.

420E. Nephrology (2.5) III. Keynes
Lecture—4 hours; laboratory—2 hours (over a 6-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamental aspects of (a) disorders in water, electrolytes and acid-base balance; (b) major categories and mechanisms of parenchymal renal diseases; (c) urinary tract infections.

420F. Metabolic Regulatory System (3.5) III. Soeldner
Lecture—4 hours; discussion—2 hours (over 8-week period). Prerequisite: approval by Committee on Student Evaluation and Promotion. Basic understanding of pathophysiological processes in organs and tissues primarily involved in metabolic regulation and sufficient factual base so that clinical and laboratory findings, diagnosis, and elementary management of patients with endocrinological disorders can be rationalized.

421. Principles of Epidemiology, Occupational Medicine, and Geriatrics (2.5) I. Schenker
Lecture—7.5 hours for 4 weeks; discussion—1.5 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamentals of epidemiology and epidemiologic study design, including measures of morbidity, mortality, and risk. Occupational medicine component covers the evaluation of occupational illness, and specific examples of occupational diseases. Geriatrics component covers the comprehensive geriatric assessment, treatment issues, and the long-term care system. (Same course as Community and International Health 421.)

440. Ambulatory Medicine Clerkship (3-12) I, II, III, IV. Fitzgerald
Clinical activity—full time (2 to 8 weeks). Prerequisite: third-year medicine clerkship. Two to eight-week ambulatory medicine experience in an internal medicine setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians. Seminars are available.

461. Problems in Internal Medicine (6 or 9) I, II, III, IV. Laughlin
Clinical activity—full time (4 or 6 weeks). Prerequisite: satisfactory completion of third year of medical school; consent of instructor. Study of inpatient medical services and the performance of medical rounds. Designed to aid in selected pathology and internal medicine clerkship seminars. Weekly affiliated specialty conference.

462. Electrophysiology (1-21) I, II, III, IV. Fitzgerald and staff
Clinical activity—full time (4, 8 or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Student assumes role of acting intern and will be primary physician on
based on pathophysiological mechanisms. May be repeated for credit. Limited enrollment.

464. Preventive Cardiology (3-6) I, II, III, IV. Amsterdam Seminar—2 hours (for 2-4 weeks); clinical activity—full time (2-4 weeks). Prerequisite: completion of third year of medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease will be carried out in Lipid, Hypertension, Exercise, Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services.

480. Insights in Cardiology (1-3) I, II, III, IV. The Staff Clinical activity—3 hours. Prerequisite: medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia, introduction to the diagnosis/treatment of common cardiovascular problems. (SU grading only.)

498. Special Group Study: EKG Unit (1-12) I, II, III, IV. The Staff (Chairperson in charge) Special study—2 week sessions. Prerequisite: medical students with approval by monthly attending faculty. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. (SU grading only.) Limited enrollment.

499. Research (1-12) I, II, III, IV. The Staff Prerequisite: approval by Division of Cardiology. (SU grading only.)

Internal Medicine—Clinical Nutrition and Metabolism (NCM)

Upper Division Course

192. Internship in Clinical Nutrition (1-12) I, II, III, IV. Halsted, Pinney, and staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

290C. Clinical Nutrition Research Conference (1) I, II, III, IV. Halsted, Pinney, Davis Seminar—1 hour. Weekly seminar presented by a graduate student, taking the form of research completed or in progress, topic review or journal review from current journal. (SU grading only.)

Professional Courses

461. Nutrition Clinical Clerkship (3-18) I, II, III, IV. Halsted, Pinney, and staff Lecture—2 hours; clinical activity—full time (2 to 12 weeks). In-depth experience in assessment and monitoring of nutritional support of adult patients at UCSD Medical Center whose illnesses are complicated by malnutrition, and of patients attending the Nutrition Clinic with problems in under-nutrition due to various illnesses.

480. Insights in Clinical Nutrition (1-3) I, II, III, IV. Halsted, Pinney, and staff Clinical activity—3 hours. Prerequisite: student in good academic standing; consent of instructor. Student will attend weekly clinical nutrition consult rounds (four evenings) and/or Nutrition Clinic (one day). Introduction to diagnosis and treatment of common nutritional problems. (SU grading only.)

499. Research in Nutrition (9-18) I, II, III, IV. Halsted, Pinney, and staff Prerequisite: medical student in good standing; consent of instructor. Participation in on-going clinical or basic nutrition research. Student may devise own project depending upon time commitments.

Internal Medicine—Endocrinology and Metabolism (ENM)

Upper Division Course

192. Internship in Endocrinology (1-12) I, II, III, IV. Walter and staff Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff (Walter in charge) Prerequisite: consent of instructor. Endocrinology research. (SU grading only.)
Professional Courses

460. Endocrinology Clinical Clerkship (5-18) I, II, III, IV. Walter and staff
Clinical activity (inpatient-outpatient service)—full time (3 days per week). Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.

461. Ambulatory and Consult Clerkship (6-12) I, II, III, IV. Meyers and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations include general hematology-oncology clinics, hemophilia clinic, sickle cell clinic, and two medical/surgical joint clinics. In addition, students will work on inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division.

462. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. Meyers and staff
Clinical activity (inpatient-outpatient service)—full time (4-12 weeks). Prerequisite: Medical Sciences 431 and/or consent of instructor. Clinical experience in hematology-oncology at the Sacramento VA Clinic with emphasis on evaluating new patients with anemia, coagulation disorders, and administering chemotherapy. Weekly tutorial sessions with faculty and attendance at division conferences. May be repeated for credit. Limited enrollment.

463. Practicum in Care for the Terminally Ill (6) I, II, III, IV. Meyers
Clinical activity—40 hours/week for 4 weeks. Prerequisite: fourth-year medical student and an interview with the Program Director. Work with hospice team and gain experience in symptom relief, psychosocial care and bereavement counseling. A written report will be a major component used in grading. The course fulfills the Ambulatory Care requirement.

469. Research (1-12) I, II, III, IV. Meyers and staff
Prerequisite: consent of instructor. (SU grading only.)

Internal Medicine—Gastroenterology (GAS)

Upper Division Course

182. Internship in Gastroenterology (1-12) I, II, III, IV. Trudue and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only.)

Professional Courses

460. Clinical Clerkship (3-18) I, II, III, IV. Trudue and staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of third-year of medical school. Work-up, management, and follow-up new patients on upper gastrointestinal patients. Daily rounds with attending physician.

461. Clinical Clerkship (5-18) I, II, III, IV. Trudue and staff
Clinical activity—full time (3 days per week). Prerequisite: medical sciences 431 and/or consent of instructor. Student will observe work-up, diagnostic evaluation and management of common general internal medicine problems in ambulatory and inpatient settings. Supervised physical examination while attending General Medicine clinic and/or Consult Rounds; and make brief presentations to consensus service. (SU grading only.)

462. General Medicine Research (1-18) I, II, III, IV. Trudue and staff
The Staff
Discussion—3 hours; clinical research—8-40 hours. Prerequisite: consent of instructor. The student will be involved in a clinical research problem within the areas of interest and expertise of members of Division of General Internal Medicine. Alternatively, the research effort will be directed toward investigation of a clinical problem of general medical interest.

Internal Medicine—Hematology-Oncology (HON)

Upper Division Course

199. Research in Hematology-Oncology (1-5) I, II, III, IV. Trudue and staff
Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

Graduate Courses

298. Topics in Hematology (1-4) I, II, III, IV. Meyers and staff
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 covered. Specific topics to be dictated by the interest and background of the students.

299. Research (1-12) I, II, III, IV. Meyers and staff
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

Professional Courses

460. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. Trudue and staff
Clinical activity (inpatient-outpatient service)—full time (4-12 weeks). Prerequisite: Medical Sciences 431 and/or consent of instructor. Acting intern in patient Hematology-Oncology Service. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment.

Internal Medicine—Infectious Diseases (IDT)

Upper Division Courses

141. Infectious Diseases of Humans (1) Dandekar
Lecture—1 hour. Prerequisite: introductory knowledge of medical microbiology and virology. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.)

192. Research Internship in Internal Medicine (1-12) I, II, III, IV. Jordan and staff
Internship—3-36 hours; final report. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Infectious Diseases Research (1-5) I, II, III, IV. The Staff (Jordan in charge)
Prerequisite: chemistry through organic chemistry (in addition, and physical and biochemistry preferred), biolo-gy through basic bacteriology (in addition, microbiology and immunology preferred) and consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.)

Graduate Courses

280. Molecular Pathobiology for Diagnosis and Therapy of Human and Animal Diseases (3) Dandekar
Lecture—3 hours. Prerequisite: graduate standing. Presentation of molecular pathobiology of human and animal viruses. Emphasis on molecular diagnostics at cellular/tissue level, and therapy including vaccines and gene transfer using recombinant DNA technology.

298. Research in Infectious Diseases (1-12) I, II, III, IV. The Staff (Jordan in charge)
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)
Professional Courses

460. Infectious Diseases Clinical Clerkship (3-6) I, II, III, IV. Jordan
Clinical activity—full time (2-4 weeks). Prerequisite: successful completion of two years of study in an accredited medical school. In addition to seeing patients with infectious diseases regarding whom consultation has been requested, students will have laboratory experience in clinical microbiology. Students will also attend and participate in infectious diseases conferences and rounds. Limited enrollment with priority to third-year medical students.

499. Research Topics in Infectious Disease (2-12) I, II, III, IV. The Staff (Jordan in charge)
Prerequisite: successful completion of the first year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (SU/GU grading only.)

Internal Medicine—Nephrology (NEP)

Upper Division Course

192. Internship in Nephrology (1-12) I, II, III, IV.
Kaysen and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. (F/P/NP grading only.)

Professional Courses

460. Nephrology and Fluid Balance (6-12) I, II, III, IV.
Kaysen and staff
Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of instructor. Active participation in inpatient/outpatient clinical activities, attendance at selected conferences and lectures at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. Limited enrollment.

499. Research in Nephrology (3-18) I, II, III, IV.
Kaysen
Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. (GU grading only.)

Internal Medicine—Occupational and Environmental Health (OEH)

Upper Division Courses

190C. Research Conference in Occupational and Environmental Health (1) I. Gold, II. Beaumont; III. McCurdy
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in occupational and environmental health. Critical discussion of recent journal articles. May be repeated for credit. (P/N grading only.)

192. Internship in Occupational and Environmental Health (1-12) I, II, III, IV. Schenker and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in occupational and environmental health. May be repeated for credit up to 12 units. (P/N grading only.)

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

Professional Courses

466. Occupational and Environmental Medicine Elective (6-12) I, II, III, IV. Schenker
Clinical and laboratory experience—full time (4 to 8 weeks). Prerequisite: fourth-year student and consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Also participate in ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center. (SU/GU grading only.)

470. Clinical Selective in Occupational and Environmental Medicine I (1-3) I, II, III, IV. McCurdy
Clinical activity—full time. Prerequisite: fourth-year medical students in good academic standing, with consent of instructor. Outpatient clinical experience in Occupational and Environmental Medicine with Emphasis on Environmental Medicine at UCDMC and in local industries. Participants will gain experience in evaluating occupationally and environmentally related health problems, use of medical literature resources, and documentation and computing systems in occupational and environmental medicine.

480. Insights in Occupational and Environmental Medicine II (1-3) I, II, III, IV. Schenker
Clinical activity—3-9 hours. Small research projects. Prerequisites: first- or second-year medical student in good standing; consent of instructor. Students will observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Students develop and present small individual research projects. (SU grading only.)

499. Research (1-12) I, II, III, IV. Schenker and staff
Laboratory—40 hours; clinical activity—4 or 8 hours. Prerequisite: third-year medical student or consent of instructor. Student participates in activities of Division of Occupational and Environmental Medicine. Major activity is involvement in an epidemiologic research project of the Division. Also participates in ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center.

Internal Medicine—Pulmonary Medicine (PUL)

Upper Division Course

192. Internship in Pulmonary Medicine (1-12) I, II, III, IV. Albertson and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for credit up to 12 units. (P/N grading only.)

Graduate Course

210. Grant and Scientific Paper Writing (1) I, II, III, IV.
Last
Discussion—2 hours. Basics of scientific writing for grants and papers. Each student will prepare a grant for critique and tutorial feedback.

Professional Courses

460. Pulmonary Clinical Clerkship (3-13) I, II, III, IV. Albertson and staff
Clinical activity—full time (2 to 12 weeks). Prerequisite: Medical Sciences 431. At UCD Medical Center participating and rounding with Pulmonary fellows and consultation staff. Also participates in pulmonary function test interpretation, research assignments in our patient clinic and preparation and presentation of material at weekly conferences.

452. Pulmonary Clinical Clerkship II (3-12) I, II, III, IV. Bonekatz
Clinical activity—full time (2-8 weeks). Prerequisite: completion of second year of medical school and/or consent of instructor. Participation at the Sacramento VA clinic with members of the subspecialty service in clinical evaluation and management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic procedures. Limited enrollment.

480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV. Albertson
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Cross in charge)
Prerequisite: consent of instructor. (SU/GU grading only.)

Internal Medicine—Rheumatology-Allergy (RAL)

Lower Division Course

99. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin
Laboratory—1-4 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/N grading only.)

Upper Division Courses

192. Internship in Rheumatology-Allergy (1-12) I, II, III, IV. Gershwin and staff
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. (P/N grading only.)

199. Directed Research in Immunology (1-5) I, II, III, IV. Gershwin
Laboratory—1-5 hours. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/N grading only.)

Graduate Courses

261. Clinical Immunology and Immunopathology (4) I. Gershwin, II. Robb
Lecture—4 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 270, or consent of instructor. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infection, genetics, transplantation, allergy and autoimmunity. Offered in alternate years.

258. Topics in Rheumatology and Clinical Immunology (3-5) I, II, III, IV. Gershwin
Laboratory—1-5 hours. Prerequisite: consent of instructor. Library and/or laboratory work as required. (GU grading only.)

299. Research in Autoimmune Disease (1-12) I, II, III, IV. Gershwin
Laboratory—1-12 hours. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including canine, feline, porcine, canine, Aspergillus, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjogren's syndrome, polymyositis and drug hypersensitivity. (SU grading only.)

Professional Courses

460. Rheumatology Clinical Clerkship (1-18) I, II, III, IV. Leek and staff
Clinical activity (inpatient-outpatient services)—full time. Prerequisite: Medical Sciences 431 and consent of instructor. Participation with members of the subspecialty service in inpatient and outpatient management of patients with rheumatologic diseases.

461. Allergy Clinical Clerkship (3-18) I, II, III, IV. Gershwin and staff
Clinical activity (inpatient-outpatient services)—full time (2 to 12 weeks). Prerequisite: completion of second year of medical school and consent of instructor. Student will work with practicing allergists in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis.

480. Insights in Rheumatology (1-3) I, II, III, IV. Leek
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with...
supervised readings in rheumatology. (SU grading only)

498. Research (1-12) I, II, III, IV. The Staff (Gershwin in charge)
Prerequisite: medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures. Students can gain experience in clinical medicine and clinical investigation. (SU grading only.)

Medical Microbiology (MMI)

Upper Division Courses

107. Chemical and Cellular Immunology (4) II. Sci-bianski
Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B or consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochimical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (Same course as 407.)

115. Ecological Parasitology (3) II. Theis
Lecture—2 hours. Prerequisite: upper division standing in environmental factors, behavior, geography that effect the development and spread of parasitic agents.

116. Parasitology for Wildlife Biologists (2) III. Thesis
Lecture—2 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the role diseases and parasites play in wildlife dynamics. Lectures on techniques of collection, preservation and methods of surveying wildlife for parasites and the pathogenesis, ecology and zoonotic potential of parasites encountered by wildlife biologists.

*130. Medical Mycology (2) II. Pappagianis
Lecture—2 hours. Prerequisite: a course in pathogenic fungi. Various aspects of pathogen fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 430.)

192. Internship in Medical Microbiology (1-12) I, II, III, IV. The Staff (Beanam in charge)
Internship—3.36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.)

198. Group Study in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beanam in charge)
Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and laboratory investigation on selected topics. (P/NP grading only.)

199. Research in Medical Microbiology (1-5) I, II, III, IV. The Staff (Beanam in charge)
Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses

200D. Mechanisms for Microbial Interactions with Hosts (3) II. Beanam
Lecture/discussion—3 hours. Prerequisite: Microbiology 200A or consent of instructor. Study of mechanisms involved in microbial interactions within a host environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense.

209. Current Immunology (2) I, II, III. Van de Water Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (SU grading only.) (Same course as 409.)

*215. Medical Parasitology (5) I. Theis
Lecture—5 hours; laboratory—6 hours. Prerequisite: graduate students with consent of instructor. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (Same course as 415.)

220. Current Concepts in Bacterial Ultrastructure (2) III. Beanam
Discussion—2 hours; student presentations, term paper. Prerequisite: Microbiology 105 or consent of instructor. Critical evaluation of current literature dealing with all aspects of bacterial ultrastructure. Discussion of selected and assigned reading and formal student presentations of assigned topics.

298. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beanam in charge)
Prerequisite: consent of instructor, open to graduate students. Directed reading and discussion and laboratory investigation on selected topics. (Sections 1, 2, 4, 5: SU grading only.)

299. Research (1-12) I, II, III. The Staff (Beanam in charge)
Prerequisite: consent of instructor, open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (SU grading only.)

Professional Courses

407. Chemical and Cellular Immunology (4) II. Sci-bianski
Lecture—4 hours. Prerequisite: medical student with consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochimical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (SU grading only.) (Same course as 107.)

409. Current Immunology (2) I, II, III.
Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (Same course as 206.)

*415. Medical Parasitology (5) I. Theis
Lecture—3 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Medical parasitology; with consent of instructor for graduate degree credit. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in alternate years. (SU grading only.) (Same course as 215.)

420. Current Concepts in Bacterial Ultrastructure (2) III. Beanam
Discussion—2 hours; formal presentation or term paper. Prerequisite: medical students with consent of instructor. Evaluation of current status of bacterial ultrastructure with an emphasis on host-parasite interactions through discussions and assigned readings. (SU grading only.)

*430. Medical Mycology (2) II. Pappagianis
Lecture—2 hours. Prerequisite: a course in pathogenic mycology. Consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 130.)

400A. Medical Immunology (2.5) III. Sobicinski
Lecture—7 hours (four weeks only). Prerequisite: approval by Committee on Student Evaluation and Promotion. Presents the structure and function of the molecules, cells, and tissues involved in immunity, and their interactions in health and disease.

408B. Pathogenic Microbiology (6.5) I. Sobicinski
Lecture—7 hours for 9 weeks; laboratory—20 hours per quarter. Prerequisite: approval by Committee on Student Evaluation and Promotion. The biology of pathogenic microorganisms with emphasis on their role in human disease.

407T. Tutoring in Medical Microbiology (1-5) I, II, III, IV. Beanam
Tutoring—3 to 15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

489. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beanam in charge)
Prerequisite: medical students with consent of instructor. Directed reading and discussion and laboratory investigation on selected topics. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff (Beanam in charge)
Prerequisite: medical students with consent of instructor. (SU grading only.)

Medical Pharmacology and Toxicology (PHA)

Lower Division Courses

92. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Internship—3.36 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: lower division standing. (P/NP grading only.)

Upper Division Courses

100. Survey of Pharmacology (2) I. Hollingsworth
Lecture—2 hours. Prerequisite: introductory physiology or the equivalent, or consent of instructor. Survey of the principles underlying the action of drugs; consideration of the pharmacology of prescription and non-prescription drugs commonly used to treat medical conditions in children of school age; pharmacological aspects of drug dependency and related topics. Offered in alternate years.

192. Internship in Pharmacology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Internship—3.36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

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

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

Graduate Courses

200A. Advanced General Pharmacology (3) I. Hance and staff
Lecture—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent. May be taken concurrently. Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of the major classes of drugs.

200B. Advanced General Pharmacology (4) II. Stark and staff
Lecture—4 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human pharmacology designed for graduate and medical students. The actions, use and toxicity of major classes of drugs. Continuation of course 200A.

201. Pharmacology of the Nervous System: Transmitter Substances (2) I. Hance
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in alternate years.

202. Pharmacology of the Nervous System: Hypnotics, Sedatives and Anesthetics (2) I. The Staff (Chairperson in charge)
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in alternate years.
400A-400B, or the equivalent. Pharmacology of centrally-acting sedative, hypnotic, and anesthetic agents with emphasis on alterations in brain function. Offered in alternate years. (SU grading only.)

203. Pharmacology of the Nervous System: Stimulants and Anticonvulsants (2) II. Stark Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsant agents and their evaluation in animal models. Offered in alternate years.

204. Pharmacology of the Nervous System: Drug Alteration of Behavior (1-3) II. K.F. Killam Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacologic agents, hallucinogens, antidepressants. Offered in alternate years.


208L. Pharmacokinetics Laboratory (2) I. Henderson Lecture—6 hours. Prerequisite: course 206 (may be taken concurrently). Laboratory procedures for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject matter sequence of courses 200-200B. Offered in alternate years.

209. Laboratory—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

220. Statistical Approach to Pharmacological Research (2) I. Hance Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to application of statistics in pharmaceutical research and therapeutics, basic principles of analysis of normality, location, dispersion and correlation, significance, probability, uncertainty, design of experiments.

297T. Tutoring in Pharmacology (1-3) I, II, III. The Staff (Chairperson in charge) Tutorial—3 to 6 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or the equivalent; consent of instructor. Under supervision of the instructor, students assist in preparation and teaching of courses in Pharmacology. (SU grading only.)

298. Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

400A. Principles of Pharmacology (2.5) I. Hance and staff Lecture—6 hours for 4 weeks; discussion—2 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs.

400B. Principles of Pharmacology (6) II. Stark and staff Lecture—36 hours total; discussion—28 hours total. Prerequisite: consent of Committee on Student Evaluation and Promotion. The actions, uses and toxicities of the major classes of drugs. Continuation of 400A.

490. Seminar in Pharmacology for Medical Students (1-3) I, II, III, IV. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students.

497T. Tutoring in Pharmacology (1-5) I, II, III. The Staff (Chairperson in charge) Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (SU grading only.)

498. Special Study for Medical Students (1-5) I, II, III, IV. The Staff (Chairperson in charge) Lecture, directed reading, and/or discussion groups—3 to 5 hours. Prerequisite: consent of instructor. Special study in pharmacology for medical students. (SU grading only.)

499. Directed Research for Medical Students (1-12) I, II, III, IV. The Staff (Chairperson in charge) Laboratory—3 to 15 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (SU grading only.)

Neurology (NEU)

Upper Division Course

199. Individual Special Study and Research (1-4) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Individual's special study in neurophysiology and biomedical engineering is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentations are offered in Davis. (P/NP grading only.)

Graduate Courses

201. Human Behavioral Neurobiology (2) I. Robertson Lecture—discussion—2 hours. Prerequisite: Cell Biology and Human Anatomy 203; Psychology 108 or 136. Neurobiology of normal and abnormal behavior of humans, based on specific neuroanatomical, neurophysiological, and psychological parameters. Evaluation of these parameters will be, for example, by application of clinical neurological, neuropsychological, and neuromodulatory methods.

202. Visualmotor Neurobiology (2) II. Raffel Seminar—2 hours. Prerequisite: course 201, Cell Biology and Human Anatomy 203. An overview of neural mechanisms of visually guided behavior in humans will be examined in the integration of visual attention and eye movements. Performance of normal humans and neurologically patients in reflexive orienting, visual search, reading and reaching will be considered. Offered in alternate years.

203. Seminar in Selected Topics (1) I, II, III, IV. Gorrin, Tait Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (SU grading only.)

208. Group Study (1-3) I, II, III, IV. The Staff (Gabor in charge) Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (SU grading only.)

209. Individual Special Study and Research (1-12) I, II, III, IV. The Staff (Richman in charge) Laboratory—3 to 36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered to both Davis and Sacramento Medical Center. (SU grading only.)

Professional Courses

420. Clinical Neurosciences (4) II. Remler and staff Lecture—6 hours; laboratory/discussion—5 hours (for five weeks total). Prerequisite: medical student with consent by Committee on Student Evaluation and Promotion. Lectures and case discussions of pathophysiology underlying neurological disorders including disorders of development, muscle, nerve, cerebral circulation, motoneurons, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing and diagnosis of neurological disorders encountered in practice. Offered in the Martinez VA Medical Center. (SU grading only.)


452. Advanced Clinical Neurology (6) II, III, IV. Remler and staff Clinical activity—full time (4 weeks at Highland General Hospital, Oakland). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of the nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

453. Advanced Clinical Neurology (6) II, III, IV. Remler and staff Clinical activity—full time (4 weeks at Highland General Hospital, Oakland). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of the nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized.

454. Electroencephalography and Evoked Potentials (3-18) I, II, III, IV. Gabor, Soley Clinical activity—full time (2-12 weeks) technique and interpretation. Prerequisite: one year of basic and advanced Electroencephalography and Evoked Potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

455. Child Neurology (6) II, III, IV. Gospe Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and consent of instructor for child in need of extension to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings, differential diagnosis, management and therapy. Course satisfies the fourth-year neurosciences requirement.

456. Cortical Neurology (3-18) I, II, III, IV. Remler, Knight Clinical neurological research—full time (12 weeks at Highland General Hospital, Oakland). Prerequisite: course 451 or the equivalent; consent of instructor. Student will participate in a small project in clinical neurologic research on higher cortical functions. The focus is on specific analysis of behavior in disease states. Study may be arranged for from two weeks to twelve weeks, with units corresponding to length of course.

457. Special Topics in Neurology (3-18) I, II, III, IV. The Staff Clinical activity—full time (2 to 12 weeks). Prerequisite: course 450, 451 or consent of instructor. Students study areas of special interest in tutorial manner under supervision of member of faculty with expertise and interest in electrodiagnostic methods. Students may elect tutorial clinical experience with member of staff.

458. Introduction to Cognitive and Communication Disorders (3) I. Dronkers Lecture—3 hours; observations, individual projects. Prerequisite: consent of instructor. Introduction to cognitive and communication disorders. Includes a survey of disorders subsequent to brain damage; management by neurology, neuropsychology, and speech pathology; functional evaluation and treatment. Offered in the Martinez VA Medical Center. (SU grading only.)

459. Independent Study in Neurogenic Communication Disorders (1-12) I, II, III, IV. Dronkers Coursework, observations, data collection—3-9 hours. Prerequisite: consent of instructor. Independent study of neurogenic communication disorders—aphasia, dementia, apraxia of speech, dysarthria. Designed for individual interest and includes discus-
464. Elective Clerkship (4-18) I, II, III, IV. The Staff
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A (or the equivalent); consent of instructor. Participate in specified clinics each week; General Gynecology, Obstetrics and Gynecology, with emphasis on gynecologic problems. Prerequisite: Medical Sciences 432A; consent of instructor. Student will perform as intern and meet the following clinical experiences: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Consent of instructor. (SU grading only.)

470. Ambulatory Gynecology and Obstetrics (6-9) I, II, III, IV. The Staff
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student will perform as intern and the following clinical experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Consent of instructor. (SU grading only.)

471. Ambulatory Gynecology and Obstetrics (6-9) I, II, III, IV. The Staff
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student will perform as intern and the following clinical experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Consent of instructor. (SU grading only.)

472. Ambulatory Gynecology and Obstetrics (6-9) I, II, III, IV. The Staff
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student will perform as intern and the following clinical experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Consent of instructor. (SU grading only.)

Ophthalmology (OPT)

Upper Division Courses

192. Research Internship (1-12) I, II, III, IV. The Staff
Internship—36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P.N.P grading only.)

193. Special Study for Advanced Undergraduates (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (P.N.P grading only.)

Graduate Course

299. Basic Research in Visual Science (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

461. Basic Clinical Ophthalmology (4.5) I, II, III, IV. J. Brandt
Clinical activity—to be arranged (3 weeks). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Provides an introduction to the fundamentals of routine ophthalmological procedures.

465. Clinical Ophthalmology (6 or 9) I, II, III, IV. Mannis, Keilner, J. Brandt
Clinical activity—to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). Prerequisite: medical students who have completed either medical sciences 430 or course 440 (in third or fourth year); consent of instructor. Provides an introduction to the fundamentals of routine ophthalmological procedures.
Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. Rotations at UMD Medical Center may be arranged in 5-week units of one service alone, or in combination, as arranged with instructors.

480. Insights in Ophthalmology (1-3) I, II, III, IV. J. Brandt and staff. Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical exposure in ophthalmology including slide-tape program, patient exposure, and department conferences (i.e., grand rounds and subspecialty conferences). (SU grading only.)

489. Group Study (1-3) I, II, III, IV. The Staff (J. Brandt in charge). Prerequisite: medical students with consent of instructor. Directed reading and discussion. (SU grading only.)

499. Research in Ophthalmology (1-12) I, II, III, IV. The Staff. To be arranged—3 to 36 hours. Prerequisite: medical student in good academic standing; consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external diseases. (SU grading only.)

Orthopaedic Surgery (OSU)

Lower Division Course

*390. Special Studies for Undergraduates (1-4) I, II, III, IV. The Staff (Martin in charge). Prerequisite: lower division standing and consent of instructor. (PNP grading only.)

Upper Division Course

*199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Martin in charge). Prerequisite: upper division standing; consent of instructor. (PNP grading only.)

Professional Courses

*421. The Musculoskeletal System (2.5) The Staff. Lecture—5 hours for the week; laboratory/discussion—1 hour. Prerequisite: approval by Committee on Student Evaluation and Promotion. An introduction to the basic and clinical science of orthopaedic surgery and rheumatology.

428. Ambulatory Orthopaedics (3-6) I, II, III, IV. Matthews. Clinical activity—full time (2-4 weeks). Prerequisite: third- or fourth-year medical student in good academic standing and consent of instructor. Instruction in the surgical and medical management of outpatients. Emphasis placed on orthopaedic physical examination and interpretation of x-rays.

462. Community Preceptorship (6) I, II, III, IV. Matthews. Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing and consent of instructor. Designed to acquaint students with private practice of orthopedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room and inpatient environment. Preceptorships available in Sacramento and surrounding areas. Students must provide their own transportation.

464. Acting Internship (6) I, II, III, IV. Matthews. Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing and consent of instructor. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern.

480. Insights in Orthopaedic Surgery (1-3) I, II, III, IV. Szabo. Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (SU grading only.)

481. History of Medicine for Medical Students (1.5) I. Benson Lecture/discussion—2.5 hours (for six weeks). Prerequisite: third- or fourth-year students in the School of Medicine or second-year students with permission of Instructor of Record. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the development of health care and to provide an expanded philosophical perspective on the ever-changing field of modern medicine. (SU grading only.)

499. Orthopaedics Research (1-12) I, II, III, IV. The Staff (Rochberg in charge). Clinical activity—3 to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. (SU grading only.)

Otolaryngology (OTO)

Lower Division Courses

*192. Internship in Otolaryngology (1-12) I, II, III, IV. Chairperson in charge. Internship—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (PNP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff. Prerequisite: consent of instructor. (PNP grading only.)

199. Special Study in Otolaryngology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff. Chairperson in charge. Prerequisite: advanced undergraduate with consent of instructor. (PNP grading only.)

Graduate Courses

290C. Research Conference in Otolaryngology (1) I, II. The Staff. Lecture/discussion—1 hour. Prerequisite: graduate students; medical students, advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (SU grading only.)

291. Principles of Speech, Hearing and Equilibrium (3) I, II. The Staff. Lecture/discussion—3 hours. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation.

298. Group Study (1-5) I, II, III, IV. The Staff (SU grading only.)

299. Individual Study in Otolaryngology for Advanced Graduate Students (1-12) I, II, III, IV. The Staff. Chairperson in charge. Prerequisite: advanced graduate student with consent of instructor. (SU grading only.)

Professional Courses

401. Clinical Examinations in Otolaryngology (1) I, II, III, IV. Chole Lecture—1 hour; laboratory—1 hour; practical—1 hour total. Prerequisite: second-year medical student with consent of instructor; open to graduate students. Approved for graduate degree credit. Obtaining the history, applied anatomy of the regions, and the art of the examination. Head mirror required.

402. Otolaryngology in Family Practice (1) I, II, III, IV. Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students. Approved for graduate degree credit. Planned as a refresher course for those already possessing a background of knowledge in the specialty.

403. Basic Principles of Reconstructive Surgery (1) I. Donald. Lecture—four 2-hour sessions; laboratory—one 2-hour session (5 weeks). Prerequisite: third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plasties and revision of scars. Laboratory session utilizing animal tissues.

404. Otolaryngology Required Clerkship (3) I, II, III, IV. Brodie. Clinical activity—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides fundamental knowledge of otolaryngologic diagnosis and principles, develops facility with basic Ear, Nose and Throat instruments, provides an understanding of treatment for ear, nose and throat problems manageable by a primary care physician, provides knowledge of what patients should be referred for otolaryngologic care.

406. Clinical Otolaryngology Elective (3-18) I, II, III, IV. Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department.

480. Insights in Otolaryngology (1-3) I, II, III, IV. Brodie. Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Individualized activities (depending upon time available). (SU grading only.)

*490. Journal Seminar (1) I, II, III, IV. Donald. Lecture/discussion—10 hours total (course given three times per quarter). Prerequisite: fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and articles.

498. Individual or Group Study (1-5) I, II, III. The Staff. Lecture/discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: consent of instructor. Introduction to basic research in Otolaryngology. Lectures, discussion and laboratory study of sensory and motor systems. (SU grading only.)

499. Research (1-12) I, II, III, IV. The Staff. Prerequisite: medical student with consent of instructor; open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. (SU grading only.)

Pathology (PMD)

Upper Division Courses

192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff. Internship—36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (PNP grading only.)

199. Special Study in Pathology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff in charge. Prerequisite: advanced undergraduates and consent of instructor. (PNP grading only.)

Graduate Courses

202. Current Topics in Tumor Biology (2) I, II, III, IV. Cardiff. Seminar—2 hours. Prerequisite: consent of instructor. Discussion of current topics in tumor biology by invited speakers and members of the class. A forum
for presentation of proposed and completed experi-
ences by persons interested in tumor biology. (SU grading only.)

207. Introduction to Nervous System Pathology
(1-4) I, II, III, IV. Ellis
Seminar—1-4 hours. Prerequisite: consent of instruc-
tor; open to advanced undergraduate, graduate, vet-
erinary medical, and medical students. Study of
nervous system tissue responses to injury, infection,
neoplasia, and malformation in both the human and
experimental animal. Seminars include correlation of
clinical, gross and microscopic findings. Discussions
provide instruction in microscopic techniques.

210. Introduction to Human Pathology
(4.5) III. C. McMail
Lecture/discussion—8 hours; laboratory—4 hours (5
weeks). Prerequisite: graduate or upper division
students with background in basic and microscopic
anatomy, physiology and biochemistry. Lectures, lab-
oratories, and computer-assisted learning. Introduces
basic human disease processes. Stresses mastery of
pathophysiology and vocabulary. Examining gross
and microscopic tissue sections is taught. (Course
given one second year of spring and taken with first-
year medical students enrolled in course 410A.)
Course not intended for veterinary medical or medical
students.

256. Advanced Group Study
(1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor.

259. Research
(1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

404. Forensic Pathology
(2) I, II, III, IV. Ellis
Laboratory—3-10 hours. Prerequisite: medical student or
consent of instructor. Systematic study of current
forensic cases with emphasis on differential diagnosis,
preservation of evidence, and medico-legal proced-
ures. Introduction to histopathologic diagnosis, bal-
istics, and toxicology. (SU grading only.)

406. Brain-Cutting Conference
(1-4) I, II, III, IV. Ellis
Prerequisite: third- and fourth-year medical students;
consent of instructor. Current specimens are sec-
tioned, discussed, and clinical correlations proposed.

407. Diseases of the Nervous System
(1-3) I, II, III, IV. Ellis
Lecture—1 hour; discussion—1 hour; seminar—1
hour. Prerequisite: third- and fourth-year medical stu-
dents or special training in pathology or neurological
sciences; consent of instructor. Study of human ner-
vous system, including musculoskeletal system, neoplasia
and maldevelopment; application of experi-
mental models to human disease; and clinical corre-
lations. Seminars emphasize microscopic findings in
cases of specific interest and involve individualized
experience in neuropathologic techniques. Given
jointly with the Departments of Neurology and Neu-
surgery.

408. Anatomic Pathology Case Studies
(1-12) I, II, III, IV. Ruebner
Discussion—1-4 hours; laboratory—2-3 hours. Prerequisite:
medical student or consent of instructor. Participation
and/or performance, under supervision, of complete
autopsy and surgical pathology, with correlative dis-
cussion of clinical material, gross, microscopic and
laboratory findings.

410A-410B. General/Systemic Pathology
(4.5, 7.5) III-IV. Cardiff
Lecture—30 hours total; laboratory/discussion—
25, 90 hours total; autoradiology—0, 5 hours total.
Prerequisite: approval by Committee on Student Eval-
uation and Promotion. In-depth study of disease and
its effects related to the general mechanisms of dise-
ses and each of the specific human organ systems.
Concepts of pathophysiology applicable and required
for clinical diagnosis. (Deferred grading only, pending
completion of course).

446. Clerkship in Advanced Surgical Pathology
(6-12) I, II, III, IV. Liv
Clinical activity—full time (4-8 weeks). Prerequisite:
third- or fourth-year medical student or consent of
instructor. Designed to provide students with an inten-
sive experience in surgical pathology. Participation in
grossing of specimens, preparation of frozen sections and
slide reading sessions. Students attend surgical
pathology conferences and seminar sessions in
which clinical correlation and diagnostic information is
discussed.

465. Applied Clinical Laboratory Medicine
(6-9) II, III. Kost
Clinical activity—full time (4-6 weeks). Prerequisite:
consent of instructor. Emphasis upon laboratory tech-
niques, preanalytical, and interpretation of laboratory
results. Students will be expected to participate fully
and in all laboratory operations including bench tech-
niques, laboratory management and quality control.

497T. Tutoring in Pathology
(1-5) I, II, III, IV. The Staff
Tutoring—3-15 hours. Prerequisite: advanced stand-
ard or consent of instructor. Assist instructor by tutor-
ning medical students in preparation for one of the
departmental courses that is a component of the
required curriculum of the School of Medicine. (SU
grading only.)

498. Advanced Group Study
(1-5) I, II, III, IV. The Staff
Prerequisite: medical student and consent of Instruc-
tor. Group study in varied advanced topics in gen-
eral, special, experimental, or comparative pathology.
(SU grading only.)

499. Research
(1-18) I, II, III, IV. The Staff
Prerequisite: medical student with consent of instruc-
tor. Research in experimental, molecular, compara-
tive, and applied pathology. Limited enrollment. (SU
grading only.)

Pediatrics (PED)

Upper Division Course

199. Senior Seminar in Pediatric Research
(1-5) I, II, III, IV. The Staff
Prerequisite: Chairperson in charge
Clinical activity—full time (1-6 weeks). Prerequisite:
undergraduate student with consent of instructor based upon adequate preparation as deter-
mined by instructor. (PAP grading only.)

Graduate Course

299. Pediatric Research
(1-12) I, II, III, IV. The Staff
Prerequisite: graduate students who are candidates for
a degree in some area of biology or behavioral sci-
ences; consent of instructor. (SU grading only.)

Professional Courses

401. Preceptorship in Pediatrics
(2) I, II, III, IV. Chairperson in charge
Preceptorship agreement. Prerequisite: second-year
medical student or first-year medical student with
consent of instructor. Opportunity to observe and par-
ticipate in primary medical care in a practicing pedi-
atrian's office. Participation in history-taking, physical
examination, and patient management.

420. Reproductive System/Perinatology
(2) I. Oi Lecture—3.5 hours (for 6 weeks). Introduction to
clinical obstetrics and gynecology and perinatology as an
extension of material introduced in the sciences basic
to medicine in anatomy, reproductive physiology, and
molecular biology/genetics. (Same course as Obstet-
rics and Gynecology.

460A. Acting Internship: General Inpatient Pedi-
atric Clerkship
(6-18) I, II, III, IV. Hausted
Clinical activity—full time (4-6 weeks). Prerequisite:
completion of Medical Sciences course 432B with grade of
B or better; letter of recommendation from Pedi-
atrics faculty member. The Ward Acting Intern func-
tions in a manner similar to that of a pediatric intern.

The Acting Intern takes admissions in the regular
stream and is expected to take night call. The Act-
ing Intern can expect to manage between six and ten
patients at a time. Limited enrollment.

460B. Acting Internship: Outpatient Pediatrics
(6-18) I, II, III, IV. McCann
Clinical activity—full time (4 to 12 weeks). Prerequisites:
completion of Medical Sciences course 432B with grade of
B or better; letter of recommendation from Pedia-
trics faculty member. Supervised experience in pedi-
atrian care on outpatient service at UC Davis Medical
Center. Student functions as "Acting Intern" with
appropriate supervision by residents and attending
faculty. Limited enrollment.

461. Elective in Pediatric Hematology/Oncology
(3-18) I, II, III, IV. Duncan
Clinical activity—full time (2 to 12 weeks). Prerequisite:
satisfactory completion of Medical Sciences course
432B, consent of instructor. Inpatient and outpatient
experience in diagnosis and management of hema-
tologic disorders in children. Laboratory experience
and participation in clinical investigation may be ar-
ranged. Limited enrollment.

462. Elective in Pediatric Endocrinology
(3-18) I, II, III, IV. Conners and Staff
Clinical activity—full time (2 to 12 weeks). Prerequisite:
satisfactory completion of second-year study or the equiva-
 lent consent of instructor. Inpatient and outpatient
experience in diagnosis and management of endo-
crine disorders in children. Laboratory experience
and participation in clinical investigation may be ar-
ranged. Limited enrollment.

464. Acting Internship in Neonatology
(6-18) I, II, III, IV. Forrest
Clinical activity—full time (4 to 12 weeks). Prerequisite:
completion of Medical Sciences course 432B with grade of
B or better; letter of recommendation from Pedi-
atrics faculty member. Diagnostic and therapeutic
aspect of the medical and surgical high-risk neonate.
Student expected to take night call. Limited enroll-
ment.

465. Pediatric Specialty Clinic Elective
(3-18) I, II, III, IV. McCann and Staff
Clinical activity—full time (2 to 12 weeks). Prerequisite:
satisfactory completion of Medical Sciences course
432B, consent of instructor. Supervised experience in a
variety of pediatric subspecialty clinics. Limited
enrollment.

466. Elective in Pediatric Cardiology
(3-18) I, II, III, IV. Parish
Clinical activity—full time (2 to 12 weeks). Prerequisite:
satisfactory completion of Medical Sciences course
432B. Inpatient and outpatient experience in diagno-
sis and management of cardiovascular disorders in chil-
dren. Laboratory experience and participation in clinical
investigation may be arranged. Limited enrollment.

467. Elective in Pulmonary Medicine
(3-18) I, II, III, IV. McDonald, Joad
Clinical activity—full time (2 to 12 weeks); daily rounds,
two weekly half-day clinics. Prerequisite: pediatric clerkship.
Inpatient and outpatient manage-
ment of pediatric patients with pulmonary diseases.
These will include but will not be limited to cystic fibro-
sis, asthma, and other forms of chronic pulmonary dis-
wases as well as congenital abnormalities.

468. Elective in Pediatric Nephrology
(3-18) I, II, III, IV. Makker
Clinical activity—full time (2 to 12 weeks). Prerequisite:
satisfactory completion of Medical Sciences course
432B, consent of instructor. Inpatient and outpatient
experience in diagnosis and management of renal disor-
ers in children. Laboratory experience and par-
ticipation in clinical investigation may be arranged.
Limited enrollment.

469. Elective in Pediatric Infectious Disease
(3-18) I, II, III, IV. Halsted
Clinical activity—full time (2 to 12 weeks). Prerequisite:
satisfactory completion of Medical Sciences course
432B, consent of instructor. Inpatient and outpatient
experience in diagnosis and treatment of infectious disease of
infants and children. Laboratory and clinical investiga-
tion may be arranged. Limited enrollment.

*Course not offered this academic year.
enones 430, 431: completion of third year in Medical School. Emphasis on evaluation of patients with neurologic or orthopedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at the campus facility must be approved by Chairperson.

498. Advanced Group Study (1-5) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (SU grading only.)

499. Research for Medical Students (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (SU grading only.)

Plastic Surgery (PSU)

Professional Courses

Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical student; Medical Sciences 430: consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and followup. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation.

461. Dentistry for Future Physicians and Surgeons (6-8) I, II, III, IV. Thaller
Discussion-seminar—3 hours; laboratory—2 hours; clinical activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry; recognize potential dental problems; provide emergency care; have knowledge of where to refer these problems. (SU grading only.)

Psychiatry (PSY)

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (PINP grading only.)

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Professional Courses

440. Rehabilitation Medicine Clerkship (3) I, II, III, IV. McDonald
Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student; consent by Committee on Student Evaluation and Promotion. Rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and musculoskeletal disorders. Physiological effects, indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

461. Rehabilitation Medicine Clinical Elective (5-4-18) I, II, III, IV. Kilmer
Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 430; 431. Prerequisites for non-UC medical students. Emphasis on evaluation of patients with neurological or orthopedic problems requiring rehabilitative techniques for their management. Limited enrollment.

462. Rehabilitation Medicine Clinical Elective (5-18) I, II, III, IV. Kilmer
Clinical activity—full time. Prerequisite: Medical Sciences 430, 431: completion of third year in Medical School. Emphasis on evaluation of patients with neurologic or orthopedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Fourth-year student may function as acting intern on Physical Medicine and Rehabilitation services.

470. Elective in Pediatric Neurology (3-18) I, II, III, IV. Goodfriend
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment.

471. Elective in Pediatric Gastroenterology (3-18) I, II, III, IV. Cannon
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

476. Acting Internship in Pediatric Intensive Care (6-18) I, II, III, IV. Sheik
Clinical activity—full time (4 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B with grade of A or better on clinical report; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night for their rotation. Limited enrollment.

499. Research Topics in Pediatrics (1-18) I, II, III, IV. The Staff (Stryne in charge)
Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. (SU grading only.)

Physical Medicine and Rehabilitation (PMR)

Upper Division Courses

198. Directed Group Study (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (PINP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: advanced standing and consent of instructor. (PINP grading only.)

Graduate Course

299. Research (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

Psychiatry Clerkship (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Experience in clinical management and treatment of adult outpatients, psychiatric and substance abuse disorders; crisis management/intervention, evaluation/development of diagnoses and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/ residents.

414. Consultation-Liaison Clerkship (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents.

416. Child Psychiatry Clerkship (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic formulation, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis.

417. Jail Psychiatric Clerkship (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of course coordinator. Students gain experience, under close supervision, assessing acute and chronic mentally ill inmates in both inpatient and clinic settings.

418. Off-Campus Clinical Experience (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 8 weeks). Prerequisites: fourth-year medical students; consent of instructor. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advanced approval of instructor and individual in charge of off-campus setting.

420. Acting Internship in Psychiatry (6-12) I, II, III, IV. Maddock and staff
Clinical activity—full time (4 to 6 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management.
442. Readings in Psychiatry (1-3) I, II, III, IV. Maddock and staff
Readings-discussion—3 to 9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (SU grading only.)

440. Insights in Psychiatry (1-3) I, II, III, IV. Maddock
Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of professor. Individual basis, student provided with an opportunity for gaining insight into various clinical activities in the practice of psychiatry. (SU grading only.)

448. Directed Group Study (1-6) I, II, III, IV. Servis and staff
Prerequisite: consent of instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (SU grading only for graduate or medical students.)

449. Research (1-12) I, II, III, IV. Maddock and staff
Prerequisite: consent of instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. (SU grading only for graduate or medical students.)

Radiation Oncology (RON)

Graduate Course
299. Independent Study and Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: enrollment with Biophysics Group for Ph.D. candidacy, and consent of group adviser and sponsor. (SU grading only.)

Professional Courses
463. Radiation Oncology Clerkship (3-6) I, II, III, IV. Castro, Ryu, Wilder
Clinical activity—full time (2-6 weeks). Prerequisite: completion of Medical Sciences 430, 431; third-year clinical clerkship, consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics.

484. Group Study in Therapeutic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU grading only for medical students.)

499. Research in Therapeutic Radiology (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU grading only for medical students.)

Radiology—Diagnostic (RDI)

Professional Courses
413. Radiological Diagnosis II (Physics of Diagnostic Radiology) (5) I. Seibert, Boone
Lecture—4th hours total; laboratory—6 hours total. Prerequisite: consent of instructor. Physics of diagnostic radiology: production and interaction of ionizing radiation; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereotaxic neuroradiography; computed and geometrical tomography; magnetic resonance imaging. Principles of radiation protection in imaging will be covered. Offered at UC Davis Medical Center. Offered in alternate years. (SU grading only.)

414. Medical Radiation Biology (3) III. Bushberg Lecture—2 hours total. Prerequisite: consent of instructor. Medical radiation biology: molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. Offered at UC Davis Medical Center. Offered in even numbered years only. (SU grading only.)

415. Radiopharmacy (3) III. Vera
Lecture—3 hours. Prerequisite: consent of instructor. Fundamentals of radiopharmaceutical science including radiochemistry; radiopharmaceutical production; theory; applications; mechanisms of localization, radioactive decay; interacting with ionizing radiation; dosimetry; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scientific and computerized planar and tomographic imaging. Offered at UC Davis Medical Center. Offered in alternate years. (SU grading only.)

461. Clinical Clerkship in Diagnostic Radiology (1-18) I, II, III, IV. Greenspan
Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of Medical School; consent of instructor. Student works with radiologists at UCD Medical Center in film reading sessions and radiologic procedures. Includes fluoroscopy, vascular radiology and special investigations. Includes daily individual teaching sessions with faculty radiologists, radiology learning laboratory, and all radiology conferences and seminars. Limited enrollment.

462. Group Study in Diagnostic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. (SU grading only.)

463. Research in Diagnostic Radiology (1-12) I, II, III, IV. The Staff
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU grading only for medical students.)

Radiology—Nuclear Medicine (RNU)

Upper Division Courses
101. Biomedical Radiochemistry (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include: choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radiomonomers. Same course as 401.

198. Directed Group Study (1-5) I, II, III, IV. The Staff (St. DeNardo in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Stadnik in charge)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Course
299. Research: Special Study for Graduate Students
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses
410. Biomedical Radiochemistry (3) III. The Staff
Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate and medical students; consent of instructor. Approved for graduate degree credit. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radiomonomers. (Same course as 411.)

411. Radiological Physics I (Physics of Nuclear Medicine) (5) I. Bushberg, Vera
Lecture—43 hours total; laboratory—12 hours total. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine: basic nuclear physics, radioactive decay; interaction of ionizing radiation; dosimetry; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scientific and computerized planar and tomographic imaging. Offered at UC Davis Medical Center. Offered in alternate years. (SU grading only.)

461. Clinical Clerkship in Nuclear Medicine (9 or 18) I, II, III, IV. Stadnik
Clinical activity—full time (3 days per unit). Prerequisite: satisfactory completion of second year of Medical School or the equivalent; consent of instructor. Clerkship correlates radiotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research projects available. Limited enrollment with preference to students enrolling for 18 units.

462. Group Study in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU grading only for medical students.)

463. Research in Nuclear Medicine (1-12) I, II, III, IV. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Approved for graduate degree credit. (SU grading only for medical students.)

Surgery (SUR)

Upper Division Courses
192. Internship in General Surgery (1-12) I, II, III, IV. The Staff
Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by supervisor. Supervised work experience in general surgery and related fields. (P/NP grading only.)

199. Special Study in General Surgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

Graduate Course
299. Research (1-12) I, II, III, IV. Wolfe in charge
Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Professional Courses
416. Introduction to Clinical Surgery (1-6) I, II, III, IV. Werth
Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the more common surgical diseases. Course will afford opportunity to review surgical patients and discuss them with members of staff.

460. Clinical Surgical Elective (1-6) I, II, III, IV. Bentfield
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Rotation through Surgery Specialty clinics: vascular, GI, GU, thoracic, plastic, radiotherapy. Student works up one new, two return patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussion.

461. Surgery Burn Unit Clerkship (6 or 9) I, II, III, IV. The Staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student functions as an extern in the eight-bed Burn Unit; learns principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

462. Surgery Trauma Service Clerkship (6 or 9) I, II, III, IV. Balsclude and staff
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student works as an extern on one of the two general surgery trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off.
Urology (URO)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, IV, deWhite
Pre requisite: consent of instructor. (P/NP grading only)

Professional Courses

400. Office Urology (1) I, II, III, IV, deWhite
Clinical activity—4 hours in afternoons (6 weeks). Pre requisite: fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized.

460. Urology Clinical Clerkship (5-18) I, II, III, IV, deWhite
Clinical activity—full time. Pre requisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. Limited enrollment.

461. Externship in Urology (5-18) I, II, III, IV, deWhite
Clinical activity—full time. Pre requisite: fourth-year medical students with consent of instructor. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participation in surgical procedures; outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit.

499. Research in Urology (1-12) I, II, III, IV, deWhite
Research—3-36 hours. Prerequisite: medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamic bladder, unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics.

Medicine and Epidemiology

(School of Veterinary Medicine)

Anthony A. Stannard, D.V.M., Ph.D., Chairperson of the Department

Department Office, 2102 Medical Science 1A
(617-752-1363)

Faculty

Alexander A. Arcand, D.V.M., M.S., Professor (Medicine and Epidemiology, Pathology, Microbiology and Immunology)

Dale L. Brooks, D.V.M., Ph.D., Director, Animal Resources Laboratory (SU grading only)

Gary P. Carlson, D.V.M., Ph.D., Professor

Tim Carpenter, Ph.D., Professor

Jim Case, D.V.M., Ph.D., Associate Professor

Larry D. Cowgill, D.V.M., Ph.D., Associate Professor

Nancy E. East, M.S., D.V.M., D.P.M., Associate Professor

Pamela H. Eisele, D.V.M., Assistant Clinical Professor

Laurence R. Eno, Pharm.D., Lecturer

Edward A. Feikert, D.V.M., Professor

Ian Gardner, D.V.M., M.P.V.M., Associate Professor

Steps G. George, D.V.M., Ph.D., Associate Professor

Ronald P. Hagans, M.D., Associate Professor

David E. Hinton, Ph.D., Professor

David A. Hird, D.V.M., M.P.V.M., Professor

Peter J. Ichke, V.M.D., Professor

Mark D. Kittleson, D.V.M., M.S., Ph.D., Professor

Gerald V. Ling, D.V.M., Ph.D., Professor

John P. Marz, D.V.M., M.S., Assistant Professor

Clinical Diagnostic Medicine Vet/Ext

John Madigan, M.S., D.V.M., Associate Professor

Richard W. Nelson, D.V.M., Associate Professor

William D. Norman, D.V.M., M.S., Ph.D., Lecturer

N. C. Pedersen, D.V.M., Ph.D., Professor

Lyndsay G. Phillips, D.V.M., Associate Professor

Jeffrey A. Roberts, D.V.M., Assistant Clinical Professor

Bradford F. Smith, D.V.M., Professor

Ellen Spangler, D.V.M., Ph.D., Adjunct Professor

Sharon J. Spier, D.V.M., Ph.D., Assistant Professor

Anthony A. Stannard, D.V.M., Ph.D., Professor (Medicine, Pathology)

Carolyn Stull, Ph.D., Extension Specialist

William B. Thomas, D.V.M., Associate Professor

Mark Thurmord, D.V.M., M.P.V.M., Ph.D., Professor

Michael Torte, D.V.M., Ph.D., Research Virologist

James F. Wilson, D.V.M., J.D., Lecturer

W. David Wilson, B.V.M.S., M.R.C.V.S., Associate Professor

Emeritii Faculty

Murray E. Fowler, D.V.M., Professor Emeritus

Donald G. Low, D.V.M., Ph.D., Professor Emeritus

William R. Pritchard, D.V.M., Ph.D., J.D., Professor Emeritus

Linda G. Ragal, D.V.M., Ph.D., Professor Emeritus

Edward A. Rhode, D.V.M., Professor Emeritus

Donald R. Strombeck, D.V.M., Ph.D., Professor Emeritus

Courses in Medicine and Epidemiology (VME)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III, The Staff (Chairperson in charge)

(SU grading only)

Graduate Courses

217. Evaluation of Diagnostic Tests (2) II, III, The Staff
Lecture/discussion—1-2 hours; laboratory—1 hour. Prerequisite: consent of instructor. Topics include sensitivity, specificity, predictive values, Bayes' Theorem, ROC curves, measuring agreement between tests, series and parallel testing strategies. Emphasis on rational interpretation and presentation of test results for individuals and aggregates. Offered in alternate years.

255. Animal Health Economics (3) III, The Staff
Lecture—3 hours. Prerequisite: consent of instructor. Basic concepts of microeconomics (production and cost functions, firm decision making, and the market price) as they relate to animal health are considered. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

290. Seminar in Veterinary Medicine (1) I, II, III, The Staff (Chairperson in charge)

291. Seminars in Epidemiology (1) II, III, The Staff
Seminar—1 hour. Participants will present and discuss ongoing or published research projects in epidemiology. Emphasis will be on study design and data analysis. (SU grading only)

298. Group Study (1-5) I, II, III, The Staff
Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (SU grading only)

299. Research (1-12) I, II, III, The Staff (Chairperson in charge)

(SU grading only)

Professional Courses

401. Small Animal Clinics (1/2 per week) I, II, III, The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospitals, or consent of instructor. Resident responsible for diagnoses, medical and surgical treatment of animals in the wards and outpatient clinic, including history taking, physical examinations, laboratory tests, *Course not offered this academic year.*
special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit (SU grading only).

402. Large Animal Medicine (1 1/2 per week) I, II, III. The Staff (Smith in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the VM Teaching Hospital and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (SU grading only.

403. Small Animal Medicine (1 1/2 per week) I, II, III. The Staff (Ling in charge)
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of animals in the wards and outpatient clinic including physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (SU grading only.

410. Management of Captive Wild Animals (2) II. Brooks
Lecture—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to management and husbandry dynamics as a prerequisite for preventive health programs in zoos, aquaria, vivaria, and other environments for exotic pets and wild animals.

411. Laboratory Animal Medicine (2) II. Brooks
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnostic, therapeutic, and preventive methods for a variety of animal species, including rabbits, guinea pigs, hamsters, and other related laboratory animals will be presented to serve the needs of clinical and research veterinarians. Lecture demonstrations with subject species will be provided.

412. Laboratory Animal Medicine (2) III. Brooks
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats, and other laboratory species. Emphasis will be placed on animal colony health management technique, and concepts of preventive medicine needed by veterinarians in charge of research facilities.

413. Medical Primatology (2) III. Roberts
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Major diseases, medical management and husbandry of captive nonhuman primates. (SU grading only.

414. Applications of Epidemiologic Methods to Herd Health (3) III. Gardner
Lecture/discussion—2 hours; fieldwork—2 hours. Prerequisite: Epidemiology and Preventive Medicine 405 and 400 or consent of instructor. Epidemiologic applications to health and production problems in animal populations, topics include test interpretation, detection, treatment analysis, time trend analysis, disease reporting, investigation of chronic diseases, microcomputer programs for herd health will be discussed.

415. Management and Diseases of Captive Wildlife (2) II. Phillips
Lecture—30 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Lectures, demonstrations, and discussions used to illustrate selected medical problems of captive wild animals.

416. Aquatic Animal Medicine (2) III. Hedrick
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish and of some aquatic arthropods and mammals. Preventive management of diseases is emphasized. (SU grading only.

417. Cage Bird Medicine (2) II. Phillips
Lecture—20 hours. Prerequisite: third-year veterinary medical student or consent of instructor. Approved for graduate degree credit. Medical and surgical problems of caged birds: handling and restraint, feeding, nutritional and infectious diseases, anesthesia and surgery, plus problems of organ systems.

421. Veterinary Dermatology (3/4 per week) I, II, III.
Lecture—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents are responsible for patient care in the hospital and out patient clinic including history taking, physical examination, and diagnostic procedures under the direction of the staff dermatologist. (SU grading only.

423. Pulmonary Diseases (3/4 per week) I, II, III.
Lecture—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 are demonstrated and discussed. Interns assist in assessment of respiratory dysfunction of patients and correlation of the dysfunction and clinical signs. (SU grading only.

Lecture—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the VM Teaching Hospital and outpatient clinic including physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (SU grading only.

428. Food Animal Surgery (1 1/2) Smith
Lecture—16 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Selected topics in surgical diseases of food animals covered in detail. (SU grading only.

428L. Food Animal Surgery Laboratory (0.7) Smith
Lecture—7 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Surgical diseases of food animals performed by groups of students. Limited enrollment. (SU grading only.

430A-430B-430C. Raptor Medicine (1-1-1)
Lecture—1 hour. Prerequisite: upper division standing (Avian Science 115 recommended) or second-year standing in the School of Veterinary Medicine. Three- part course sequence performed sequentially with laboratory course, providing basic core of prey medical and raptor rehabilitation and techniques and skills. Fall—normal raptor; winter—abnormal raptor; spring—rehabilitation.

431A-431B-431C. Raptor Medicine Laboratory (1-1-1)
Lecture—1 hour. Prerequisite: upper division standing (Avian Science 115 recommended) or second-year standing in the School of Veterinary Medicine. Three-part course sequence performed sequentially with laboratory course 430A-430B-430C. Providing skills of raptor management and techniques. Fall—normal raptor; winter—abnormal raptor; spring—rehabilitation.

432A-431B-431C. Raptor Clinic (1-1-1)
Lecture—1 hour. Prerequisite: student in the School of Veterinary Medicine or consent of instructor. Provides a hands-on experience with handling, restraint and treatment for raptors and injured birds of prey with the goal of rehabilitation and release back into their native habitat. (SU grading only.

446. Small Animal Reproduction (1) Feldman
Lecture—7 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. Serves as student treatment crew for the Reproductive Center, providing hands-on experience with handling, restraint and treatment for ill and injured birds of prey with the goal of rehabilitation and release back into their native habitat. (SU grading only.

448A. Small Animal Medicine—Level 1 (6.0) Nelson
Lecture—6 hours (for 12 weeks). Prerequisite: course 447. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of the dog and cat. Course is a core option for the professional veterinary curriculum and preparatory for small animal medical diagnosis and therapeutics.

448B. Small Animal Medicine—Level II (5.4) Inkle
Lecture—5 hours; laboratory—13 hours; discussion—4 hours. Prerequisite: course 447 and 448A. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of the dog and cat. Course is a core option for the professional veterinary curriculum and preparatory for small animal medical diagnosis and therapeutics.

449A. Large Animal Medicine—Level I (6.1) Wilson
Lecture—6 hours (for 12 weeks); laboratory—3 hours (for 2 weeks). Prerequisite: course 447. Instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, prevention and control of contagious and noninfectious diseases of Food Animals and horses. A problem-based approach to differential diagnosis will be emphasized.

449B. Level II Advanced Equine Medicine (4.9) Mandigo
Lecture—49 hours total. Prerequisite: course 449A. Instruction in the medical aspects of equine practice including large and small farm management practices, sports medicine principles and applications, perinatology and neonatology and the etiology, epidemiology and control of various infectious and noninfectious conditions of the equine.

449L. Level II Advanced Equine Medicine Laboratory (0.6) Mandigo
Lecture—6 hours. Prerequisite: course 449A, course 449B concurrently. Clinical presentation and instruction in treatment of the medical aspects of equine practice. (SU grading only.

450. Clinical Immunology (2) III. Pedersen
Lecture—16 hours; laboratory—6 sessions. Prerequisite: basic immunology, second-year standing in the School of Veterinary Medicine. Comprehensive discussion of the basic mechanisms of immunologic responses in small companion animals and a description of common immunologic diseases, including clinical presentation, diagnosis and treatment.

457. Veterinary Business Management (2) II. Wilson
Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Course presents a groundwork of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, medical recordkeeping, money management, business and personal insurance, client relations and tax law. (SU grading only.

464. Therapeutic and Restraint Procedures of Food Animals (0.5) II. George
Lecture—2 hours. Prerequisite: course 447. Introduction to animal restraint and therapeutic techniques. (SU grading only.

481A-481B-481C. Clinic Rounds (1-1-1)
Lecture—1 hour. Prerequisite: course 447. Discussion of selected small and large animal cases from the Veterinary Teaching Hospital. (SU grading only.

486A. Equine Clinical Neurology (1) II. Madigan
Lecture—1 hour. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of methods of equine neurological diseases. (SU grading only.)
486B. Equine Clinical Neonatology (1) III. Madigan  
Discussion—1 hour. Prerequisite: first year standing in the School of Veterinary Medicine or consent of instructor. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. (SU grading only.)

487. Comparative Bio-Medical: Form and Function (2) III. Rogers  
Lecture—1 hour; discussion—2 hours. Prerequisite: first or second year standing in the School of Veterinary Medicine or consent of instructor. Introduction and basic principles for Zoological Medicine courses, involving comparative biology recommended concepts for nontraditional animal species or alternative pets, zoo, rehabilitation centers, aquaculture, laboratory animals, and non-human primates.

488. Nondomestic Pet Animal Medicine (2) III. Brooks  
Discussion—2 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Discussion of practical medical and surgical management of common spontaneous and infectious diseases of nondomestic pets.

489. Personal, Financial, and Professional Development (1) II. Wilson  
Lecture—1 hour. Prerequisite: third-year standing in the School of Veterinary Medicine. Focus on skills essential for successful careers in veterinary medicine. Includes personal finance and investment strategies; understanding personal taxation; bookkeeping and accounting; insurance needs; and stress management. (SU grading only.)

491. Small Animal Grand Rounds (1/2) I, II, III. The Staff (Ling in charge)  
Discussion—1 hour. Prerequisite: professional standing, intern, or resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (SU grading only.)

492. Large Animal Grand Rounds (1/2) I, II, III. The Staff (Carlson in charge)  
Discussion—1 hour. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital. Seminar given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (SU grading only.)

493. Seminar in Veterinary Medicine (1) I, II, III. The Staff (Cowgill and Smith in charge)  
Seminar—3 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital. Seminar given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (SU grading only.)

Medieval Studies  
(College of Letters and Science)  
Program Director  
Program Office, 922 Sprout Hall (916-752-1219)

Committee in Charge  
Samuel G. Armstead, Ph.D. (Spanish) 
Dennis Dutschke, Ph.D. (German)  
Ingborg Henderson, Ph.D. (German)  
Phyllis Jeates, Ph.D. (History)  
Winder McConnell, Ph.D. (German)  
Marijana Ossborn, Ph.D. (English)  
Lary Peterman, Ph.D. (Political Science)  
Kevin Roddy, Ph.D. (Medieval Studies)  
George Van Den Abbeele, Ph.D. (French)

The Major Program  
The major in medieval studies is designed to introduce students to the main features of European civilization during the period from the fall of Rome to the

beginnings of the Renaissance. The program involves studies in history, art, philosophy, literature, drama, music, modern languages, religion, rhetoric, and political theory.

The Program. The major is designed to give students a broad view of the period and to allow for the flexibility necessary to accommodate their individual interests. The department offers a series of medieval studies courses providing an excellent introduction to the major, and preparation for advanced work within the individual disciplines. Upon the upper division, each student completes course work in specific areas of history (the fall of Rome to the Renaissance), literature (Old and Middle English, Chaucer, romantic literature), including French, German, Italian, Russian, and non-European languages and political thought. In addition, each student may complete a senior thesis on some selected aspect of medieval culture.

Career Alternatives. The major in medieval studies is a liberal arts major and provides preparation for the rigors of the professional schools as well as careers in law, library science, museology, journalism, and teaching.

A.B. Major Requirements:  

Preparatory Subject Matter  

Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval field.

Depth Subject Matter  
History, at least 12 units from History 102B, 121A, 121B, 121C, 201B ....... 12  
Literature: at least 16 units, including two courses from each of the following:.... 16  
(a) English 111, 113A, 113B, 150A, 188, 189.  
(b) French 115, 141.  
(c) German 120, 122.  
(d) Italian 131, 115A, 115B, 135B, 140.  
Philosophy and religion, at least 8 units from Philosophy 132, 145, 146, 190; Religious Studies 102, 110 ........ 8  
Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B, Dramatic Art 156, German 105, Music 121 (note prerequisite); 199; Rhetoric and Communication 110, 111 ........ 8  
Senior thesis, Medieval Studies 190 .......... 4  
Total Units for the Major ....... 52

Minor Advisers. W. McConnell (German), P. Justice (History), K. Roddy (Medieval Studies).

Minor Program Requirements:  

Medieval Studies ........ 24  
The minor in Medieval Studies is designed to be a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, drama, history, literature, music, modern languages, philosophy, political theory, religious studies and rhetoric. Courses must be upper division and chosen from at least two of these subject areas, and they must be within the three periods of Early Medieval Culture, culture of the High Middle Ages, and Medieval Transformations. Students may also select a minor with a thematic emphasis.

*Course not offered this academic year.

There is no foreign language requirement for the minor; although knowledge of Latin or a romance language is recommended.

The minor must be designed in consultation with a Department Advisor.

Minor Advisers. D.J. Dutschke (Italian), W. McConnell (German), M. Osborn (English), K. Roddy (Medieval Studies).

Courses in Medieval Studies (MST)  

Lower Division Courses  
20A. Early Medieval Culture (4) I. Roddy  
Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the Codes of Justinian, the Confessions of Saint Augustine, The Consolation of Philosophy of Boethius, Beowulf, the Nibelungenlied, and the Song of Roland. General Education credit: Civilization and Culture.

20B. The Culture of the High Middle Ages (4) II. Roddy  
Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, The Canterbury Tales of Chaucer, and the Divine Comedy of Dante. General Education credit: Civilization and Culture.

20C. Medieval Transformations (4) III. Roddy  
Lecture—2 hours; discussion—1 hour; paper or formal presentation. Course deals with the great medi eval transformations that took place before the Renaissance. Topics will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and other pertinent fields. General Education credit: Civilization and Culture.

20D. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)  
(PNP grading only.)

20E. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)  
(PNP grading only.)

Upper Division Courses  
210A-F. The Medieval World (4) I, II, III. The Staff (Chairperson in charge)  
Lecture—2 hours; discussion—1 hour; term paper. Course deals with selected themes from the Middle Ages: the Fall of Rome to the beginning of the Renaissance. Subjects will vary from year to year and cover such topics as  

(A) The Monastic Orders;  
(B) Origins of Universities;  
(C) The Seven Liberal Arts, and their Significance in the Middle Ages;  
(D) Family and Society;  
(E) Chivalry; and  
(F) Church and State.  
General Education credit for course 120A or 120D or 120E: Civilization and Culture.

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) I, II, III. The Staff (Chairperson in charge)  
Seminar—2 hours. Prerequisite: courses 20A and 20B: upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 8 units. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)  
(PNP grading only.)
Military Science
(Formerly Department of Military Science)

Reserve Officers’ Training Corps (ROTC), Army

Michael P. Tucker, LCol., Chairperson of the Department
Department Office, 125 Hickey Gymnasium
(916-752-0541)

Faculty
Lieutenant Colonel Michael P. Tucker, Professor
Major Steve Sargent
Captain Gary Thomson
Captain Alan Villandre

Program of Study

The Military Science Department offers hands-on training in management and leadership. The program stresses the following leadership dimensions: oral and written communications, presentation skills, initiative, sensitivity, influence, planning and organizing, delegating, administrative control, problem analysis, judgement, decisiveness, physical stamina, mission accomplishment, and followup. Also stressed are current events, national and international politics, military affairs, ethics training, and human relations with emphasis on eliminating racial and gender discrimination. Management and leadership are taught using the U.S. Army as a model. Military skills (such as drill and ceremonies, map reading, and squad tactics) are taught to the extent necessary to create an environment where students can encounter leadership positions and apply theories taught in the classroom. Students learn by doing. The program assists students in all academic fields to prepare for positions of leadership in military or civilian careers.

The department offers two program tracks: (1) a purely academic track and (2) a precommissioning track for those desiring a commission in the U.S. Army. The academic track entails no obligation to the military and is open to all students. Students pursuing the academic track do not wear a uniform or otherwise participate in extra-curricular activities designed as part of the precommissioning process. Activities for all students include the Ranger Challenge (a club designed for adventure activities such as rappelling, water rafting, paratrooper training, and innercity sports teams.

Students who desire a commission in the U.S. Army participate in both the academic portion of the program and in leadership laboratories and extra-curricular activities designed to enhance their leadership and technical skills. They wear uniforms to leadership laboratories and selected classes and become ROTC cadets. Students may be cadets in the lower division courses without incurring a military obligation. Students participating in the upper division precommissioning program incur a military obligation. See below for details. Extra-curricular activities for cadets include participating in interscholastic sports teams (Ranger Challenge), the university color guard, a military honor society, a rifle/pistol team, and opportunities to participate in field training exercises.

Department Programs

Students are enrolled in military science under one of two programs.

Four-Year Program

Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. There is no military obligation associated with attendance in lower division courses. Students may continue to the advanced course (upper division) by application from second-year lower division students who meet the academic, physical, and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service experience, upon approval by the Department Chairperson.

Upper division students receive $1000 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 experience at summer camp (advanced camp) between their third and fourth years of the course. Emphasis is on individual participation, leadership development and the capability to function effectively in positions of significant responsibility.

Two-Year Program

This program is designed for students who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp (basic camp) which is voluntary and no military supplies are paid for camp attendance and transportation costs. Applications are accepted during the winter and spring terms of the year preceding enrollment in the two-year program described above for the upper division course apply to the two-year program.

Scholarship Program

The U.S. Army offers four- and two-year active duty and two-year Reserve Forces Duty scholarships to students planning to attend or attending UC Davis. The U.S. Army ROTC scholarship pays $7000 or 80% annually of your college tuition, plus laboratory fees, or campus education fees, attendance at Advanced Camp, and a flat rate amount from which you may purchase textbooks, classroom supplies and equipment. Scholarship winners also receive a tax-free subsistence allowance of $100 a month for 10 months for each year that the scholarship is in effect.

The Army Reserve Officers’ Training Corps four-year active duty merit scholarships are awarded to qualified high school seniors in a national competition each year. There are two cycles available for submission of the four-year scholarship application. High school seniors can compete for an Early Cycle scholarship by submitting their application complete and postmarked by 15 July before their senior year. Applicants will receive notification of their final status by 1 November. Those applicants not selected in the Early Cycle can compete in the Regular Cycle competition. Applicants will receive notification of their final status by 1 March of their senior year in high school. Interested applicants should consult their senior counselor for more information or contact UC Davis, Department of Military Science.

The three-year active duty and two-year Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from a Junior College to UC Davis. Students must have three or two years remaining before graduating with a baccalaureate. Students interested in competing for these scholarships can submit their application beginning in November of each school year. The deadline for submission of an application is 15 January for the two-year scholarship and 15 February for the three-year scholarship. Additionally, students may win a two-year scholarship at the six-week summer camp (basic camp) in the Two-Year Program mentioned above. Students apply for these Army scholarships through the Military Science Department.

DASE Cooperative Program

The Department of the Army Scientific and Engineering (DASE) Cooperative Program is designed to support the U.S. Army’s efforts to recruit, employ, and retain a science and engineer skilled workforce as both military officers and civilian employees.

Qualified students may receive financial assistance of up to $5,000 per year to pay for tuition, fees, books, lodging, and meals. Additionally, a $1,000 per year stipend is paid to ROTC Advanced Course students during their last two years in school.

*Course not offered this academic year.
DASE Cooperative students must work in a Department of Defense (DA) Civilian position for a minimum of 26 weeks, typically divided into two twelve-week periods. At least one work period must be completed during the school year. While working, the DASE student will receive the regular pay and benefits for their grade.

Students must be enrolled full time in an undergraduate program leading to a degree in either science or engineering and enroll, or be enrolled, in the U.S. Army ROTC Program. A first semester freshman applicant needs a high school minimum cumulative grade point average (GPA) of 2.75 on a 4.0 scale and a recommendation from the principal or guidance counselor. Other university applicants must have a 2.0 GPA and a minimum C average in all major fields of study. The DA civilian employers may set their standards above these averages.

Students choose to serve in either the Active Army or a Reserve Component Command. The DA Civilian positions include for a specified period of employment.

For complete information you may contact the Military Science Department or the Planning and Placement Office, Guards and Career Center, the Engineering and Physical Science Program Manager.

Leadership Laboratory

During the course of the school year, several weekends and two hours per week are spent in the conduct of practical exercises. Classes emphasize adventure activities including offense, defense and patrolling techniques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and land navigation. All cadets are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at the Army ROTC Advanced Camp.

Military Qualifications Standards (MOS) System

During the program of study, students will become familiar with the MOS System. It is designed to articulate skills and knowledge that are required of ROTC commissioned officers to begin military service. The components of the MOS System include: military skills, professional knowledge, and a professional military education.

The military skills component consists of 77 military skills which are categorized into 12 subject areas. They are basic soldiering skills fundamental to the military professional and serve as the basis for future branch-directed specialty training.

The 24 professional knowledge subjects familiarize cadets with the history, customs and traditions, leadership and ethics, administration, organization, and training of the U.S. Army.

The professional military education component consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of five designated fields of study. Cadets must take a course in written communication, military history, human behavior, math reasoning, and computer literacy.

Academic Credit

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unreserved elective units available in the curriculum being followed.

School of Veterinary Medicine. The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

Courses in Military Science (MSC)

Lower Division Courses

11. Roles and Organization of the U.S. Army (1) I. Lecture—4 hour. Prerequisite: lower division status. Constitutional and legal basis of the Army, organization and strategic roles in times of war and peace, and "total Army" concept: impact of civil-military relations and Soviet military power on role of Army studied in context of latest political environment. Students are rotated through squad and team level supervisory positions, given responsibility concomitant with positions. (P(HP grading only.)

12. Introduction to Military Leadership (2) I. Lecture—2 hours. Prerequisite: lower division standing and consent of instructor. Introduction to leadership theories used in military organizations. Course surveys the duties and responsibilities of junior Army officers, the general environment in which they work, and leadership roles performed. Introduces military map reading skills.

13. Introduction to Basic Military Operations (1) I, III. Lecture—1 hour. Prerequisite: lower division status. Basic military tactical theories and their application at the individual and squad level. Course introduces military tactical operations, and covers military first aid. Principles of war as it relates to success in course 11 are applied to offensive and defensive tactics.

14A. Introduction to Military Leadership Skills (1) II. Laboratory—2 hours. Prerequisite: lower division status and consent of instructor; completion of all previous laboratories. Personal and organizational leadership skills introduced in leadership laboratory. Extended supervised leadership experiences conducted in a military environment. Basic military skills necessary to function in a leadership role are also covered. (P(HP grading only.)

14B. Introduction to Military Leadership Skills (1) II. Laboratory—2 hours. Prerequisite: lower division status and consent of instructor; completion of all previous laboratories. Development of leadership and military skills introduced in course 14A is continued with emphasis on the individual's role in the squad, the basic organizational element of the Army. As students gain capabilities, supervisory controls are reduced. (P(HP grading only.)

14C. Introduction to Military Leadership Skills (1) II. Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Students demonstrate skill levels required for promotion to non-commissioned officer level. Use of chain of command from company through individual levels emphasized. Interrelationship of squad and platoon organizations is explored. (P(HP grading only.)

21. Military History (2) III. Lecture—2 hours. Prerequisite: lower division status; course 11 or consent of instructor. Survey of military history from 1900 to present, focusing on World War I, World War II, the Korean War, and the Vietnam War. 22A. Intermediate Military Leadership and Operations: I (2) II. Lecture—2 hours. Prerequisite: lower division status; course 12 or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers.

22B. Intermediate Military Leadership and Operations: II (2) II. Lecture—2 hours. Prerequisite: lower division status; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits identified in course 22 are studied in more depth enabling each student to improve on targeted weaknesses. Instruc-

11*Course not offered this academic year.
141. U.S. Army Management Systems (2) III.
Lectures—2 hours. Prerequisite: upper division status and course 131: Army decision making, personnel and equipment management. Includes command and staff functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

142. Military Law (2) II.
Lecture—2 hours. Prerequisite: upper division status and course 141. Analysis of the American Military Justice System, the Uniform Code of Military Justice, and the Hague and Geneva Conventions, and customary law of war. Includes detailed study of selected procedures of military justice system.

143. Military Ethics and Professionalism (2).
Lecture—2 hours. Prerequisite: upper division status and course 142. Profession of arms, its characteristics, uniqueness, roles, and responsibilities. Discussion topics include the professional soldier’s responsibilities to the Army and the Nation, and the need for ethical conduct. Case studies are used to develop ethical decision making skills.

144A. Military Training Leadership Skills (12) I.
Laboratory—2 hours. Prerequisite: upper division status, courses 134A, 134B, 134C, and 141. Develops and exercises the leadership and teach leader skills necessary to plan, coordinate and conduct a training program through practical application under supervision. Emphasis on analysis of objectives, instructor training, media utilization and evaluation of learning. Students perform as cadet officers. (P/NP grading only.)

144B. Military Training Leadership Skills (12) II.
Laboratory—2 hours. Prerequisite: upper division status, courses 134A, 134B, 134C, and 141. Requires training of all other levels of the cadet corps are given to students for conduct in laboratory environment (under supervision). Students placed in realistic role of junior officer with appropriate level of responsibility. Students perform as cadet staff officers. (P/NP grading only.)

144C. Military Training Leadership Skills (12) III.
Laboratory—2 hours. Prerequisite: upper division status, courses 134A, 134B, 134C, and 141. Final laboratory in military science sequence, students are prepared for final testing and certification prior to commissioning as officers. Students will demonstrate all leadership skills necessary to commissioned officers. Students perform leadership tasks at platoon, company, and battalion levels. (P/NP grading only.)

191. Special Studies in Military Science (2) Tucker Independent study—6 hours. Prerequisite: consent of department chair, and courses 131, 132A, 132B, 141, 142, and 143. Lecture—2 hours. Prerequisite: upper division status, and 142. Independent examination of one or more special problems in military science. Possible areas of study include leadership dimensions, principles of war, air-lable battle, military strategy, the operation of military and professional ethics. May be repeated twice for credit when different topic is studied. (P/NP grading only.)

Aerospace Studies (Air Force)

Air Force ROTC is available to UC Davis students through a program offered at California State University, Sacramento (CSUS). UC Davis’ participation is large, with about 30 percent of the corps commuted to CSUS from UC Davis. The CSUS Department of Aerospace Studies (AFROT) offers a one- or two- or four-year programs leading to a commission in the United States Air Force. All course work (12 or 16 semester units) is completed on the CSUS campus. Drills and courses are normally offered on Thursday mornings. Field training is conducted during part of the summer at an active Air Force base near the student’s home state. Upon completion of the program, which is fully integrated with UCD’s autumn semester and all requirements for the Bachelor’s degree, cadets are commissioned second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and selected may enter pilot or navigator training after graduation, or serve in a specialty consistent with their academic major, individual goals, and existing Air Force needs. Graduates may request a delay of one on active duty to continue their education or may apply for Air Force sponsored graduate study to begin immediately upon entry on active duty. Due to firm scheduling requirements for the AFROT program, students are encouraged to work closely with their academic advisers in planning this study. Application to the AFROT program should normally be no later than the middle of a student’s sophomore year. Upperclassmen and graduate students may also apply under special conditions. Contact representatives in the Aerospace Studies Office, 1315 Haring Hall, (916)-752-5109, for information on the program or processing of entry. (An AFROT program is also available within the UC system at Berkeley campus. Department of Aerospace Studies, (800) 852-5747.)

AFROT offers 3-year and 2-year scholarships to qualified students. Applications are accepted in a variety of academic disciplines; however, particular emphasis will be given to applicants in the fields of engineering, meteorology, and nursing.

Molecular Biosciences

(School of Veterinary Medicine)
Shri N. Giri, B.V.Sc., Ph.D., Chairperson of the Department of Veterinary Medicine, 1311 Haring Hall, (916)-752-1059.

Faculty
Alan H. Buckholt, Ph.D., Professor, Guests, D.V.M., Ph.D., Assistant Professor (Molecular Biosciences, California Veterinary Diagnostic Laboratory)
Shri N. Giri, B.V.Sc., Ph.D., Professor, Robert J. Hansen, Ph.D., Professor, Arthur D. Jones, Ph.D., Assistant Adjunct Professor, Robert M. Joy, Ph.D., Professor, James B. Knaak, Ph.D., Assistant Adjunct Professor, James G. Morris, Ph.D., Professor, Michael E. Mount, D.V.M., Ph.D., Associate Professor, Isaac N. Pessah, Ph.D., Associate Professor, Otto G. Raabe, Ph.D., Professor in Residence (Molecular Biosciences, Civil and Environmental Engineering)
Quinton R. Rögers, Ph.D., Professor, Henry J. Segall, Ph.D., Professor, Philip R. Vultee, D.V.M., Ph.D., Associate Professor, Hanspeter Wüthrich, M.D., Professor, Medicine, (Internal Medicine)
Emeritus Faculty
Arthur L. Black, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award, Victor W. Burns, Ph.D., Professor Emeritus, Gaylord M. C. Czeizel, Jr., Ph.D., Professor Emeritus, Charles E. Cornelius, D.V.M., Ph.D., Professor Emeritus, Richard A. Freedland, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award.

Courses in Molecular Biosciences (VMB)

Lower Division Course
192. Internship (1-12) I, II, III, summ. The Internship—12 hours. Prerequisite: completion of 94 units and consent of instructor. Work experience off campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses
192. Internship (1-12) I, II, III, summ. The Internship—12 hours. Prerequisite: completion of 94 units and consent of instructor. Work experience off campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)

Graduate Courses
205A. Intermediary Metabolism of Animals (4). I. Lecture—4 hours. Prerequisite: course in biochemistry or physiological chemistry or consent of instructor; a course in physiology recommended. Biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates, lipids, and proteins; nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Dynamics of animal metabolism including pools and turnover rates. Offered in alternate years.

205B. Intermediary Metabolism of Animals (3). II. Rogers, Hansen, Hershey (Biological Chemistry, Frederick) Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, lipids, nucleotides, and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in alternate years.

223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine (2) I. Vultee Lecture—1 hour. Discussion—1 hour. Prerequisite: comparative or veterinary physiology and general pharmacology. Concepts of pharmacokinetics Absorption and disposition of various drugs, which are used as therapeutic agents, will be compared in different species (man and domestic animals). Course will provide background for research in clinical pharmacology.

243. Heavy Metal Toxicity and Metabolism (2) II. Raabe Lecture—2 hours. Prerequisite: Biological Sciences 102, 103, 104, and Neurobiology. Physiology and Behavior 100B. Toxicity and mechanism of inorganic compounds with emphasis on heavy metals. Examines the relationship between chemical properties and biologic activity of various metals. Includes discussions on metal-protein interactions, genetic disorders in metabolism, chelation therapy, and inorganic carcinogenesis. Offered in alternate years.

247. Natural Toxicants (2) III. Segall Lecture—2 hours. Prerequisite: organic chemistry, Biological Sciences 102 and 103, or consent of instructor; Toxicology and metabolism of natural toxicants with emphasis on the toxic plants present in the western United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxins are discussed. Offered in alternate years.

253. Drug Metabolism (2) II. Buckpitt Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B; consent of instructor. General pathways of drug metabolism and factors influencing the drug metabolism. Emphasis placed upon the species, age, and genetic differences affecting the biological disposition of drugs. Offered in alternate years.

285. Receptor-Mediated Mechanisms (2) III. Pessah Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201 or equivalent. Survey of modern methods for studying physiological receptors including radioligand binding analysis, ion transport and flow measurements, receptor solubilization and purification strategies, and molecular cloning. Theoretical concepts of receptor-mediated signal transduction, information processing, and mechanisms of drug-receptor interactions. Offered in alternate years.

285L. Laboratory in Receptor Methods (2) III. Pessah Laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 120L. Design and practical application of receptor binding techniques including subcellular
fractionation, equilibrium and kinetic radioligand binding studies, receptor activation/inhibition studies, isotopic ion flux measurements, and analysis of data. Limited to 12 students. Offered in alternate years.

260. Toxicologic Pathology (3). I. Wilson. Lecture—3 hours. Prerequisite: courses 201, 202, and 203. Provides introduction to organ system pathology, provides understanding of pathogenesis and significance of chemically induced tissue injury in the various organs of the body. Offered in alternate years.

265. Mass Spectrometric Methods in Pharmacology and Toxicology (3). I. Jones. Lecture/dissection—5 hours. Prerequisite: Biological Sciences 102, and Chemistry 128A or 128B or 128C. Intended to enable students in pharmacology, toxicology, and biological chemistry to evaluate and interpret mass spectrometric techniques and results. Emphasis on identification of metabolites and biological macromolecules and quantitative stable isotope methods.

260. Seminar (1–3). I, II, III. The Staff (Chairperson in charge). Seminar—1 hour. (SU grading only.)

267. Tutoring in Veterinary Pharmacology and Toxicology (1–S). I, II, III. The Staff. Prerequisite: consent of group. Group study of selected areas of Pharmacology and Toxicology. (SU grading only.)

299. Research (1–12). I, II, III. The Staff. Consent of instructor. (SU grading only.)

Professional Courses

397. Tutoring in Molecular Biosciences (1–6). I, II, III. The Staff. Prerequisite: graduate or professional student standing and consent of instructor. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. (SU grading only.)

405. Veterinary Clinical Pharmacology (2). II. Villet. Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approaches to administration of veterinary drugs. Pharmacological basis of therapeutic use of drugs in domestic animals. Emphasis on selection of most appropriate drug, its dosage form, route of administration and mode of treatment of certain disease conditions. (SU grading only.)

475. Diagnosis and Treatment of Food Animal and Equine Poisoning (2). III. Trout. Lecture—2 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in livestock, horses and other ungulate stock emphasizing diagnosis and treatment. Poisonous plants are covered in this course.


484. Ruminant Nutrition and Physiology (3). I. Kruse, Morris. Lecture—2 hours, laboratory—0.9 hours. Prerequisite: graduate or veterinary student standing. Upper division nutrition courses (e.g., Nutrition 110), upper division systemic physiology (e.g., Neurobiology, Physiology and Behavior 110), biochemistry (e.g., Biological Sciences 102), and 103 or equivalent. Basic and applied aspects of ruminant nutrition and physiology, nutritional and metabolic disorders of ruminants.

Music

(College of Letters and Science)

Christopher Reynolds, Ph.D., Chairperson of the Department

Department Office, 112 Music Building (916-752-5537; FAX: 752-9893)

Faculty

Ross Bauer, Ph.D., Associate Professor
Robert A. Bock, Ph.D., Associate Professor
Anna Maria Busse Berger, Ph.D., Associate Professor
Jonathan Elkus, M.A., Lecturer
Andrew D. Frank, Ph.D., Professor
Paul Hillier, A.G.S.M., Associate Professor
D. Kern Holzman, Ph.D., Lecturer, Academic Senate Distinguished Teaching Award
Maria Niederberger, Ph.D., Lecturer
David A. Nutter, Ph.D., Professor
Christopher A. Reynolds, Ph.D., Professor
Wayne Stawman, Ph.D., Professor

Emeriti Faculty

Sydney R. Charles, Ph.D., Professor Emeritus
Albert J. McNiel, M.S., Professor Emeritus
Jerome W. Rosen, M.A., Professor Emeritus
Richard G. Swift, M.A., Professor Emeritus
Academic Senate Distinguished Teaching Award

Faculty Affiliates in Applied Music

Dona Lee Brandon, M.S.M., Lecturer (organ)
Los Brandwynne, M.A., Lecturer (piano)
Todd Brody, B.A., flute
Nitta Craig, M.M., Lecturer (harpischord)
Thomas Derick, B.M., Lecturer (string bass)
Joel Ellis, M.M., Lecturer (trombone)
Sarah Frielberg, D.M.A., Lecturer (cello)
Stephanie Friedman, M.A., Lecturer (voice)
David Granger, M.M., Lecturer (bassoon)
Edward Higgins, M.M., Lecturer (trumpet)
Stanley Lunetta, M.A., Lecturer (percussion)
Peter Nowen, B.M., Lecturer (French horn)
Deborah Pittman, M.A., Lecturer (clarinet)
Deborah Snider, B.M.E. (oboe)

The UC Davis Contemporary Music Players

Ross Bauer, Director
Todd Brody, flute
Deborah Shider, oboe
Deborah Pittman, clarinet
David Granger, bassoon
Peter Nowen, French horn
Betty Wu, piano
Tracy Davis, percussion
Robert Samson Bloch, violin and viola
Sarah Frielberg, cello
Thomas Derick, bass

The UC Davis Windwood Quintet

Deborah Shider, oboe
David Granger, bassoon
Deborah Pittman, clarinet
Todd Brody, flute
Peter Nowen, French horn

The Major Program

The Bachelor of Arts degree in music at UC Davis provides both a broad liberal arts education and thorough training for a career in music. A fundamental grounding in music theory, music history, and performance during the first two years of study permits a music major to focus upon a special interest area in composition, analysis, history, performance, or secondary-school teaching during the last two years of undergraduate work. Approximately 50% of the music student's college work is in music, including three years of music theory, two years of music history, and participation in performing groups.

Student Performing Activities. The UC Department of Music offers performance opportunities in the

U.S. Symphony Orchestra, Early Music Ensemble, Concert Band, University Chorus, Chamber Singers, and in chamber music ensembles. The large performing groups regularly present three concerts each year, while chamber ensembles perform frequently in the weekly Thursday Noont Concerts sponsored by the department. The large performing groups also give concerts in off-campus locations, throughout Northern California, and abroad, including recent tours to Europe, China, the Soviet Union, France, Germany, Australia, and New Zealand.

Facilities. The Department of Music's facilities include a large collection of music scores, books, and modern instruments, an electronic studio, practice and rehearsal rooms, and an excellent music library. The library has holdings of well over 20,000 volumes, tapes, and scores, and the collection of books and scores in the music library offers exceptional coverage of all aspects of music.

Career Alternatives. Students graduating with a degree in music are well prepared for careers in teaching (elementary and secondary schools, community college, or university levels), research, performance, music composition, concert management, and music librarianship.

A.B. Major Requirements:

Preparatory Subject Matter


Music 30, 31, or the equivalent (for students in consultation with an advisor), one year

Depth Subject Matter

Music 104A, 104B, 104C

At least 12 units selected from Music 121a, 122, 124

At least 6 units selected from Music 107A, 107B, 107C (Note: Only 3 units of 107, electronic music, may be counted toward the major), 113, 114, 115A, 115B, 115C, 118A, 196, 199

At least 8 units in performance courses

Select from Music 130 or 131, 141, 142, 143, 144, 145, 148

Total Units for the Major

92

Beginning and transfer students must take an examination in piano playing. Sufficient practical ability to perform four-part choruses and compositions comparable in difficulty with The Little Preludes of Bach is prerequisite to upper division courses in the major. Students with deficient skills will be required to pass Music 2A, 2B, 2C. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisors before enrolling in any music course.

Foreign Language Requirement. Attention is called to the requirements in foreign languages for higher degrees in music.

Major Advisers. P. Hillier, D.A. Nutter.

Minor Program Requirements:

Music

A minimum of six units of upper division Music courses chosen with advisor's consent from Music 105, 107, 110, 129.

A minimum of six units in upper division music performance courses (Music 141, 142, 143, 144, 145, 146) may count toward the minor.

Lower division preparatory work to be determined in consultation with minor advisors.

Teaching Credential Subject Representative. See the section on the Teacher Education Program.

*Course not offered this academic year.
Graduate Study. The Department of Music offers programs of study and research leading to the M.A., M.M., and Ph.D. degrees. Information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Adviser. A. M. Busse Berger.

Courses in Music (MUS)

Lower Division Courses

1. Basic Musicianship (3) III. Block Lecture—3 hours. Fundamentals of music, singing, ear-training and conducting for beginners in music. Designed for students with career plans where musical literacy is important, for example, primary level classroom teachers, actors, theatre directors, designers, and stage managers. Not open to students who have successfully completed 3A, 4A, or the equivalent.

2A-2B-2C. Keyboard Competence (1-1-1) I-II-III.

The Staff.

Laboratory—1 hour. Prerequisite: concurrent enrollment in course 4A-4B-4C; keyboard diagnostic exam (not open to credit for students who have passed the exam). Designed to train students to meet the minimal piano requirements for the major in music. All music majors will be expected to perform scales, modulations, to realize figured basses, and to harmonize a given melody at sight.

3A. Introduction to Music Theory (4) II. Block Lecture—4 hours; laboratory—1 hour. Prerequisite: fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture.

3B. Introduction to Music Theory (4) II. Block Lecture—4 hours; laboratory—1 hour. Prerequisite: course 3A. Continued enrollment in course 3A. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture.

4A-4B-4C. Elementary Theory (5-5-5) I, II, III.

Niederberger.

Lecture/discussion—4 hours; practicum—2 hours. Prerequisite: keyboard competence; keyboard diagnostic exam (not open to credit for students who have passed the exam). Designed for students meeting the minimal piano requirements for the major in music. All music majors will be expected to perform scales, modulations, to realize figured basses, and to harmonize a given melody at sight.

5A-5B-5C. Intermediate Theory (4-4-4) I, II, III.

Frank.

Lecture/discussion—3 hours; practicum—2 hours. Prerequisite: course 4C. Study of imitative tonal counterpoint and of harmony; keyboard harmony; analysis of repertoire.


Lecture—3 hours; listening section—1 hour. An introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture.

24A. Introduction to the History of Music, I (4) I. Reynolds.

Lecture—3 hours; listening section—1 hour. Prerequisite: course 4A or 3A (concurrently). Intended primarily for majors in music. History of music from the late Baroque to the Classical Period.

24B. Introduction to the History of Music, II (4) II. Reynolds.

Lecture—3 hours; listening section—1 hour. Prerequisite: course 24A; course 4B or 3B (concurrently). Intended primarily for majors in music. History of music from the Classical Period to the nineteenth century.

24C. Introduction to the History of Music, III (4) III. Reynolds.

Lecture—3 hours; listening section—1 hour. Prerequisite: course 24B or 3B; course 4C (concurrently). Intended primarily for majors in music. History of music from the nineteenth century to the present.


Lecture—3 hours; listening section—1 hour. Prerequisite: courses 24C and 25A; course 5A (concurrently). Intended primarily for majors in music. Historical survey of composers and musical styles from antiquity to around 1400.


Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5A and 25A; course 5B (concurrently). Intended primarily for majors in music. Historical survey of composers and musical styles from around 1400 to around 1600.

25C. Introduction to the History of Music, VI (4) III, IV. Busse Berger.

Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5B and 25B; course 5C (concurrently). Intended primarily for majors in music. Historical survey of composers and musical styles from around 1500 to around 1600.

28. Introduction to Afro-American Music (4) II.

The Staff.

Lecture—3 hours; discussion—1 hour. A study of Afro music: folk, ceremonial, religious, folksongs, spirituals, blues, gospel, and jazz; the contrast between African, Afro-Caribbean, and Afro-American musical traditions.


The Staff.

Performance instruction—1 hour. Prerequisite: completion of all major requirements for music majors.


The Staff.

Performance instruction—1 hour. Prerequisite: completion of all major requirements for music majors.


The Staff.

Performance instruction—2 hours; independent practice—5 hours. Prerequisite: completion of all major requirements for music majors. Must be arranged by the student with the instructor. Performance instruction must be completed within the first 4 quarters of the course.

31. University Symphony (2) I, II, III.

Holoman.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal, and performance program included. May be repeated for credit. (P/NP grading only.)

42. University Chamber Singers (2) I, II, III.

Hillier.

Rehearsal—3 hours; plus sectionals—at least 1 hour. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of works for small chamber group. May be repeated for credit. (P/NP grading only.)

43. University Concert Band (2) II, III.

Rehearsing—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. (P/NP grading only.)

44. University Chorus (2) II, III.

Holoman.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. (P/NP grading only.)

45. Early Music Ensemble (2) II, III.

Nutter.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)

46. Chamber Music Ensemble (1) I, II, III.

The Staff.

Chairperson in charge.

Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III.

The Staff.

Chairperson in charge.

Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)

Upper Division Courses

103. Workshop in Composition (3) I, II, III.

Frank, Niederberger.

Workshop—3 hours. Prerequisite: course 4C. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies. Course will allow students to explore the techniques and materials of musical composition. May be repeated for credit. (P/NP grading only.)

104A-104B. Advanced Theory (4-4-4) I-II-III.

Bauer.

Lecture—4 hours. Prerequisite: course 5C. Twentieth-century compositional procedures: analyses and projects in composition.

105. History and Analysis of Jazz (3) IV.

Bauer.

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of all major requirements for music majors. May be repeated for credit. Offered as demand indicates.

111A. Applied Study of Music: Intermediate (Individual) Performance Instruction (2) I, II.

The Staff.

Performance instruction—1 hour; independent practice—5 hours. Prerequisite: completion of all major requirements for music majors. Must be arranged by the student with the instructor. Performance instruction must be completed within the first 4 quarters of the course.

127A. Computer and Electronic Music (3) I.

Slawson.

Lecture—3 hours; laboratory—1 hour. Prerequisite: completion of all major requirements for music majors. May be repeated for credit. (P/NP grading only.)

127B. Computer and Electronic Music (3) II.

Slawson.

Lecture—3 hours; laboratory—1 hour. Prerequisite: completion of all major requirements for music majors. May be repeated for credit. (P/NP grading only.)

107A. Computer and Electronic Music (3) III.

Slawson.

Lecture—3 hours; laboratory—1 hour. Prerequisite: completion of all major requirements for music majors. May be repeated for credit. (P/NP grading only.)

107C. Computer and Electronic Music (3) III.

Slawson.

Lecture—3 hours; laboratory—1 hour. Prerequisite: completion of all major requirements for music majors. May be repeated for credit. (P/NP grading only.)

108A-108B. Orchestration (2-2) II, III.

Bauer.

Lecture—2 hours. Prerequisite: course 5C. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations.

109. Masterworks in Performance (4) I, II.

Holoman.

Lecture—4 hours. Prerequisite: course 10 recommended. Thorough score study of a single major work to be performed on campus during the quarter. Guided listening, analysis and study of composer’s milieu. Recommended especially for members of the performing ensembles scheduled to present the work.
Graduate Courses

200. Music Research (4) Ill. Busse Berger Seminar—3 hours; term paper. Introduction to problems and techniques of research; practical application of music bibliography to questions about significant issues in musicology, music theory, and performance practice.

201. Advanced Music Research and Criticism (4) II. Swift Seminar—3 hours; term paper. Study and practice of expository writing in music. Application and evaluation of advanced research techniques in writing for different purposes, ranging from essays for the general public to thesis proposals and articles for scholarly journals.


204. Advanced Conducting (3) I, II, III. The Staff (Holoman in charge) Tutorial—2 hours; practical—2 hours. Prerequisite: courses 111, 112, or the equivalent; keyboard skills appropriate to graduate standing. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance.

207. Advanced Electronic and Computer Music (4) III. Stallion Seminar—2 hours; plus individual student/instructor meeting—2 hours. Prerequisite: courses 107A-107B-107C. Advanced composition of computer and electronic music with the Sun 3-based computer-music system and associated facilities.

210A. Proseminar in Music (Theory and Analysis) (4) I. Stallion Seminar—3 hours; term paper. Voice-leading analysis of tonal music derived from Schenker and pitch-class set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically-oriented music theory, and theories of durational structure and timbre.

210B. Proseminar in Music (Musicology and Criticism) (4) II. Busse Berger Seminar—3 hours; term paper. Issues and concepts of music history, including performance practice questions for specific repertory periods; principles, aims, and methods of archival study; historical theory; evolution of musical styles; philosophical debates about goals and aims of the discipline in general.

210C. Proseminar in Music (Ethnomusicology) (4) III. The Staff Seminar—3 hours; term paper. Intensive examination of major trends in ethnomusicology as exemplified by scholars working in several non-Western cultures. Ethnomusicological theory, ranging from ethnographic description to metamusical study (Seeger) to analysis of individual genres to sociological study.

221. Topics in Music History (4) I. Reynolds; III. Nutter Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.

222. Techniques of Analysis (4) I. Bauer Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit.

223. Ethnomusicology (Pacific Cultures) (4) Seminar—3 hours; term paper. Court music, religious music, and popular forms of China, Japan, Korea, Melanesia, and India. Issues concerning history, theoretical constructs, performance practice, and cultural settings of the music will be stressed. May be repeated for credit.

299. Individual Study (1-12) I, II, III. The Staff (Holoman in charge) (SU grading only.)
Courses in Native American Studies (NAS)

Lower Division Courses

1. Introduction to Native American Studies (4)
   Lecture/discussion—4 hours. Introduction to Native American Studies with emphasis upon basic concepts relating to indigenous American tribal and reservation societies, including intergovernmental relations.

2. Native American Experience (4) I. Macri; II, III
   Lecture—4 hours. Introduction to American Indian historical and socio-cultural development with emphasis upon the U.S. area and upon those processes such as relations with non-Indians which have contributed to the current condition of Indian people. General Education credit: Contemporary Societies.

3. Native American Music and Dance (4)
   Lecture/discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes.

   Lecture—1 hour; laboratory—6 hours; to be arranged—3 hours. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native American art, design, and crafts. (P/NP grading only.)

5. Orientation to Research in Native American Studies (4) II, Forbes
   Lecture/discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Introduces students to basic research resources pertaining to indigenous American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Limited enrollment.

55. Americanisms: Native American Contributions to World Civilization (4) II. Varose
   Lecture/discussion—4 hours. Prerequisite: course 1 or 10 recommended. American indigenous peoples’ contributions to the contemporary world, with attention to forced participation of Indian societies in the development of Western dominance and resulting appropriation of their cultural resources. Responses and initiatives of indigenous peoples will be analyzed. General Education credit: Contemporary Societies.

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

Upper Division Courses

101. Contemporary Indian Art (4) II. Longfish
   Lecture—4 hours. Prerequisite: course 33. Historical review of contemporary Indian art from 1900 to the present by looking at the two art centers of Oklahoma and Santa Fe. Social pressures that have influenced the imagery that exists today will be examined.

107. Special Topics in Native American Languages (4) II. Macri
   Lecture/discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different topic is studied.

112. History and Culture of the "Five Civilized Tribes" (4) II. Hutchison/Wilson
   Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American tribes, found in southeastern part of the U.S., called the "Five Civilized Tribes." Offered in alternate years.
115. Native Americans in the Contemporary World (4) III. Forbes Lecture/discussion—4 hours. Prerequisite: course 1, 10, or 55. The sociocultural development of American Indian populations in modern times with emphasis on North America. Attention will be given to the contemporary Indian affairs and problems as well as to the background for present day conditions. Not open for credit to students who have completed Anthropology 141B. (Formerly course Anthropology 141B) General Education credit: Contemporary Societies.

116. Native American Traditional Governments (4) II. The Staff Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Offered in alternate years.

117. Native American Governmental Decision Making (4) II. The Staff Lecture—4 hours. Prerequisite: course 116, Political Science 2; Anthropology 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Offered in alternate years.

118. Native American Politics (4) III. The Staff Lecture—4 hours. Prerequisite: course 117. Examination of the Indian groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with the roles these groups have in understanding Native American history. Offered in alternate years.

120. Ethnopolitics of South American Indians (4) I. Varese Lecture/discussion—4 hours. Prerequisite: course 1, or 55. Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed since contact with Europeans, and the ways these have impacted the understanding of indigenous peoples' historical development and the development of national societies.

122. Native American Community Development (4) II. Varese Lecture—4 hours. Prerequisite: course 1, Applied Behavioral Sciences 151. Application of community development theory and techniques to the development problems of Native American communities. Offered in alternate years. (Former course 161.)

130A. Native American Ethno-Historical Development (4) I. Crum Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-history before 1877. General Education credit: Civilization and Culture.

130B. Native American Ethno-Historical Development (4) II. Crum Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America, 1770-1890. General Education credit: Civilization and Culture.

130C. Native American Ethno-Historical Development (4) III. Crum Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America after 1890. General Education credit: Contemporary Societies.

133. Ethnohistory of Native People of Mexico and Central America (4) II. Varese Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous people; the impact of economic and political factors on the process of cultural adaptation. Attention is given to the questions of nation-building, forced assimilation, indigenous resistance, organized political alternatives.

156. Native American Ethics and Value Systems (4) II. Forbes Lecture—4 hours. Prerequisite: upper division standing; course 1. Analysis of Native American systems of values and how these values translate into actual behavior; attention to the problem of implementing traditional values in the twentieth century and the possible impact of native values in modern societies. Offered in alternate years. General Education credit: Civilization and Culture.

157. Native American Religion and Philosophy (4) II. Hernandez Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philosophical thought of Native American people with emphasis upon North America. Offered in alternate years.

180. Native American Women (4) III. Hernandez Lecture/discussion—4 hours. Prerequisite: course 1 or Women's Studies 50. Social and cultural foundations of the Native American women's personality, including the development of the Indian girl and the life phases of mature womanhood. Autobiographical and biographical text will be utilized. General Education credit: Contemporary Societies.

181A-181B-181C. Native American Literature (4-4-4) I-II-III. Hernandez Lecture—4 hours. Prerequisite: English 3, Comparative Literature 1, 2, 3, or any course from the General Education Literature Preparation List. Analysis of works by or about Native Americans including novels and autobiographies, analysis of Native American poetry and songs, and tales. (A), the novel and fiction; (B), nonfiction works by native authors; (C), traditional literature and poetry. Offered in alternate years. General Education credit: Civilization and Culture.

186. Special Topics in Native American Literatures (4) I, II, III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Special topics drawn from Native American literature. May be repeated for credit when a different topic is studied.

190. Seminar in Native American Studies (2) III. The Staff (Forbes in charge) Discussion—2 hours. Prerequisite: senior standing. Seminar of critical issues faced by Native American people. (P/NP grading only.)

191. Topics in Native American Studies (4) I, II, III. The Staff Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American ethno-history, development, culture, and thought. May be repeated for credit when a different topic is studied.

194HA-194HB. Special Studies for Honors Students (4-4) II. The Staff (Forbes in charge) Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty advisor. (Deferred grading only, pending completion of sequence.)

195. Field Experience in Native American Studies (12) I, II, III. Forbes in charge Field work—36 hours. Prerequisite: senior standing and major in Native American Studies, completion of lower division major requirements, and course 161. Field work will be with governmental and community groups, under supervision of faculty advisor and sponsor. Knowledge acquired in other courses to be applied in field work. (P/NP grading only.)

196. Senior Project in Native American Studies (4) II, III. Forbes in charge Discussion—1 hour; independent study—3 hours. Prerequisite: senior standing and major in Native American Studies, course 195 (may be taken concurrently), and consent of instructor. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis. (P/NP grading only.)

197TC. Community Tutoring in Native American Studies (1-5) II, III. The Staff (Forbes in charge) Tutorial—3-15 hours. Prerequisite: consent of major committee; upper division standing with major in

Nature and Culture (College of Letters and Science)
Mark Wheelis, Ph.D., Program Director
Program Office, 2202 Storer Hall (916-752-0562)

Committee in Charge
Francisco X. Alarcon (Spanish and Classics)
Michael Barbour, Ph.D. (Environmental Horticulture)
Richard Cowen, Ph.D. (Geology)
Paula Findlen, Ph.D. (History)
Scott McLean, Ph.D. (Comparative Literature)
Ben Ortoleva, Ph.D. (Environmental Studies)
Art Shapiro, Ph.D. (Evolution and Ecology)
Lenora Timm, Ph.D. (Linguistics)
Nematology

(College of Agricultural and Environmental Sciences)

Harry K. Kaya, Ph.D., Chairperson of the Department
Department Office, 354 Hutchison Hall
(916-752-6905)

Faculty
Edward P. Caswell-Chen, Ph.D., Assistant Professor
Howard Ferris, Ph.D., Professor
Scott L. Gardner, Ph.D., Assistant Professor
Bruce A. Jaffe, Ph.D., Associate Professor
Herb K. Kaya, Ph.D., Professor
Becky B. West, Ph.D., Professor
Valerie M. Williamson, Ph.D., Associate Professor
Emeriti Faculty
Benjamin F. Lowes, Ph.D., Professor Emeritus
Armand R. Maggenti, Ph.D., Professor Emeritus
Deewy J. Raski, Ph.D., Professor Emeritus

Minor Program Requirements: UNITS

Nature and Culture 1 .................................4
Nature and Culture 100 ......................... 4
Environmental Studies 100, Zoology 125, or Botany 101 .................................... 3-4
Anthropology/Environmental Studies 101 ..................................................4
Anthropology/Environmental Studies 133 ........................................ 4
English 184 or Native American Studies 181A, 181B, or 181C ........................................ 4
Total units for the minor .................................. 23-24

Courses in Nature and Culture (NAC)

Lower Division Courses
1. Interactions of Nature and Culture (4) Ill.
McLean, Weels Lectures/discussion—3 hours; term paper. Satisfaction of Subject A requirement; Comparative Literature 1, 2 or 3, or English 4 recommended. Nature and culture as human constructs, conditioned by both time and place; importance of nature in human thought, both scientific and spiritual; scientist and literary view of the relation between nature and culture, including forms of observation and methods of analysis.

98. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (PINP grading only.)

99. Individual Study (1-5) I, II, III. The Staff Prerequisite: consent of instructor. (PINP grading only.)

Upper Division Courses

*100 The Culture of Nature: Theoretical Frameworks and Case Studies (4) II. Orlove, Timm
Lectures/discussion—3 hours; term paper. Prerequisite: course 1, Biological Sciences 1C, and Comparative Literature 20, and Comparative Literature 1, 2, or 3, and English 3. In-depth study of one or two problems in nature and culture, with particular attention to integrative theoretical frameworks available for the investigation of specific issues. Case studies will vary with instructor. May be repeated for credit.

180. Fieldwork in Nature and Culture (4) I. Barbour, McLan
Lectures/Fieldwork—1 hour; fieldwork—70 hours/quarter; term paper. Prerequisite: course 100. Fieldwork: one week prior to the beginning of the quarter, plus two weekends. Naturalistic, antropological, sociological, and literary artistic approaches to the study of nature and culture in one place, which will vary with instructor.

197T. Tutoring In Nature and Culture (1-5) I, II, III. The Staff
Tutoring—3-15 hours. Prerequisite: consent of Instructor. Assist in field trips, lead study sessions with groups and individual students. (PINP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (PINP grading only.)

199. Individual Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (PINP grading only.)

Courses in Nematology (NEM)

Upper Division Courses

100. General Plant Nematology (4) I. Ferris
Lectures—2 hours; Laboratory—6 hours. Prerequisite: Biological Sciences 1A or 1B. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

110. Introduction to Nematology (2) II. Gardner
Lectures—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to human environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.

199. Special Study for Advanced Undergraduates (1-5) I, II, III, summer. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PINP grading only.)

Graduate Courses

*220. Principles and Techniques of Nematode Taxonomy and Morphology (4) III. The Staff
Lectures—2 hours; Laboratory—6 hours. Prerequisite: course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material. Offered in alternate years.

*222. Advanced Plant Nematology (3) II. Caswell-Chen, Jaffe, Williamson
Lectures—2 hours; Laboratory—3 hours. Prerequisite: course 100 or the equivalent. Review and investigation of parasitic nematodes and plants, the relationship between nematodes and their environment, and the relationship between nema todes and other biota. Biology of systems explored at the population, organism, and cellular levels. Offered in alternate years.

*Nematode Taxonomy and Comparative Morphology (5) II. Gardiner
Lecture—2 hours; Laboratory—6 hours; 1 hour 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 parasitids. Offered in alternate years.

*240. Biological Control in Insect and Plant Nematology (2) II. Jaffe, Kaya
Lecture—1 hour; Laboratory—3 hours or field trips. Prerequisite: upper-division course in entomology, nematology, or plant pathology. Biological control potential of nematodes against insect pests and of microorganisms against nematode hosts. Offered in alternate years.

Field Nematology (1) I. The Staff
Fieldwork—6 days. Prerequisite: courses 100, 222. Six-day demonstration and field study in applied entomology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with protected California crops. (SU grading only.)

290. Seminar (1, 2) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. (SU grading only.)

290C. Advanced Research Conference (1) (Research Faculty)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and discussions. Discussion led by individual research instructors for research group. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)
Group Study—1 hour. (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Chairperson in charge)
Research—1 hour. (SU grading only.)

Neuroscience

(A Graduate Group)

Brian Mulloney, Ph.D., Chairperson of the Group
Group Office, 198 Briggs Hall (916-752-9092)

Faculty. The group includes 26 faculty members from eight departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Neuroscience offers programs of study leading to the Ph.D. degree. Neuroscience is a broad, interdepartmental program with faculty interests ranging from molecular biology of channels to cortical organization and cognition. A major goal of the program is to prepare students for careers as research scientists. Details of the program may be obtained from the Office of Graduate Advisers. A. Ishida (Neurobiology, Physiology, and Behavior), R. Halli (Center for Neuroscience).

Courses in Neuroscience (NSC)

Graduate Courses

200LA. Laboratory Methods in Neurobiology (4) I, II, III. The Staff
Laboratory—18 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.
Neurology
See Medicine, School of

Neurosurgery
See Medicine, School of

Nutrition
See Community Nutrition; Dietetics; Nutrition (below); Nutrition (A Graduate Group); Nutrition Science; and Clinical Nutrition and Metabolism (under Internal Medicine in Medicine, School of

Nutrition
(College of Agricultural and Environmental Sciences)
Carl L. Keen, Ph.D., Chairperson of the Department
Department Office, 3315 Meyer Hall (916-752-4630)

Faculty
Lindsay S. Allen, Ph.D., Professor
Kenneth H. Brown, M.D., Professor
Andrew J. Clifford, Ph.D., Professor
Kathryn G. Dewey, Ph.D., Professor
M.R.C. Greenwood, Ph.D., Professor
Louis E. Grivetti, Ph.D., Professor (Nutrition, Geography)
Pamela Johnson, Adjunct Professor
Carl L. Keen, Ph.D., Professor (Nutrition, Internal Medicine)
Bo L. Lommerdal, Ph.D., Professor (Nutrition, Internal Medicine)
Roger McDonald, Ph.D., Assistant Professor
Jo Ann Prophet, M.S., Lecturer
Robert M. Bucki, Ph.D., Professor (Nutrition, Biological Chemistry)
Michael A. Safar, Ph.D., Assistant Professor
Barbara O. Schneeman, Ph.D., Professor (Nutrition, Food Science and Technology, Internal Medicine)
Judith S. Stern, Sc.D., Professor (Nutrition, Internal Medicine)
Emeriti Faculty
Fredric W. Hilt, Ph.D., Professor Emeritus
William C. Weil, Ph.D., Professor Emeritus
Frances J. Zernak, Ph.D., Professor Emeritus

Major Program
See the majors in Community Nutrition, Dietetics, and Nutrition Science.

Minor Program Requirements:
The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

10. Discoveries and Concepts in Nutrition (3) I, II, III. The Staff
Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. General Education credit: Nature and Environment. To receive GE credit, course must be taken in a concurrent or subsequent quarter.

11. Current Topics and Controversies in Nutrition (2) I, II, III. The Staff
Discussion—1 1/2 hours; oral reports, written reports, term paper. Prerequisite: course 10 (may be taken concurrently). Assigned readings and discussion of topics of current concern and broad interest in contemporary nutrition. Coordinated with course 15. Not open for credit to students who have taken an upper division course in nutrition. General Education credit: Nature and Environment.

12. Food and Culture: An Introduction to Culture, Diet, and Cuisine (4) I. Grivetti
Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2, and course 10 recommended. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habit research; minority food habits; origins and development of dietary practices. General Education credit: Nature and Environment.

13. Public Issues in Nutrition and Food Science (4) II. Schneeman
Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to Nutrition and Food Science for students new to the campus. (P/NP grading only.) (Same course as Food Science and Technology 93.)

99. Individual Study for Undergraduates (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses
104. Introduction to Nutrition and Metabolism (4)
Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 2 or 110. Introduction to the metabolism of protein, fat, and carbohydrate; the role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 110 or 111.

110. Principles of Nutrition (5) II. Calvert (Animal Science) and Rucker (Nutrition); III. Hung (Animal Science) and Rucker (Nutrition)
Lecture—5 hours. Prerequisite: Biological Sciences 103; a course in physiology or zoology. Fundamental principles of the nutrition of man and other animals. Physiological basis of nutrient requirements for growth, maintenance, and production. Physiological basis of nutritional disorders.

*Course not offered this academic year.
111. Human Nutrition (4) III. McDonald Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 110. Nutrition of humans; critical study of nutrient requirements at various phases of life cycle.

112. Nutritional Assessment: Dietary, Anthropometric, and Clinical (3) B. Brown Lecture—1 hour; laboratory—2 hours. Prerequisite: course 101 or 111 (may be taken concurrently). Methods of nutritional assessment in humans to evaluate dietary intake (dietary records and recalls, food frequency questionnaires, anthropometry, physiological methods), and clinical signs of malnutrition. Principles of validity and reliability and interpretation of results.

113. Nutritional Assessment: Biochemical Measures (2) T. The Staff (McDonald in charge) Lecture—1 hour; laboratory—2 hours. Prerequisite: course 111. Variety of biologic markers of human nutritional status including hematologic, urinal, and hair analyses of clinical importance will be demonstrated and evaluated. Emphasizes the precision, accuracy, reliability, and interpretation of the values.

114. Developmental Nutrition (4) II. Keen Lecture—4 hours. Prerequisite: course 110 or 101; course 301 or other major factors in embryonic and postnatal development.

115. Animal Feeds and Nutrition (4) II. Brown (Animal Science) Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 105; Physiology 110 (or the equivalent). Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.

116. Diet Therapy (3-3) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 (or the equivalent). Course in food and nutrition. Principles of nutrition and dietetics. Emphasis on evaluation of foods, influences of production, processing and storage methods on nutritive value of foods. Nutritional Diet. Diet formulation.

117. Practicum in Diet Therapy (2) I. The Staff Lecture—4 hours; laboratory—2 hours; extensive written assignments. Prerequisite: course 116A (or the equivalent). Lectures and laboratory work on the role of the dietitian in the planning and evaluation of therapeutic diets for patients in a clinical setting. Coordination of work with course 116A. (Deferred grading only pending completion of 116A-116B sequence.)

118. Experimental Nutrition (5) I. Clifford Lecture—3 hours; laboratory—6 hours. Prerequisite: course 111; Biological Sciences 103; a laboratory course in nutrition or biochemistry. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition.

119. Community Nutrition (4) II. Dewey Lecture—4 hours. Prerequisite: course 101 or 111, and 116A. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education.

120. Food Habits and their Nutritional Implications (3) I. Given Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division course in nutrition or Biological Sciences 103; course 20 related to course 116B. Analysis of major themes in exploring food habits and their nutritional implications; pica; toxicants naturally occurring in food; ethnic diet; food systems; dietary codes; overview and case histories.

121. Ruminant Nutrition and Digestive Physiology (3) III. Fadai and Maca (Animal Science) Lecture—3 hours. Prerequisite: Physiology 110; Biological Sciences 102, 103. Microbiology 2 recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

122. Ruminant Nutrition Laboratory (2) III. Macy (Animal Science) Laboratory—6 hours. Prerequisite: course 122 (concurrently). Students will conduct experiments in small groups and attend demonstrations on topics peculiar to digestion and nutrition. The laboratory will deal with topics developed in lectures.

123. Companion and Captive Animal Nutrition (4) III. Klasing Lecture—3 hours; discussion—laboratory—2 hours. Prerequisite: course 110; Biological Sciences 102 and 103. Comparative nutrition of non-ruminant vertebrate animals, including laboratory and companion animals, primates and wildlife. Relation of nutrition to metabolic adaptations in captive animals. Laboratory exercises leading to written group reports on establishment of nutritional requirements and formulating complete diets.

124. Nutrition and Feeding of Fishes and Shellfishes (3) III. Hung and Connin (Animal Science) Lecture—3 hours. Prerequisite: course 110 or 115. Application of principles of nutrition to feeding of fish and shellfishes, feeding habits, gastrointestinal anatomy, digestive physiology, aquatic environment, nutrient requirements, diet formulation and quality control, and feeding practices of commercially cultured fishes.

125. Journalistic Practice in Nutrition (2) III. Stem Discussion—2 hours. Prerequisite: course 111; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition; the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated once for credit. Offered in alternate years.

130. Experiments in Nutrition: Design and Execution (2) II. I. The Staff (Keen in charge) Laboratory—6 hours. Prerequisite: consent of instructor required; course 101, 110, 111, or 114 recommended. Experiments in current nutritional problems. Discussion of experimental design. Students must choose a project, and, independently or in groups of 2-3, design a protocol, do the project and report their findings. May be repeated for credit with consent of instructor.

190. Proseminar in Nutrition (1), I, II, III. The Staff Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental and clinical, and statistical and methodological problems of community, national and international scope. May be repeated twice for credit with consent of instructor.

190T. Nutrition Research Conference (1), I, II, III. The Staff (Keen in charge) Conference—1 hour. Prerequisite: upper division standing in Nutrition or related biological science; consent of Instructor. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12) I, II, III. The Staff Internship—3-36 hours. Prerequisite: one upper division course in nutrition or consent of instructor. Work experience in off-campus practical applications of nutrition, supervised by a faculty member. (P/NP grading only.)

197T. Tutoring In Nutrition (1-2) I, II, III. The Staff Discussion/laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Dietetics, Community Nutrition or related major. Completion of course 101 or 110 with a grade of B or better. Tutoring of students in nutrition courses, assistance with discussion groups or laboratories. Consent of instructor. Enrollment subject to instructor in charge of course: written evaluations. May be repeated if tutorin a different course. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Keen in charge) (P/NP grading only.)

Graduate Courses

201. Vitamin Metabolism (2) II. Rucker Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutrition, biochemistry of vitamins and vitamin-like compounds emphasized.


203. Advanced Protein and Amino Acid Nutrition (2) III. The Staff (Rogers, Molecular Biosciences, in charge) Lecture—2 hours. Prerequisite: course 110, Biological Sciences 103, Physiology 110 or the equivalent. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, resistance to disease, and food intake. Study of dietary requirements and interactions among amino acids.

204. Metalloprotein Devices (2) II. Lonnerdal, Keen Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Studies of metalloprotein functions and nutritional interrelationships involving minerals.

216. Advanced Diet Therapy (3) III. The Staff Lecture—3 hours. Prerequisite: course 116A-116B. Nutrition and disease: Interrelationships at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

217. Advanced Field Work in Community Nutrition (2-12) I, II, III. The Staff Discussion: 1 hour. Field work. Prerequisite: courses 118, 119; graduate standing; consent of instructor. Directed experience in community nutrition. Organization and implementation of nutrition programs.

219A. International Nutrition (3) II. Brown, Dewey, Pollett (Pediatrics) Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Epidemiology, etiology, and consequences of undernutrition in developing countries. Offered in alternate years.

219B. International Nutrition (3) III. Brown, Dewey, Pollett (Pediatrics) Lecture/discussion—3 hours. Prerequisite: upper division course in nutrition or consent of instructor. Nutrition policies and programs in developing countries. Offered in alternate years.

252. Nutrition and Development (3) I. Keen Lecture—3 hours. Prerequisite: courses 201, 202, 203. Relationship of nutrition to prenatal and early postnatal development. Offered in alternate years.

253. Control of Food Intake (3) III. Stern (Nutrition), Gietzen (Physiological Sciences), and staff Lecture—2 hours; discussion—1 hour; 2 or 3 laboratory demonstrations per quarter. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in alternate years.

254. Applications of Systems Analysis in Nutrition (3) I. Baldwin (Animal Science) Lecture—2 hours; discussion—1 hour. Prerequisite: course 202, Physiological Sciences 205A-205B or the equivalent. Quantitative aspects of digestion and metabolism; principles of fermentation; the metabolism and chemistry of foods as applied in current feeding systems. Critical evaluations of mechanic
models used analytically in support of nutritional research. Offered in alternate years.

255. Nutritional Toxicology (3) I. Brown Lecture/discussion—3 hours. Prerequisite: course 110 or the equivalent, courses 201 and 204. Physiological Sciences 205B recommended. Examines naturally occurring toxins in human food and animal feeds. Toxic nutrients, anti-nutrients, secondary plant compounds and mycotoxin metabolism will be emphasized.

256. Nutritional and Hormonal Control of Animal Meat Quality (3) II. Baldwin (Animal Science) Lecture—3 hours. Prerequisites: courses 201, 202, 203, Physiological Sciences 205A-205B. Significance and interpretation of enzyme, metabolite, in vitro and in vivo isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diet-hormone interactions in carbohydrate, amino acid, and lipid metabolism will be discussed. Offered in alternate years.

257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism (2) II. Klausing (Avian Sciences), Calvert (Animal Science) Lecture—2 hours. Prerequisites: courses 201 through 204, Physiological Sciences 205A-205B or the equivalent. Qualitative and quantitative aspects of nitrogen metabolism; critical evaluation of dietary intake, hormones and diet-hormone interactions which affect nitrogen metabolism, including protein synthesis-degradation, amino acid synthetic-catabolism, nitrogen transport-excretion, depending on current literature. Offered in alternate years.

258. Field Research Methods in International Nutrition (3) II. Brown, Dewey, Pollitt (Pediatrics) Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Offered in alternate years.

290. Beginning Nutrition Seminar (1) I, II, III. The Staff Seminar—2 hours. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field.

290C. Research Conference (1) I, II, III. The Staff (Kean 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.)

291. Advanced Nutrition Seminar (1) I, II, III. The Staff (Kean in charge) Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (SU grading only.)

297T. Supervised Teaching in Nutrition (1-3) I, II, III. The Staff (Kean in charge) Teaching under faculty supervision—3-9 hours. Prerequisite: graduate status in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Kean in charge) (SU grading only.)

299. Research (1-12) I, II, III. The Staff (Kean in charge) (SU grading only.)

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**Nutrition**

(A Graduate Group)

Q.R. Rogers, Ph.D., Chairperson of the Group
Group Office, 3135 Meyer Hall (916-752-4630)

Faculty. Faculty are drawn from the Colleges of Agricultural and Environmental Sciences, and of Letters and Science, and the Schools of Medicine and of Veterinary Medicine.

Graduate Study. The Graduate Group in Nutrition offers a course of study and research leading to the M.S. and Ph.D. degrees. Research activities in nutrition include work with humans and with laboratory, domestic, and wild animals. Areas of specialization include: the effect of diet on energetics and intermediary metabolism; studies on enzymatic adaptation, community nutrition, rumintnut nutrition, amino-acid requirements and utilization; nutrient balance and food intake regulation; biological antioxidants; food toxicants; mineral and vitamin nutrition; various anomalies of pre- and postnatal development; parenteral nutrition; the application of biometrics to nutritional analyses; human and animal dietsetics; and international nutrition. For detailed information regarding these programs, address the chairperson of the group.

Graduate Advisers. Consult the Nutrition Graduate Group Office.

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**Nutrition Science**

(College of Agricultural and Environmental Sciences)

The Major Program

The study of nutrition encompasses all aspects of the collection, preparation, and consumption of food. Also important in the study of nutrition are the biochemical reactions that take place within the body's cells to utilize these nutrients. This is the level at which the nutrition science major explores the general subject of nutrition.

The Program. While students may elect to take courses concerning the social, psychological, economic, or cultural aspects of nutrition, the bulk of the course work making up the major consists of courses in the sciences. Nutrition as it is taught on the Davis campus is a biological science and requires a complete background in chemistry and biology, along with physics and calculus. These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition classes can be taken. Nutrition science students go on to study nutrition in depth during their junior and senior years.

Career Alternatives. The nutrition science major is excellent preparation for technical work in nutrition in animal, food, and pharmaceutical industries. It also provides a strong background for technical writing or health education. Students who wish to continue their studies are well prepared for professional study in nutrition, dietetics, medicine, and other health sciences.

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**B.S. Major Requirements:**

For convenience in program planning, the usual course taken each semester is shown in parentheses. Equivalent or more comprehensive courses are acceptable. (Courses shown without parentheses are required.)

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**English Composition Requirement**

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**See College requirement**

**Preparatory Subject Matter**

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**B.S. Major Requirements:**

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**Satisfaction of General Education requirement plus additional coursework required in social sciences and humanities**

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**Depth Subject Matter**

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**Biochemistry (Biological Sciences 102, 103)**

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**Nutrition 110, 111, 117**

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**Nutrition courses selected from 112, 113, 114, 115, 116A, 116B, 122, 122L, 123, 190, 190C, 198, and 199**

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**Restricted Electives**

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**Biochemistry laboratory (Molecular and Cellular Biology 120L)**

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**Food science (upper division courses)**

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**Physiology with laboratory (Physiology 110, 116A, 116B, 122A, 122B, 123, 190, 190C)**

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**Additional nutrition or related biological and physical sciences**

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**Unrestricted Electives**

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**Total Units for the Degree**

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**B.S. Major Adviser.** B. L. Lonnerdal.

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**Advising Center for the major is located in 1151 Meyer Hall (916-752-2512).**

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**Graduate Study.** The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in nutrition. For information on graduate study contact the graduate adviser. See also the Graduate Studies section in this catalog.

**Graduate Adviser.** See Class Schedule and Room Directory.

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To fulfill the academic requirements for an internship in Dietetics, choose the following courses from the categories in which they appear above: English 1 or 3, Psychology 1, Rhetoric and Communication 1, Sociology 1 or 3 and Anthropology 2, Economics 1A or 1B, Food Science and Technology 100A, 102B, 101A, 101B, Nutrition 110, 111, 113, 116A, 116B, 116AL, 118, 190. The following courses must be added: Agricultural Economics 112, Food Service Management 120, 120L, 121, 122, 123; Applied Behavioral Sciences 173 or Education 110. Students intending to apply for admission to a dietetic internship should contact the Advising Office no later than the first quarter of the junior year for information on procedures.
Pathology, Microbiology, and Immunology
(School of Veterinary Medicine)
N. James MacLachlan, B.V.Sc., Ph.D., Chairperson of the Department
Department Office, 1125 Haring Hall (916-752-1385)

Faculty
Mark L. Anderson, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Alex A. Ardans, D.V.M., M.S., Professor (Medicine and Epidemiology)
Bradditt Barr, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Arthur A. Blackford, V.M.D., Ph.D., Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Patricia C. Blanchard, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Walter M. Boyce, D.V.M., Ph.D., Associate Professor
Pat A. Conrad, D.V.M., Ph.D., Associate Professor
George Cooper, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Microbiology (California Veterinary Diagnostic Laboratory)
James S. Cullor, D.V.M., Ph.D., Associate Professor
Brad DeBey, D.V.M., Ph.D., Associate Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Associate Professor
Dwight C. Hird, D.V.M., Ph.D., Professor
Nami C. Jain, M.V.Sc., Ph.D., Professor
Bill Johnson, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Kenneth M. Lamm, Ph.D., Professor
Linda J. Lowenstein, D.V.M., Ph.D., Professor
N. James MacLachlan, B.V.Sc., Ph.D., Professor
Christopher J. Miller, D.V.M., Ph.D., Assistant Adjunct Professor (Pathology, California Primate Research Center)
F. Charles Mohr, D.V.M., Ph.D., Associate Professor
Peter F. Moore, B.V.Sc., Ph.D., Associate Professor
Frederick A. Murphy, D.V.M., Ph.D., Dean
Harvey J. Olander, D.V.M., Ph.D., Professor
Bennie I. Oaturn, D.V.M., Ph.D., Professor
Roy N. Pool, J.D., D.V.M., Professor
Deryck H. Read, B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
H. L. Shilavaprasad, M.S., B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology (California Veterinary Diagnostic Laboratory)
Anthony A. Stannard, D.V.M., Ph.D., Professor (Medicine and Epidemiology; Pathology, Microbiology and Immunology)
Jeffrey L. Stott, Ph.D., Associate Professor
Richard L. Walker, D.V.M., M.P.V.M., Ph.D., Associate Professor (California Veterinary Diagnostic Laboratory)
Dennis W. Wilson, D.V.M., M.S., Ph.D., Associate Professor
Tah VLuna, D.V.M., Ph.D., Professor
Yuan Chung Zee, D.V.M., Ph.D., Professor
Joseph G. Zinkl, D.V.M., Ph.D., Professor
Part-Time Clinical Faculty
Robert M. DuFort, D.V.M., Assistant Clinical Professor

Courses in Pathology, Microbiology, and Immunology (PMI)

Upper Division Courses

101. Comparative Hematology (3) II. Kaneke, Zinkl
Lecture—2 hours. Prerequisite: Biological Sciences 1A, Physiology 110, Biochemistry 101A-101B or Psychological Sciences 101A-101B or consent of instructor. Principles, interpretation, and applications of clinical hematology; comparative blood cellular morphology and function.

101L. Comparative Hematology Laboratory (3) II. Kaneke, Zinkl, Jain
Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

102. Clinical Biochemistry (3) II. Kaneke
Lecture—3 hours. Prerequisite: Physiology 112, 113, Psychological Sciences 101A-101B or Biochemistry and Biophysics 101A-101B or consent of instructor. Principles of biochemistry as related to alterations in the biochemical constituents of blood, urine and other body fluids.

126. Fundamentals of Immunology (3) I. Ferrick, Gershwin, Stoel
Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defenses against infection; antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hyperactivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

126L. Immunology Laboratory (2) II. Ferrick
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) II. LeFebvre
Lecture—3 hours; laboratory—6 hours. Prerequisite: general microbiology (Microbiology 20 or 102), basic immunology (Pathology, Microbiology and Immunology 126 or Medical Microbiology 107). An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Limited enrollment.

128. Biology of Animal Viruses (3) I. Zee
Lecture—3 hours. Prerequisite: Biochemistry 101A or the equivalent. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses.

132. Introduction to Parasitology (5) III. Conrad
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 18. The nomenclature of human and animal parasites, their general morphology, life cycles, epidemiology, diagnostic techniques, and
Graduate Courses

204. Normal and Abnormal Bone Marrow
Cytology (1) I, II. Jain
Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B, or consent of instructor. Metabolism, ultrastructure, kinetics, homeostasis, cytochemistry, and functions of different leukocytes; physiological, functional, histochimical, and morphological changes in leukocytes in diseases; their role in inflammation and immunologic processes. Offered in alternate years.

205. Immunohematology (2) III. Jain, MacKenzie (Medicine)
Lecture—2 hours. Prerequisite: course 101, Venerology 126, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hemolytic diseases; reactions to blood transfusions; transplantation mechanisms. Offered in alternate years.

214. Immunodiagnostic Techniques (3) II. Lam, Cullor
Lecture—3 hours. Prerequisite: enrollment in MPVM program or consent of instructor. Consideration of immunodiagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple, and inexpensive procedures for mass screening.

216L. Immunodiagnostic Techniques Laboratory (2) II. Lam
Discussion—1 hour. Laboratory—2 hours. Prerequisite: reading course 216L (may be taken concurrently) or consent of instructor. Application and interpretation of serologic techniques for diagnosis of animal diseases.

219. Mycoplasma as Agents of Disease (2) II. Lam
Lecture—3 hours. Prerequisite: Veterinary Microbiology and Immunology 127 or the equivalent or consent of instructor. Offered in alternate years.

228. Molecular Biology of Animal Viruses (3) III. The Staff
Lecture—3 hours. Prerequisite: course 128 or Microbiology 162 or the equivalent. Current status of molecular biology of the major groups of animal viruses. Topics of major emphasis include: virus genome structure, strategy of genome replication and transcription, and regulation of genome expression.

275. Advanced Immunology (3) II. Stolt
Lecture—3 hours. Prerequisite: course 128 or Veterinary Microbiology 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement. Biology of lymphocytes; cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenesis of mechanisms in immunological diseases, immunological unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunohematology and immunobiology. Offered in alternate years.

281. Foreign Animal Diseases (3) II. Olander
Lecture—2 hours. Prerequisite: course 210, and Veterinary Medicine 452, and 451 or 459. For students interested in research and teaching in tropical veterinary medicine. The diseases studied are the most important, or currently ravage third-world countries, particularly Africa and Latin America. Offered in alternate years.

282. Tumor Pathology (3) II. The Staff
Lecture—3 hours. Prerequisite: graduate standing or final-year veterinary student and consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, growth and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in alternate years.

283. Comparative Avian Anatomy and Pathology (1-3) I. Lowenstein
Lecture—3 hours. Prerequisite: anatomy sections—upper division undergraduates, graduates, and veterinary students; pathology sections—third- and fourth-year veterinary students and graduates. Ten laboratory periods covering the gross and microscopic anatomy of a wide range of avian species as appropriate for students interested in avian biology. Twenty lectures encompass comparative aspects of avian pathobiology and disease manifestations or studies interested in avian diseases. Offered in alternate years.

284. Pathogenesis of Infectious Disease (2) III. Cullor
Lecture—2 hours. Prerequisite: upper division or graduate standing in biology or the medical sciences and introductory courses in microbiology, immunology, histopathology, or consent of instructor. Features of pathogenicity and host defense mechanisms common to infection with bacteria, viruses, fungi, and protozoa are emphasized, as well as the important species differences. Perinatal immune responses of dam and offspring are also covered. Offered in alternate years.

285. Cellular Basis of Disease (3) II. Mohr, Wu
Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B, Biological Sciences 104, and either Veterinary Medicine 452 or Medical Pathology 210. The disciplines of cell biology, biochemistry and molecular biology will be applied to the understanding of the basic nature of disease. Covers cellular injury and mechanisms of adaptation, host-defense and vascular responses, and cellular transformation. Offered in alternate years.

286A. 286B-286C. Selected Topics in Advanced Special Pathology (211) I, II, III. The Staff
Lecture—variable. Prerequisite: graduate standing, DVM degree, or final-year veterinary student. Varied topics. See department for details. Offered in alternate years. (Deferred grading only, pending completion of sequence.)

287. Comparative Pathology of Laboratory Animals (3) III. Lowenstein
Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary student; consent of instructor in charge. The pathology of diseases of animals commonly kept in laboratory settings including cold-blooded vertebrates as well as rodents, lagomorphs, and non-human primates. Emphasis will be recognition of lesions and understanding of pathogenesis. Offered in alternate years.

290. Seminar in Veterinary Pathology (1) I, II, III. The Staff
Seminar—1 hour. (SU grading only.)

290A. Current Topics in Avian Medicine (1) I, II, III. Lam, Walker
Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation.

291A. Seminar in Immunology (1) I, II, III. Gershwin
Seminar—1 hour. Prerequisite: consent of instructor. A discussion of the current topics in immunology. (SU grading only.)

291B. Histopathology Conference (1) I, II, III. The Staff (Wilson in charge)
Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected cases based on records and slides. Defense of diagnoses. (SU grading only.)

292A. Seminar in Animal Virology (1) I, II, III. Yilmaz, Zoe
Seminar—1 hour. A discussion of the current topics in animal virology. (SU grading only.) (Same course as Microbiology 296.)

292B. Surgical Pathology Conference (1) I, II, III. The Staff (Pool in charge)
Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Diagnosis and discussion of current surgical pathology cases based on clinic records and microscopic study. (SU grading only.)

293A. Seminar in Infectious Diseases (1) I, II, III. Hirsh
Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (SU grading only.)

293B. Necropsy and Surgical Pathology (1-4) I, II, III. The Staff (Olender in charge)
Discussion—1 hour; laboratory—32 hours. Prerequisite: graduate standing; consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. (SU grading only.)

294A. Comparative Pathology Conference (1) I, II, III. Lowenstein
Seminar—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected topics in comparative pathology based on currently available case materials from fish, laboratory animals, zoo and wild animals and non-human primates. Given jointly by the Department of Pathology in the Medical and Veterinary Schools and the California Primate Research Center. (SU grading only.)

294B. Conservation Biology and Veterinary Medicine (1) I, II. Boyce
Seminar—1 hour. Discussion of current topics in conservation biology as they relate to veterinary medicine; the emphasis is on wildlife. (SU grading only.)

296. Microbiological Diagnosis (2-5) I, II, III. Gershwin, Hirsh
Discussion—1 hour, laboratory—5-14 hours. Prerequisite: laboratory course in veterinary or medical microbiology or the equivalent; course 293 (concurrent); consent of Chief of Microbiology, VM Teaching Hospital. Laboratory diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (SU grading only.)

298. Group Study (1) I, II, III. The Staff
Graduate Group Study of advanced topics in pathology. (SU grading only.)

299. Research (1-12) I, II, III. The Staff
(SU grading only.)

Professional Courses

418. Diseases of Free-Living wildlife (2) II. Boyce
Discussion—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures on the ecology and epidemiology of disease in free-living wild animals including medical management of free-living populations.

418L. Diseases of Free-Living Wildlife Laboratory (3) III. Boyce
Lecture—1 hour; laboratory—90 hours total. Prerequisite: third-year standing in the School of Veterinary Medicine and course 418. Field course designed to develop problem solving skills for field and laboratory assessments of wildlife health and related environment; learn and perform technical aspects of wildlife restraint; develop skills necessary to approach field studies.

Pediatrics
See Medicine, School of
Pharmacology and Toxicology

See Medical Pharmacology and Toxicology (under Medicine, School of); Molecular Biosciences (Veterinary Medicine); and Pharmacology and Toxicology (A Graduate Group), below.

Pharmacology

Pharmacology and Toxicology (A Graduate Group)

David E. Hinton, Ph.D., Chairperson of the Group
Group Office, 4111 Meyer Hall (Department of Environmental Toxicology, 916-752-4516)

Faculty. The 50 faculty in the graduate group are from more than 20 academic departments and organized research units within the College of Agricultural and Environmental Sciences, the School of Medicine and the School of Veterinary Medicine.

Graduate Study. The program of study and research leading to the Ph.D. degree emphasizes an interdisciplinary approach to graduate student training (students are admitted for the M.S. degree only under unusual and limited circumstances). Areas of research specialization are broad in scope and include clinical pharmacology and toxicology, environmental and ecotoxicology, genetic and development pharmacology and toxicology, neuropharmacology and toxicology, and respiratory pharmacology and toxicology. Career opportunities include teaching in professional schools and hospitals, laboratory research in academia, government, industry, environmental control, and agricultural and drug regulatory agencies. For detailed information on the program, contact the Group Office, appropriate graduate advisor, or the group chair.

Graduate Advisers. C.G. Ploner (Veterinary Anatomy and Cell Biology), A.-H. Jance, (Medical Pharmacology and Toxicology), J.A. Last (Pulmonary Medicine), B.W. Wilson (Environmental Toxicology).

Courses in Pharmacology and Toxicology (PTX)

Graduate Courses

201. Principles of Pharmacology and Toxicology I (5) I. Miller (Environmental Toxicology)
Lecture—5 hours. Prerequisite: Biological Sciences 103, Physiology 110. Basic concepts underlying metabolic fate of xenobiotics, receptor and cell biology, and chemotherapy for cancer and infectious disease. Specific topics include fate processes, disposition kinetics, dose-response relationships, cellular toxicity and oncogenes.

202. Principles of Pharmacology and Toxicology II (5) I. Bucknight (Veterinary Pharmacology and Toxicology)
Lecture—5 hours. Prerequisite: satisfactory completion of course 201. Mechanisms of action, pharmacologic and toxic effects, and pathologic changes produced by drugs and other chemical substances on various body systems and their associated organs.

203. Principles of Pharmacology and Toxicology III (5) I. Bucknight (Veterinary Pharmacology and Toxicology)
Lecture—3 hours; discussion—1 hour; tutorial—1-3 hours. Prerequisite: courses 201 and 202. Mecha-
nisms of action, pharmacology, toxic effects, and pathologic changes produced by drugs and other chemical substances on various body systems and their associated organs. Ecotoxicity, risk assessment, and environmental studies.

230. Advanced Topics in Pharmacology and Toxicology (1-3) I. II. III. The Staff
Lecture/discussion/seminar—1 hour each (course format can vary at option of instructor). Prerequisite: course 201 and consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.

290. Seminar (1) I. II. III. The Staff
Current topics in pharmacology and toxicology. (S/U grading only.)

A.B. Major Requirements:

Preparatory Subject Matter-------------------- 16
Philosophy 12, 21, 22. 23 .......................... 16
Depth Subject Matter----------------------- 36
Upper division units in Philosophy selected with approval from the major adviser. ...36
Total Units for the Major------------------------- 52


Minor Program Requirements:

Students wishing to minor in Philosophy may choose a general minor or a minor specializing in logic. There are no specific courses required for the general minor, so students may create a program to suit their own interests, subject to the approval of the minor adviser. The range of choice in the logic specialization is limited to the courses listed.

Philosophy—General----------------------------- 20
20 upper division units in philosophy, chosen in consultation with the minor adviser. At most, 4 units may be lower division if the student has taken two lower division philosophy courses, one of which is drawn from the following: Philosophy 12, 21, 22, 23

Philosophy—Logic------------------------------- 20
Philosophy 12 or Mathematics 108. . . . 4
Philosophy 112------------------------------- 4
Select units from Philosophy 113, 131, 132, 133, 134, 135------------------------ 12


Courses for Non-Majors.

The department offers a range of courses outside the major. One or two years of philosophy is a General Education course for the non-major. Students pursuing careers in agriculture and engineering might find Philosophy 6 especially useful, since this course provides practice in concise and logical writing. Science and mathematics students may find this course useful, as well as Philosophy 12, 107, 108, and 112. Pre-law students and students planning careers in medicine or the various health sciences may be interested in Philosophy 14, 114, 115, 116 and 118. The offerings at the upper division level include courses of direct relevance to students in psychology, history, art, sociology, anthropology, and political science.

Department Activities. The Philosophy department sponsors a lecture-series of well-known philosophers who present papers in their fields of expertise. The department also operates ongoing faculty and graduate student colloquia. Undergraduate students are welcome to attend and join these discussions. Information can be obtained in the department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. In association with the Program on Economy, Justice and Society, the department also offers the Ph.D. in Philosophy with designated emphasis in Economy, Justice and Society. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. M. Jubien.

Courses in Philosophy (PHI)

Lower Division Courses

1. Introduction to Philosophy (4) I. Wedin; II. The Staff; III. Mattey
Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. General Education credit: Civilization and Culture.

*Course not offered this academic year.
5. Critical Reasoning (4) I. Friedman
Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Topic: What is the role of critical thinking in everyday life? What are the main criteria of good reasoning in everyday life and science? Is critical thinking enough to solve complex problems?

6. Critical Reasoning and Writing (4) III. The Staff
Lecture—3 hours; discussion—1 hour. Topics to be covered may include criteria of good reasoning in everyday life and science; basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigations; aids to clarity. Not open to students who have completed course 6.

7. Philosophy of East and West (4) II. Friedman
Lecture—3 hours; discussion—1 hour. Comparative treatment of select theories in Eastern and Western philosophy, e.g., of self, God, being, knowledge, enlightenment. Topics selected from the following: Eastern—Buddhism, Confucian, Hindu, Taoist, Confucian—Confucius, Laozi, Maurya, Buddhist, Japanese, Chinese, Modern Rationalists/Epistemists, Kantian, Hegelian, Existentialist. Offered in alternate years. (Former course 102.) General Education credit: Civilization and Culture.

12. Introduction to Symbolic Logic (4) J. King

13. The Person (4) III. Wolheim
Lecture—3 hours; discussion—1 hour. Examination of the concept of the person, that is, of our intuitions about what persons are, e.g., that persons are agents, that they have a distinct psychology, that they are rational, that they are language-users, that they are mortal. General Education credit: Civilization and Culture.

14. Ethical and Social Problems in Contemporary Society (4) I. Clark
Lecture—3 hours; term paper. Philosophical issues and positions involved in contemporary moral and social problems. Among possible topics are: civil disobedience and revolution, social and sex discrimination, political-economic issues, the control of genetic engineering, technology and human values, sexual morality, freedom in society. General Education credit: Civilization and Culture.

21. History of Philosophy: Ancient (4) I. Malcolm
Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the pre-Socratic, Plato, and Aristotle. General Education credit: Civilization and Culture.

22. History of Philosophy: Seventeenth Century (4) II. Matthey
Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz, and seventeenth-century scientific thinkers. General Education credit: Civilization and Culture.

23. History of Philosophy: Eighteenth Century (4) III. Matthey
Lecture—3 hours; discussion—1 hour. Selections from Locke, Hume, and Kant. General Education credit: Civilization and Culture.

24. Introduction to Ethics and Political Philosophy (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works and currents of ethical theory and political philosophy. Why should we be moral? What is moral behavior? What is justice, both for the individual and for society? What is the role of the individual in society? General Education credit: Civilization and Culture.

31. Approaching Scientific Reasoning (4) II. The Staff
Lecture—2 hours; discussion—1 hour. Introduction to scientific hypotheses and the kinds of reasoning used to assess them. Emphasis on adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories.

Concrete historical and contemporary cases. General Education credit: Civilization and Culture of Nature and Environment.

90X. Lower Division Seminar in Philosophy (1-2) I, II, III. The Staff
Seminar—1 hour. Prior prerequisite: completion of fewer than 84 quarter units; completion of at least one course in philosophy; consent of instructor. Investigation of a selected topic in philosophy through readings, discussions, and written assignments. Emphasis upon student-centered approach, with the instructor acting as a facilitator. (P/N grading only.)

98B. Directed Group Study (1-5) I, II, III. The Staff
Chairperson in charge
Prerequisite: consent of instructor. (P/N grading only.)

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

Upper Division Courses

(Certain upper division courses may not be offered every year.)

101. Metaphysics (4) I. Julian
Lecture—3 hours; discussion—1 hour. Prior prerequisite: one course in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. General Education credit: Civilization and Culture.

102. Theory of Knowledge (4) I. Matthey

103. Philosophy of Mind (4) III. Wolheim
Lecture/discussion—3 hours; term paper. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation.

104. Introduction to Philosophy of Science (4) I. Teller
Lecture—3 hours; discussion—1 hour. Prior prerequisite: one course in philosophy or a science background recommended. Basic problems in the philosophy of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observation, and the scientific method, the nature of theories, operationalism and behaviorism, realism, reduction. General Education credit: Civilization and Culture.

105. Philosophy of Religion (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prior prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. General Education credit: Civilization and Culture.

106. Science and Metaphysics (4) I. The Staff
Lecture/discussion—3 hours; term paper. Prior prerequisite: one course in philosophy or consent of instructor. Intensive study of topics in metaphysics to which the results of modern science are or appear to be relevant: the nature of time, causation, determinism, physicalism, realism.

107. Philosophy of the Physical Sciences (4) II. The Staff
Lecture—3 hours; discussion—1 hour. Prior prerequisite: one course in philosophy or a science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanation, and prediction. Problems of causality, determinism, induction, and probability; the structure of scientific revolutions. General Education credit: Civilization and Culture.

108. Philosophy of the Biological Sciences (4) III. Dietrich; III. Griesemer

109. Philosophy of the Social Sciences (4) I. Teller

110. An Historical Introduction to the Philosophy of Science (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prior prerequisite: one course in philosophy. Several general topics in the philosophy of science introduced and discussed in the context of actual episodes in the development of the natural sciences. Impact of science on society and culture. Critical examination of the philosophical thought of the immediately following historical period.

111. Philosophy of Space and Time (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prior prerequisite: one course in philosophy or consent of instructor. The philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of geometry, conventionalism, absolute versus relational views of space and time, philosophical impact of relativistic theory.

112. Intermediate Symbolic Logic (4) I. Friedman
Lecture—3 hours; discussion—1 hour. Prior prerequisite: course 12 or Mathematics 106 or the equivalent. Topics will vary between metalogic of First-Order logic through the Completeness and Löwenheim-Skolem theorems; and Zermelo-Frankel set theory typically axiomatized as a First-Order theory. May be repeated once when subject area differs.

114. History of Ethics (4) III. Clark
Lecture—3 hours; term paper. Prior prerequisite: philosophy course. Study of fundamental ethical theories and tests from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.

115. Problems in Normative Ethics (4) I. Copp
Lecture/discussion—3 hours; term paper. Prior prerequisite: one course in philosophy. Moral philosophy studied through examination of moral problems and the moral principles and common sense intuitions that bear on them. Problems discussed may include: animal rights, legal rights, euthanasia, juszicis and health care, war, nuclear deterrence, world hunger, environmental protection.

116. Ethical Theories (4) II. The Staff
Lecture/discussion—3 hours; term paper. Prior prerequisite: one course in philosophy; one course in ethics recommended. Study of fundamental ethical theories and problems in ethical theory through an examination of classical and contemporary philosophical theories of ethics. Among the theories that may be discussed are utilitarianism, virtue ethics, deontology, Kantian ethics, and contractarianism.

117. Foundations of Ethics (4) III. Clark
Lecture/discussion—3 hours; term paper. Prior prerequisite: one of courses 114, 115, 116, 101, or 137. Advanced investigation of ethical foundations and theories and defenses of morality. Among the topics that may be discussed are moral realism and anti-realism, cognitivism and non-cognitivism, types of rela-
The Major Program

The mission of the Department of Physical Education is the integrative study of physical activity and its adaptive consequences on human form and function. The Program. The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is designed primarily for those students who desire a liberal arts program with a broad-based lower division curriculum. This program permits specialization in either the biological or psychological aspects of physical education, and is more appropriate for those who intend to pursue careers in coaching, teaching, or in community/corporate exercise programs, and for those intending graduate study in the behavioral aspects of sport and exercise. The Bachelor of Science program is designed for students desiring a more intense curriculum in the natural sciences. It involves more extensive physical and life science preparation in lower division courses, and requires additional upper division course work more specific to either biomechanics or exercise physiology. This degree program provides preparation for graduate study in exercise and sport science, for careers in the allied health sciences, and for professional schools in medicine, physical therapy, and podiatry.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>32-35</th>
<th>Biological Sciences 1A</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 2A, 2B</td>
<td>10</td>
<td>Physical Education 45</td>
<td>3</td>
</tr>
<tr>
<td>Physics 1A or 5A</td>
<td>3-4</td>
<td>Psychology 1 or 15</td>
<td>3-4</td>
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<tr>
<td>Statistics 13</td>
<td>4</td>
<td>Additional requirements:</td>
<td></td>
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<tr>
<td>Biological emphasis—Biological Sciences</td>
<td>18</td>
<td>Biological emphasis—Psychology</td>
<td>41</td>
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</tbody>
</table>

Depth Subject Matter

| Cell Biology and Human Anatomy 101 | 4 |
| Cell Biology and Human Anatomy 101L | 2 |
| Physical Education 101, 101L, 102, 103, 104, 106 | 16 |
| Neurobiology, Physiology and Behavior 101 | 5 |

Minimum of 12 upper division units in physical education chosen with approval by a major adviser.

B.S. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>S3-59</th>
<th>Anthropology 1</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences 1A</td>
<td>5</td>
<td>Chemistry 2A-2B or 24H-25H</td>
<td>10</td>
</tr>
<tr>
<td>Computer science (Computer Science Engineering 10, 15, 30, or Engineering 5)</td>
<td>4</td>
<td>Mathematics 18A-18B or 21A-21B</td>
<td>6-8</td>
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<tr>
<td>Physical Education 45</td>
<td>3</td>
<td>Physics 5A-5B or 9A-9B</td>
<td>8</td>
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<tr>
<td>Psychology 1 or 15</td>
<td>3-4</td>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Exercise Physiology emphasis: Chemistry 9A-9B, or 116A-116B</td>
<td>6-8</td>
<td></td>
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</tr>
</tbody>
</table>

Depth Subject Matter

| Cell Biology and Human Anatomy 101 | 6 |
| Physical Education 101, 101L, 102, 103, 104, 106 | 16 |
| Neurobiology, Physiology and Behavior 101 | 7 |
| Required electives: | 24 |

1. Minimum of 10 upper division units from outside the major selected with advisor's approval and as restricted below.

2. Minimum of 12 upper division units of Physical Education courses, including Biomechanics emphasis: Physical Education 113, 115, 125.

Exercise Physiology emphasis: at least 9 of the 12 units must be selected from Physical Education 110, 111, 112, 113, 117, 118.

No variable-unit courses or Physical Education 143A, 143B, 144, 145, 146L, 147L, 148L, 148L, or 149L may be used to fulfill these requirements. Consult your advisor regularly.

Total Units for the Major

| 104-110 |

Honor Program. Those students with outstanding records in the major requirements may elect to enter the Honors Program with the consent of an advisor. A senior project must be completed, for which up to 10 units (minimum of 6 units) of Physical Education 199 (split over two quarters) may be earned. The units are taken in addition to the major requirements, and it should be realized that only a maximum of ten 199 units may be counted toward the B.S. degree total unit requirement.


Teaching Major. The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

Minor Program Requirements:

| Physical Education | 18 |

At least 18 upper division units in physical education from one of three options...

1. Biomechanics:
   1. Physical Education 103 and one course from 101, 102, 104, 105.
   2. Minimum of two courses from Physical Education 113, 115, 125.
   3. Additional courses to complete a total of 18 upper division units. No variable-unit

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*Course not offered this academic year.
Courses in Physical Education (PHE)

Lower Division Courses

1. Physical Education for Men and Women (12/2) I, II, III. The Staff (Chairperson in charge)
   Laboratory—2 hours. Sections in: (a) sports skills, rules and strategy; (b) physical fitness and personal health; (c) recreation; (d) dance, and (e) intercollegiate athletics. May be repeated for a total of 6 units. (PYP grading only.)

2. Principles of Basic Exercise Conditioning (2) I. Swimley (in charge)
   Lecture—1 hour, laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches current in selected exercise training regimens, e.g., the 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. (PYP grading only.)

5. Foundations of Emergency First Aid Services (2) I, II, III. Harrell (in charge)
   Lecture—1 hour, laboratory—1 hour. An introduction to the basic principles and practices that fulfill the prerequisites for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course, the Standard Red Cross Certificate is awarded.

6. Participation and Praction in NCAA Competitions (1) I, II. Harrell (in charge)
   Discussion — laboratory—10-20 hours. Prerequisite: consent of instructor (coach). Preparation and participation in intercollegiate athletics. Development of fundamental skills and team skills. In-depth knowledge of rules and strategy. Advanced sports competition and Conference and NCAA levels. May be repeated for a total of 6 units. (PYP grading only.)

7. Professional Physical Education Activities: Men and Women (1) I, II, III. The Staff (Chairperson in charge)
   Lecture—1 hour, or laboratory—2 hours. Fundamentals for skills for: (a) coaching competitive athletics; (b) classroom teaching and coaching; (c) classroom teaching and officiating. May be repeated for a total of six units.

15. Administration of Intramural Sports (2) I. Colberg
   Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

25. Theory of Lifesaving and Water Safety (2) I, II, I. Jahn
   Lecture—1 hour, laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current American Lifesaving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of lifesaving classes. (American Red Cross Red Cross Water Safety Instructor’s Certificate awarded upon successful completion of necessary requirements.)

27. Training Course for Water Safety Instructors (2) I. Jahn
   Lecture—1 hour, laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current American Lifesaving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American Red Cross Water Safety Instructor’s Certificate awarded upon successful completion of necessary requirements.)

35A. Dance Composition (2) I. Bolten
   Laboratory—5 hours. Prerequisite: course 1, modern jazz or jazz dance techniques, or consent of instructor. Composing phases of movement with a knowledge of elements involved in the craft of choreography: design, dynamics, rhythm, motivation and gesture, vocabulary.

35B. Dance Composition (2) II. Bolten
   Laboratory—5 hours. Prerequisite: course 35A or consent of instructor. To learn the art of dance production as it applies to the use of lighting, costume design, selection of music, and building of stage props.

35C. Dance Composition (2) III. Bolten
   Laboratory—5 hours. Prerequisite: courses 35A, 35B, or consent of instructor. To encourage the student to create new dance forms and prepare them for 4-7 minute presentation in a spring concert or stage. Costumes and lighting can be created and correlated for each dance by the choreographer.

36A-36B. History of Dance (3-3) I-III
   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.

*Course not offered this academic year.
Biological and Human Anatomy 101 and Physics 1A; Physics 5A recommended. Analytical and mechanical fundamentals of human motion. Qualitative and quantitative application of kinematic principles to a variety of movement situations.

104. Introduction to Motor Control and Skill Acquisition (3) J. Jennings
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1 or 15, and course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neurophysiological and behavioral accounts of motor control processes are examined. Theories of movement representation and control are discussed. 

105. Psychosocial Factors in Motor Performance (3) J. Jennings
Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Survey of theories and experimental findings from social psychology and human motivation and their application to motor performance, including sex differences, success and failure, expectations, anxiety, competition, and aggression.

110. Exercise Metabolism (3) J. Meló
Lecture—2 hours; laboratory—5 hours, for five 4-hour sessions. Prerequisites: courses 101, 102 Chemistry 2A. Focus on energy metabolic pathways and fuels used during different modes of exercise. Also, exercise-induced adaptations for exercise 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) J. Adams, J. Meló
Lecture—2 hours; laboratory—3 hours, with discussion—1 hour (alternate weeks). Prerequisite: courses 101 and 102, or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied.

112. Clinical Exercise Physiology (4) J. Holly
Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined in normal and diseased populations (cardiovascular, pulmonary, diabetic). Assessment (graded exercise testing), exercise prescription and effects of exercise conditioning will be studied.

113. Growth and Development in Human Performance (3) J. Adams, J. Meló
Lecture—3 hours. Prerequisite: Biological Sciences 1A, Cell Biology and Human Anatomy 1, and Neurobiology, Physiology and Behavior 101. Development and human performance potential from conception to old age, including influence of exercise, athletic participation, and preventive medicine. Alterations in motor skill patterns, morphology, and body composition, and physiological capacities will be covered.

115. Biomechanical Bases of Movement (3) J. K. Williams
Lecture—2 hours; laboratory—3 hours to alternate weekly. Prerequisite: course 101 or consent of instructor. Biomechanical bases of human movement investigated; topics include muscle-skeletal mechanics, tissue mechanics, electrical and mechanical properties of skin and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion.

116. Nutrition for Physically Active Persons (3) J. Meló
Lecture—3 hours. Prerequisite: course 101, Neurobiology, Physiology and Behavior 110. The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans.

117. Exercise and Aging In Health and Disease (2) J. Holly
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) or 113 (concurrently). Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary and renal diseases, diabetes, obesity, lipomas, etc.). Exercise will then be considered as a protective and/or therapeutic modality.

118. Physical Fitness in the Workplace (3) J. III. The Staff
Lecture—2 hours; discussion—1 hour. Explores principles and practices of health promotion in the workplace. Established assessment procedures including validation of job-specific skills will be conducted. Cost and health benefits are examined with respect to onsite and offsite programs of fitness maintenance and remediation.

120. Sports in American Society (4) J. Gill-Fisher
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) J. III. Jennings
Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection in sport psychology through a critical examination of relevant experimental, clinical, and field data.

122. Psychological Effects of Physical Activity (3) J. II. Jennings
Lecture—3 hours. Prerequisite: Psychology 1 or 15, and upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety).

125. Neuromuscular and Behavioral Aspects of Motor Control (3) J. G. Hawkins
Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences.

128A. Research Diving: 65 Feet (1) J. Fastenau
Lecture—1 hour. Laboratory—1 hour. Prerequisite: course 105 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 sessions available for certification (contact Department Office for details). (P.N.P. grading only.)

128B. Research Diving: 65 Feet (2) J. Fastenau
Lecture—1 hour. Laboratory—2 hours. Prerequisite: course 105 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 sessions available for certification (contact Department Office for details). (P.N.P. grading only.)

131. Physical Education for the Handicapped (4) J. Ichihara
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 104 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) J. III. The Staff
Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety and first aid programs in school and community sports, recreation and all types of group activities. The study and practice of first aid leadership skills. (The

American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

133. Prevention and Care of Sports Injuries (3) J. II. The Staff (Chairperson in charge)
Lecture—1 hour; laboratory—6 hours. Prerequisite: upper division standing; Cell Biology and Human Anatomy 101 (may be taken concurrently). Management of the prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques.

135. Advanced Procedures in Evaluation and Management of Athletic Injuries (3) J. III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: course 133, Cell Biology and Human Anatomy 101, and consent of instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. In-depth study of selected current topics in athletic training.

142. Physical Education in the Public Schools (3) J. II. Piper
Lecture—3 hours. Analysis and study of the principles and methods for teaching physical education at the elementary and secondary levels.

143A. Coaching Effectiveness (2) J. II. The Staff
Lecture—2 hours. Prerequisite: consent of instructor. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport psychology, coaching, (P.N.P. grading only.)

143B. Coaching Effectiveness (2) J. II. The Staff
Lecture—2 hours. Prerequisite: course 143A. Application of general principles of management and administration to athletic coaching in high school. (P.N.P. grading only.)

144. Principles of Health Education (2) J. II. The Staff
Lecture—2 hours. Prerequisite: course 44 and upper division standing or consent of instructor. Principles of teaching health education in the public schools. (P.N.P. grading only.)

145. Administration of Health/Fitness Programs (2) J. II. The Staff
Lecture—2 hours. Principles of organizing and directing health/fitness programs. Includes selection and training of personnel, methods of evaluating personnel and programs, and elements of planning.

146. Theory and Practice of Exercise Training (1) J. II. III. Jennings
Lecture/discussion—1 hour. Prerequisite: course 2 or 425. Psychological adaptations, exercise programming and behavioral techniques focusing on young and middle-aged adults. Topics include exercise prescription, nutrition, psychological effects of exercise, stress management techniques, and exercise adherence techniques. (P.N.P. grading only.)

146L. Shape-Up Testing and Training Laboratory (1) J. II. III. Jennings
Lecture—3 hours. Prerequisite: course 146L (may be taken concurrently). Primary activities involve leading shape-up classes, attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (P.N.P. grading only.)

147L. Adult Fitness Training Laboratory (1) J. III. Jennings
Laboratory—3 hours. Prerequisites: courses 146, 146L, and 102 may be taken concurrently); current CPR. Involves attending and assisting with aerobic training sessions for older adults, including exercise testing sessions. (P.N.P. grading only.)

148. Theory and Practice of Exercise Testing (1) J. II. III. Holly
Lecture/discussion—1 hour. Prerequisite: courses 101, 102, 112 (may be taken concurrently), and 146; current CPR. Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing, and training to healthy and diseased populations. (P.N.P. grading only.)

148L. Adult Fitness Testing Laboratory (1) J. II. III. Holly
Laboratory—3 hours. Prerequisite: courses 146, 148 (concurrently), current CPR. Testing symptomatic and
asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter required only.

149L. Cardiopulmonary Rehabilitation Laboratory (I) I, II, III. Holly Laboratory—3 hours. Prerequisite: courses 148 and 149L; current CPR certification. Testing and training of cardiac patients or individuals at high risk of developing heart disease. Present mini-lectures to programs participants, maintain patient records, and present patients' cases in rounds. Two quarters minimum; third quarter grading only.

150. Recreation in the Community (3) I, II. Jahn Lecture—2 hours; discussion—1 hour; two Saturday field trips—4 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities.

192. Physical Education Internship (2-12) I, II, III. The Staff (Chairperson in charge) Internship—5 to 60 hours; written project proposal and evaluation. Prerequisite: full upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physical Education majors. Work experience in the application of physical education programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit for total of 12 units (including course 92), but not more than 6 units will be counted toward Physical Education major. (P/NP grading only.)

197T. Tutoring in Physical Education (1-3) I, II, III. The Staff (Chairperson in charge) Tutorial—1 to 3 hours. Prerequisite: consent of chairperson. Tutoring students in lower division physical activity courses. Written reports on methods and materials required. May be repeated once for credit. (P/NP grading only.)

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

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

Graduate Courses

200A. Introduction to Research: History and Philosophy in Physical Education (2) I. Mole Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science and the application to current research in human performance; benchmark studies in the evolution of the field.

200B. Problem Solving and Research Design in Physical Education (2) I, II. Jennings Discussion—1 hour; seminar—1 hour. Prerequisite: course 200A. Conventional approaches to problem solving; processes in research design and analysis; written and oral presentation of a thesis proposal.

201A. Sports Medicine: Medical Aspects of Sports Injuries (3) I. Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systematic physiology or anatomy, and medical students. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed.

201B. Research Topics in Biomechanics (3) I, II. Williams Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing; course 115 recommended. Survey of current research into diverse areas of biomechanics of human movement. Topics include locomotion, sport biomechanics, electromyography, muscle-skeletal and tissue mechanics, advances in measurement technology, and clinical biomechanics. Offered in alternate years.

211. Anthropometry in Physical Activity (3) III. Adams Lecture—2 hours; laboratory—five 3-hour sessions to alternate weeks. Five 1-hour discussion sessions. Prerequisite: courses 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, and of body structural and compositional changes accompanying prolonged, systematic physical conditioning. Offered in alternate years.

222. Metabolic Functions in Exercise (4) III. Mole Lecture—2 hours; discussion—1 hour, laboratory—3 hours, Research Laboratory 102, Neurobiology, Physiology and Behavior 101. Review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

223. Physiological Basis of Physical Fitness (2) II. Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical training and adaptation. Offered in alternate years.

224. Exercise Electrocardiography (2) I. Holly Lecture—2 hours. Prerequisite: course 112 or consent of instructor. Physiological and clinical implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as the significant factor in normal and abnormal ECG. Offered in alternate years.

225. Seminar in Cardiac Rehabilitation (2) I, II. Holly Seminar—2 hours. Prerequisite: course 112 or graduate standing and consent of instructor. Critical examination of literature dealing with the causes, prevention and treatment of cardiovascular disease with particular emphasis on dependence through cardiac rehabilitation. Both the theoretical bases and practical approaches to cardiac rehabilitation will be examined. Offered in alternate years.

226. Measurement of the Biological Aspects of Human Performance (3) I. The Staff (Adams in charge) Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101; consent of instructor. Introduction to primary measurement techniques used to investigate the biological bases of human performance. Emphasis placed on the critical selection of the most valid tests and on obtaining the most accurate and reliable results.

227. Research Techniques in Biomechanics (4) II. Williams, Hawkins Lecture—2 hours; laboratory—4 hours; Term Paper/Discussion—1 hour. Prerequisite: consent of instructor, Mathematics 222B; course 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227B/ Mechanical Engineering 227.)

228. Skeletal Muscle Mechanics: Form, Function, Adaptability (3) II. Hawkins Lecture—3 hours. Prereq: 1-hour: graduate standing, consent of instructor, and basic background in biology, physiology, and engineering. Engineering 3 and 45, Mathematics 225B, and Neurobiology, Physiology and Behavior 110 recommended. Basic structure and function of skeletal muscle is examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disease. Special emphasis on the relation between muscle structure and function and its implications (e.g., force, work, power). (Same course as Biomedical Engineering 228.)

230. Human Performance: Psychological Aspects (3) II. Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Critical review of current literature on learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport.

232. Health Psychology: Effects of Physical Activity (3) I. Jennings Seminar—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health.

236. Seminar in Physical Education (1) I. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing; required of all first-year students for first two quarters. Presentation and discussion of topics of interest, and the analysis of research in physical education. (S/U grading only.)

238. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

239. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing; consent of instructor and department chairperson. (S/U grading only.)

Professional Courses

300. The Elementary Physical Education Program (2) III. Goldbar Lecture—1 hour; laboratory—2 hours; field trips to selected programs. Prerequisite: senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program.

305. Methods of Teaching Physical Education (3) III. Goldbar Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 7, or consent of instructor. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only.)

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Physical Medicine and Rehabilitation

See Medicine, School of

Physics

(College of Letters and Science)

Barry M. Klein, Ph.D., Chairperson of the Department

Wendell H. Petter, Ph.D., Vice Chairperson of the Department

Department Office, 225 Physics-Geology Building (916-752-1500)

Faculty

Robert H. Becker, Ph.D., Professor

Frank P. Brady, Ph.D., Professor

Thomas A. Cahill, Ph.D., Professor

Steven Carle, Ph.D., Associate Professor

Daniel A. Cebert, Ph.D., Assistant Professor

Ling-Lie Chau, Ph.D., Professor

Lawrence B. Coleman, Ph.D., Professor, Academic Senate Distinguished Teaching Award

Linton R. Druce, M.D., Professor

James E. Hrapa, Ph.D., Professor

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*Course not offered this academic year.*
Physics

Minor Program Requirements:
Three distinct minors are offered, all requiring prerequisites equivalent to Mathematics 21A-21B-21C-21D and 22A-22B and Physics 9A-9B-9C-9D. Students considering the possibility of earning a Physics minor should consult with a Physics major adviser before beginning work in one of these minor programs.

UNITS

Physics Class...

Classical Physics emphasis...


(If the fall quarter courses, 104A, 105A, 110A, 112A, are taken in different years, 104A and 105A should be taken in the first year; course 105C does not require 105B.)

UNITS

Quantum Physics emphasis...


(Physics 104A-104B and 105A-105B must be preceded 115A-115B. Physics 110A recommended.)

UNITS

General Physics emphasis...


(Physics 104A-104B and 105A-105B must be preceded 115A.)

Graduate Study. The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees and the Ph.D. degree with an Applied Physics Research Specialty. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, University of California, Davis, CA 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 (AST)

Lower Division Courses
2. Introduction to Modern Astronomy and Astrophysics (4). The Staff Lecture—3 hours; laboratory/discussion—2 hours. Prerequisites: 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, relativities, 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.

18. General Astronomy (4) III. The Staff Lecture—3 hours; laboratory/discussion—2 hours. A non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, galaxies, and the universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extra-terrestrial communications. Not open to students who have received credit for course 2 or any physics course (except 10, 137, 160), General Education credit: Nature and Environment.

Courses in Physics (PHY)

Physics 10 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Physics 1 is a two-quarter sequence requiring some mathematics (trigonometry). Either 1A alone or both
quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 5 is a three-quarter sequence using calculus throughout, and including laboratory work as an integral part. The entire sequence is recommended, rather than just 1 or 2 quarters.

Physics 9 is a four-quarter sequence using calculus throughout, and including laboratory work as an integral part. The course is designed primarily for students in the physical sciences and engineering.

Note: Faculty listed for each course are well acquainted with the course, but may not teach it this year.

Lower Division Courses

1A. Principles of Physics (3) I. McCoIn
Lecture—3 hours. Prerequisite: trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open for credit to students who have completed course 5A or 9A (or former 6A or 8A).

1B. Principles of Physics (3) II. McCoIn
Lecture—3 hours. Prerequisite: course 1A or 5A (or former 6A); and consent of instructor. Continuation of course 1A. Emphasis on mechanics, electricity, modern physics. Not open for credit to students who have completed course 5B, 5C, 9B, 9C, or 9D (or former 6B or 8B, 8C, 8D).

5A. General Physics (4) I. I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: Mathematics 16B (may be taken concurrently). Mechanics and fluids. Introduction to general principles and analytical methods used in physics. Primarily for students with special majors. Students who have had course 6A or 9A (formerly 8A) may not receive credit for 5A. Those who have had course 1A may receive only 2 units of credit.

5B. General Physics (4) II. I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5A or 1A with consent of instructor and Mathematics 16B; or Physics 9A (formerly 8A). Continuation of course 5A. Kinetic theory and thermodynamics, wave phenomena, optics. Students who have had course 9B or 9C may not receive credit for course 5B. Those who have had course 1B may receive only three units of credit.

5C. General Physics (4) III. I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5B. Continuation of course 5B. Electricity and magnetism, modern physics. Students who have had course 6B or 9C (former 8B) may not receive credit for course 5C. Those who have had course 1B may receive only three units of credit.

9A. Classical Physics (4) I. III. Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: Mathematics 21B. Mechanics. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Only two units of credit allowed for students who have completed course 1A. Only one unit of credit allowed for student who have completed course 5A.

9B. Classical Physics (4) II. I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9A or 5A with consent of instructor. Mathematics 21C. Mathematics 21D (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Not open for credit to students who have completed Engineering 105A. Only 1 unit of credit allowed for students who have completed course 5B.

9C. Classical Physics (4) II. I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9B; Mathematics 21D; Mathematics 22A (may be taken concurrently). Continuation of course 9B. Electricity and magnetism including circuits and Maxwell's equations. Only one unit allowed to students who have completed course 5C.

9D. Modern Physics (4) III. I. The Staff
Lecture—3 hours; discussion—1 1/2 hours. Prerequisite: course 9C and Mathematics 22A; Mathematics 22B recommended (may be taken concurrently). Introduction to special relativity, quantum mechanics, atomic and subatomic physics. Only two units of credit allowed to students who have completed course 5D.

9H. Honors Classical Physics (4) I. III. Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: high school physics, Mathematics 21A, 21B with at least a B+ average (or by recommendation of academic advisor). Same material as course 9A. In greater depth. Only 2 units of credit allowed for students who have completed course 1A or 5A.

9H. Honors Classical Physics (4) II. I. The Staff
Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: high school physics, Mathematics 21A, 21B with at least a B+ average (or by recommendation of academic advisor). Mathematics 21C, 21D (may be taken concurrently). Continuation of course 9H. Same material as in course 9B, but in greater depth. Only 2 units of credit allowed for students who have completed course 5B.

9H. Honors Classical Physics (4) III. I. The Staff
Lecture—3 hours; discussion—1 1/2 hours. Prerequisite: high school physics, course 9C or course 9E (with recommendation of course 9A instructor or academic advisor). Mathematics 21C, 21D (may be taken concurrently). Continuation of course 9H. Same material as in course 9C, but in greater depth. Only 2 units of credit allowed for students who have completed course 5C.

9H. Honors Modern Physics (4) III. I. The Staff
Lecture—3 hours; discussion—1 1/2 hours. Prerequisite: high school physics, course 9E (with recommendation of course 9C instructor or academic advisor). Mathematics 21A, 21B (may be taken concurrently). Continuation of course 9H. Same material as in course 9D, but in greater depth. Only 3 units of credit allowed for students who have completed course 5D.

10. Basic Concepts of Physics (4) I. II. Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of basic principles: motion, gravitation, electricity and magnetism, light, relativity, atoms, quanta, nuclei, elementary particles. Includes lecture demonstrations and elementary problems. Departmental office for emphasis (history, philosophy, environment, natural phenomena, etc.) each quarter. Students who have had any other physics course (except 137, 160) will not receive credit for course 10. General Education Credit: Natural and Environment.

90X. Lower Division Seminar (1) I. II. The Staff
Lecture—1 1/2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic. Oral and written presentations, readings, assignments, or special activities such as laboratory work. May not be repeated for credit. Limited enrollment.

98. Directed Group Study (1-9) I. II. The Staff
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I. II. The Staff
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics (4) Lecture—3 hours. Discussion—1 hour. Prerequisites: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C- or better; or consent of department; course 104A passed with a grade C- or better; consent of department required for 104B. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with a applications to physics.

105A-105B. Analytical Mechanics (3-3) I. Ko
Lecture—3 hours. Prerequisites: courses 9B, 9C, 9D, and Mathematics 21D, 22A, and 22B passed with grade C- or better; or consent of department; course 104A and 105A passed with a grade C- or better; or consent of department required for 105B. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations.

105A. Computational Laboratory in Mechanics (1). Lecture—3 hours. Prerequisite: Engineering 5 or the equivalent; course 105A concurrently. Introduction to the application of computers to solving physics problems. Introduction to numerical and graphical methods in mechanics. (P/NP grading only.)

105B. Computational Laboratory in Mechanics (1). Lecture—3 hours. Prerequisite: course 105A; course 105B concurrently. Application of numerical and graphical methods in mechanics. (P/NP grading only.)

105C. Continuum Mechanics (3). Lecture—3 hours. Prerequisite: courses 9B and 105A and passed with a grade of C- or better, or consent of department. Continuum mechanics.

108. Optics (3) I. Caltll
Lecture—3 hours. Prerequisite: course 9B and 5 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of diffraction, interference, reflection, refraction, polarization, and applications to current problems in astrophysics, material science, and atmospheric science. Study of modern optical instrumentation. Open to non-majors.

108B. Optics Laboratory (1). Lecture—3 hours. Prerequisite: course 108 concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques.

110A-110B. Electricity and Magnetism (3-3) I-III. Draper
Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D, and Mathematics 21D, 22A, and 22B passed with grade C- or better, or consent of department; prerequisite for 110B is courses 110A and 104A passed with a grade of C- or better; or consent of department; prerequisite for course 110C is courses 110B and 104B passed with a grade of C- or better, or consent of department. Theory of electrodynamics, electromagnetism, Maxwell's equations, electromagnetic waves.

112A-112B. Thermodynamics and Statistical Mechanics (3-3) I-III. Garrod
Lecture—3 hours. Prerequisite: course 105B or 115A or the equivalent. Introduction to statistical mechanics and thermodynamics.

115A-115B. Introduction to Quantum Mechanics (3-3) I-III. Quientraker
Lecture—3 hours. Prerequisite: for 115A—courses 104A and 105B and passed with grade C- or better, or consent of department; for 115B—115A passed with a grade of C- or better, or consent of department. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

116A. Electronic Instrumentation (4) I. Pellet
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C. Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

116B. Electronic Instrumentation (4) II. Pellet
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 9D, 116A. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics.

121. Foundations of Atomic and Molecular Physics (4) I. McColl
Lecture—3 hours; outside work—9 hours. Prerequisite: course 93; 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.
Physics

122A. Advanced Physics Laboratory: Atomic/ Solid State (I). II. Web Lecture—3 hours. Laboratory—8 hours. Prerequisite: course 9D. Experimental techniques and measurements in atomic and solid-state physics; e.g., spectroscopy, optical pumping, magnetic resonance, superconductivity, semiconductor devices, ferroelectrics. The student performs three to six experiments depending on difficulty. Individual work is stressed.

122B. Advanced Physics Laboratory: Nuclear/Plasma (I). II. Landau Lecture—3 hours. Laboratory—8 hours. Prerequisite: course 9D. Similar to course 122A with experiments in gamma-ray coincidence, Mössbauer Effect, Rutherford scattering, magnetic lifetime, and others. Student performs three to six experiments, some of these may be chosen from course 122A.

127. Introduction to Astrophysics (3) III. Becker Lecture—3 hours. Prerequisite: course 105A. Celestial mechanics, radiation, astrophysical measurements, electromagnetic processes, the sun, binary and variable stars, stellar structure and evolution, galaxies, cosmology. Offered in alternate years.

129A. Introduction to Nuclear Physics (3). I. Brady Lecture—4 hours, terminal examination 115A. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics.

129B. Nuclear Physics (4) II. Brady Lecture—3 hours; outside work—9 hours. Prerequisite: courses 115B, 129A, Continuation of course 129A.


137. Science and Technology of Nuclear Arms Effects and Control (3) I. Jungmann, Craig (Applied Science) Lecture—3 hours. Prerequisite: upper division standing; one course from courses 18, 5C, 9D, 10. Scientiﬁc and technical aspects of nuclear arms systems and nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. General Education credit: Contemporary Societies or Nature and Environment (Same course as Applied Science Engineering 137.)

140A. Introduction to Solid-State Physics (3) II. Zhu Lecture—3 hours. Prerequisite: course 115A or 9D, and consent of instructor. Survey of basic concepts and classification of experimental phenomena in solids. Crystal structure, phonons, simple metals.

140B. Introduction to Solid-State Physics (3) III. Zhu Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. Discussions of the following: energy bands and Fermi surfaces, transport phenomena, semiconductors, ferromagnetism, magnetic resonance.

160. Environmental Physics and Society (3). Jungmann Lecture—3 hours. Prerequisite: course 9D or 5C; or course 10 or 18 and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Engineering 160.) General Education credit: Contemporary Societies or Nature and Environment.

190X. Upper Division Seminar (1-2) I. II. III. The Staff Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in physics. Emphasis on student participation in learning. May not be repeated for credit. Limited enrollments.

194A-194BH. Special Study for Honors Students (4-4) I. II. III. The Staff (Chairperson in charge) Independent study—12 hours. Prerequisite: consent of instructor and enrollment in Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. (Deferred grading only, pending completion of sequence.)

195. Senior Thesis (I, II, III. The Staff (Chairperson in charge) Independent study—15 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units.

197T. Tutoring in Physics and Astronomy (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200A. Theory of Mechanics and Electromagnetics (4-4) I, II. Webb Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104B, 105B, and 110C or the equivalent; course 204A concurrently. Theoretical approaches in classical mechanics including the use of variational principles and the Hamiltonian formalism. Lagrange equations; symmetries, conservation laws, and Noether's theorem; Lagrangian density, Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations.

200B-200C. Theory of Mechanics and Electromagnetics (4, 4-4) II, III. Webb Lecture—3 hours; independent study—1 hour. Prerequisite: course 200A, and course 204B concurrently. Theoretical approaches in electromagnetic fields including static electromagnetic fields; Maxwell's equations, plane waves in various media, magnetohydrodynamics; diffraction theory; radiating systems; and special relativity.

204A-204B. Methods of Mathematical Physics (4-4) II, I. Chau Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104A and 104B or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis.

215A-215B-215C. Quantum Mechanics (4-4-4) II, III. Reid. Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics and its applications to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation.

219A-219B. Statistical Mechanics (4-4) I, II. Singh Lecture—3 hours; independent study—1 hour. Prerequisite: course 215B or the equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with applications to properties of solids, real gases, polar molecular matter, etc.; fluctuation about the equilibrium state; and phase transitions and critical phenomena.

224A. Advanced Nuclear Theory 3 (I, II. Bray Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Not offered every year.

226B. Advanced Nuclear Theory 3 II. Bray Lecture—3 hours. Prerequisite: course 222A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Not offered every year.

230A. Quantum Theory of Fields 3 (I, II. Gunion Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

230B. Quantum Theory of Fields 3 II. Carlip Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formalisms.

240A-240B. Solid State Physics 3 (3-3) II. Scalatlar Lecture—3 hours. Prerequisite: courses 215A-215B-215C; courses 140A-140B recommended. Introduction to the phenomena and theory of the solid state. Periodic structures, lattice surfaces, electron states, static properties, electron-electron interaction, electron dynamics, transport properties, optical properties, the Fermi surface, magnetism, superconductivity.

240C-240D. Solid State Physics 3 (3-3) II, III. Zimanyi Lecture—3 hours. Prerequisite: course 240A-240B or the equivalent. General introduction to many-body theoretical techniques as applied in solid-state physics.

241. Advanced Topics in Magnetics 3 II, III. Singh Lecture—3 hours. Prerequisite: courses 240A-240B, 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Offered in alternate years.

242. Advanced Topics in Superconductivity 3 II. Scalatlar Lecture—3 hours. Prerequisite: courses 240A-240B, 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Offered in alternate years.
245A. High-Energy Physics (3) II. Kiskel Lecture—3 hours. Prerequisite: course 230A. Phenomenology and systematic studies of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders.

245B. High-Energy Physics (3) III. Mani Lecture—3 hours. Prerequisite: course 245A. Electromagnetic interactions, quantum chromodynamics, and jet and other experimental tests; quark and gluon distribution functions, quark and gluon scattering; applications of the renormalization group. Not offered every year.

250. Special Topics in Physics (3) I, II, III. The Staff Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from year to year. May be repeated three times for credit. Not offered every quarter.

252A. Techniques of Experimental Physics (3) III. The Staff Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized.

252B. Techniques of Experimental Physics (3) III. Mani Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized.

259. Seminar in Nuclear Physics (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (SU grading only.)

261. Seminar in Elementary Particle Physics (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. (SU grading only.)

262. Seminar in Condensed Matter Physics (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. (SU grading only.)

265. Introduction to Departmental Research (1) II. The Staff (Chairperson in charge) Seminar—1 hour. Seminar to introduce first- and second-year graduate students to the fields of specialty and research of the Physics staff. (SU grading only.)

267. Research on the Teaching and Learning of Physics (3) II. Potter Seminar—3 hours. Prerequisite: graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students understand of physics and other science concepts and the implications of this research for instruction.

288. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (SU grading only.)

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

Professional Course

390. Methods of Teaching Physics (1) I, II, III. The Staff Lecture/discussion—1 hour. Prerequisite: graduate standing in Physics; consent of instructor. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. (SU grading only.)

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**Physiology**

((See Biological Sciences: Section of Neurobiology, Physiology and Behavior; Human Physiology (Medicine, School of); and Plant Physiology)

**Physiology (A Graduate Group)**

James H. Jones, Ph.D., Chairperson of the Group Office, 188 Briggs Hall (916-752-9092)

Faculty consists of more than 70 faculty members drawn from departments in the College of Agricultural and Environmental Sciences, the College of Letters and Science, the School of Medicine, and the School of Veterinary Medicine.

Graduate Study. The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees and participates in joint Ph.D./M.D. and Ph.D./D.V.M. programs. The program emphasizes broad training in the fundamental principles of physiology and in-depth specialization in cardiorespiratory, cellular, comparative, endocrine, reproductive, exercise, metabolic, neuro-, systemic and domestic animal physiology. For information regarding these programs, please contact the Graduate Program Coordinator.

Graduate Adviser. J. M. Horowitz (Neurobiology, Physiology, and Behavior), J. Ross (Animal Science), and E. M. Staffley (Surgical and Radiological Sciences).

Graduate Admissions Officer. T. Adams (Animal Science).

**Courses in Physiology (PGG)**

Graduate Courses

200L. Animal Cell Culture Laboratory (4) II. E. Wilson Discussion—2 hours; laboratory—6 hours. Prerequisite: courses in undergraduate biochemistry, cellular biology, or general physiology, or consent of instructor. Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxins on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro. 210A-210B-210C. Advanced Physiology (6-6-6) I-II-III. Jones Lecture—5 hours; discussion—1 hour. Prerequisite: graduate student in the Physiology Graduate Group Ph.D. program, or consent of instructor. Advanced course on general principles of physiology, surveying homeostasis, cellular, neurophysiology, cardiovascular, reproductive, endocrine, gastrointestinal, metabolic, reproductive, exercise, comparative, environmental and integrative physiology.

213. Principles of Electronics for Biologists (3) II. Horowitz, Scokey Lecture—1 hour; laboratory—3 hours. Prerequisite: Physics 5A, 5C, and Mathematics 16A, 16B, 16C or the equivalent. Principles of electronics applied to biological measurements. Focuses on interconnection of laboratory instruments including filters and computers. Topics covered include: RC networks, operational amplifiers; digital circuits; computer interfacing; and programming.

214. Neurophysiology (4) II. Carstens Lecture—4 hours. Prerequisite: Neurobiology, Physiology and Behavior 111B, 112; consent of instructor. Electrical activity of neurons and neuroeffector functions; physiology of the nervous system as studied by its electrical activity.

215. Neurophysiology Laboratory (3) III. Horowitz, Scokey Discussion—3 hours; laboratory—9 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments will be conducted to illustrate in depth, surgical techniques, stimulating and recording techniques used in neurophysiology research.

216. Neurophysiology Literature (2) L. Pappone Lecture—1 hour; discussion—1 hour. Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structural/function relationships of some of the most important channel types. Discussion of classical and current original papers.

217. The Vertebrate Eye (2) II. Sillman Seminar—1 hour; lecture/discussion—1 hour. Prerequisite: graduate standing and a background in biology; Neurobiology, Physiology and Behavior 120F strongly recommended. Physiology, biochemistry, and biology of the vertebrate eye with emphasis on the retina, particularly photoreceptors. A comparative approach will be taken with adaptations in ocular function related to behavior and environment. May be repeated for credit with consent of instructor. Offered in alternate years.

218. Topics in Circulatory Pathophysiology (3) II. Weidner Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Selected topics in circulatory or cardiovascular physiology to be chosen and advertised each offering. Topics will include pathophysiology, lecture and discussion based on current research literature in the field. May be repeated with consent of instructor. Offered in alternate years.

219. Muscle Growth and Development (3) II. R. Carlson (Human Physiology) Lecture—2 hours; seminar—1 hour. Prerequisite: Biological Sciences 103, Biological Sciences 104 or Molecular and Cellular Biology 150. Consent of instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors, prenatal and neonatal differences in different muscle fiber types. Experimental and hereditary myopathies. Offered in alternate years.

220. General and Comparative Physiology of Reproduction (3) I. Anderson (Animal Science), Lasley (Reproduction) Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110, 110L; Biological Sciences 101, 103. Basic mechanisms of sexual and asexual reproduction and comparison of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.

222. Mammalian Gametogenesis and Fertilization (3) II. Berger Lecture/discussion—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 121 or equivalent.

*Course not offered this academic year.*
Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding will be discussed.

230. Advanced Endocrinology (2) II. Moberg
Lecture—1 hour. Prerequisite: Neurobiology, Physiology, and Behavior 130 or the equivalent, and graduate standing. Focus on timely topics of endocrine research. Critical review of current literature and discussion of future research strategies in the area. May be repeated for credit when topic differs.

231. Neuroendocrinology (3) II. Woolley
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent course in systemic physiology; Neurobiology, Physiology and Behavior 130 or the equivalent course in endocrinology. Neuro-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain.

234. Neuropharmacological Basis of Neurotoxicology (3) I. Woolley
Lecture—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent; basic understanding of neurotoxicology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Environmental Toxicology 234.)

242. Biological Rhythms (3) I. Fuller
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: Neurobiology, Physiology and Behavior 110 or the equivalent. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periodic shifts; jet lag and sleep disorders. Offered in alternate years.

275. Neurohemural Regulatory Mechanisms of Thermogenesis (3) II. Horwitz, Horwitz
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 or the equivalent; Biological Sciences 102 or the equivalent; consent of instructor. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell).

290. Seminar (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (SU grading only.)

290C. Research Conference in Physiology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (SU grading only.)

291A. Selected Topics in Visual Science (2) II. Chalupa (Psychology), Johnson (Ophthalmology), Scofield (Neurology, SJH)
Seminar—2 hours. Prerequisite: graduate student standing and consent of instructor; course 217 recommended. Vision from the standpoint of physiology, biochemistry, morphology and psychophysics. Consideration of all levels of the visual system from periphery to highest brain centers. Emphasis on recent research. Topics vary each year. May be repeated for credit. (SU grading only.)

291B. Seminar in Cellular Mechanisms of Adaptation to Hypoxia (1) II, III. H. Hargrove
Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: Neurobiology, Physiology and Behavior 100B; Biological Sciences 103, consent of instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when a different topic is studied. (SU grading only.)

291D. Research Approaches in Physiology (2) I. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: graduate standing in Graduate Group in Physiology or consent of instructor. Current research in physiology. Overall design of experiments and particular research areas. (SU grading only.)

293. Current Progress in Physiology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: standing and consent of instructor. Seminars presented by guest lecturers discussing their current research activities. May be repeated for credit. (SU grading only.)

297T. Tutoring in Physiology (3) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour, tutorial—2 hours. Prerequisite: completion of course to be tutored (with a grade of A) and consent of instructor. Advanced study of systemic physiology through leading small discussion groups in upper division courses (students are required to attend lectures in the course which they are tutoring). May be repeated for credit by tutor in different courses or in the continuation of a course (e.g., courses 112, 113, 114). (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

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

Professional Courses

300A-300B. Pedagogical Aspects of Physiology in Higher Education (3-3/1) I, II, III. The Staff (Chairperson in charge)
Lecture, discussion, or laboratory, or combination. Prerequisite: meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (SU grading only.)

390. The Teaching of Physiology (1) I, II, III. The Staff (Chairperson in charge)
Discussion—1 hour. Prerequisite: Teaching Assistant assignment to a physiology lecture course and consent of instructor. Practical experience in methods and problems of teaching physiology lecture courses. May include analyses of types and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, and formulation of topics and questions for examination under supervision of instructor. May be repeated for credit. (SU grading only.)

Graduate Study. The Graduate Group in Plant Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The program is designed to prepare students for careers in teaching and research at colleges and universities, government or industrial laboratories. The graduate curriculum includes both a broad overview of plant biology and in-depth study and research in one of four areas of specialization: cell and molecular biology; ecology, systematics, and evolution; integrative plant and crop physiology; plant development and structure. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, cell biology, cytology, developmental biology, genetics, molecular biology, morphology, paleobotany, population biology, systematics, and weed science.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelors degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisite to the advanced degree in Plant Biology: inorganic chemistry, organic chemistry, introductory physics, genetics, structural botany, biochemistry, introductory plant physiology, introductory plant physiology laboratory, calculus, introductory statistics, plant ecology/systematics, plant cells and molecular biology. Limited deficiencies can be made up after admission. The graduate advisor, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Adviser. Contact the Group office.

Courses in Plant Biology (PBI)

Graduate Courses

"201. Plant Senescence: Cellular and Molecular Aspects (4) II. Bennett (Vegetable Crops), Huffaker (Agronomy and Range Science), Labavitch (Plant Molecular Biology); Lecture—4 hours. Prerequisite: Plant Biology 111, 112; Biological Sciences 102 and 103. Cellular and molecular phenomena associated with the senescence of plants and plant parts. Emphasis on principles and mechanisms. Offered in alternate years.

202. Advanced Physiology of Cultivated Plants (2) I. Sacle (Environmental Horticulture), Labavitch (Plant Biology); Lecture—1 hour; discussion—1 hour. Prerequisite: Plant Science 101 and 102; Plant Biology 111, 112. Selected physiological topics generally focusing on source-sink behavior affecting crop production and quality. Offered in alternate years. (P/N grading only.)

205A. Advanced Plant Physiology (3) III. Lucas
Lecture—3 hours. Prerequisite: Plant Biology 112; Chemistry 107A or consent of instructor. Cellular physiology; water relations, translocation and membrane transport.

205B. Advanced Plant Physiology (3) III. Sternier, Thiel
Lecture—discussion—3 hours. Prerequisite: Plant Biology 111, 112, and Biological Sciences 103. Photosynthesis, photosynthesis, chloroplast metabolism and biology. Offered in alternate years.

205C. Advanced Plant Physiology (3) I. The Staff
Lecture—3 hours. Prerequisite: Plant Biology 112, Biological Sciences 102, 103, 104, 105A, 105B and Biological Sciences 103 recommended. Internal and environmental regulation of plant growth and development.

205A. Advanced Plant Physiology Laboratory (3) II, III. Lucas
Laboratory—6 hours; term paper. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments demonstrate the theory and practice of modern instrumentation, and are designed to illustrate subject matter of course 205A.

205B. Advanced Plant Physiology Laboratory (3) Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently).
be taken concurrently); Molecular and Cellular Biology 120L. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

**205C. Advanced Plant Physiology Laboratory** (3) I., II., III. Laboratory—9 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

**208. Plant Hormones and Regulators** (4) I. Labavich (Pomology)

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 112. Chemistry, biochemistry and physiology of plant hormones and regulators of natural growth regulators. Primary consideration given to concepts that are of current research interest. Growth regulators in agriculture. Offered in alternate years.

**210. Plant Ecophysiology** (3) I. Pearcy

Lecture—3 hours. Prerequisite: Plant Biology 111, 112, 117. Study of the mechanisms of physiological adaptation of plants to their environment. Offered in alternate years.

**211. Ecophysiological Methods** (3) III. Pearcy

Lecture—2 hours; laboratory—4 hours; individual project: one Saturday field trip to be arranged. Prerequisite: Plant Biology 111, 117, and consent of instructor. A laboratory and lecture course covering basic concepts, methods and research techniques useful in plant ecophysiology.

**212. Physiology of Herbicidal Action** (3) III. Bayer

Lecture—3 hours. Prerequisite: Plant Biology 112, 122. Study of the fundamental processes involved in the physiology and biochemistry of herbicide consideration of the fate of herbicides in plants.

**214. Higher Plant Cell Walls** (3) I. Labavich (Pomology), Nevins (Vegetable Crops)

Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112. Cell wall components and their function in biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.

**215. Light and Plant Growth** (3) I. Bonner

Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 5B. Mechanisms and phenomena involved in the control of plant growth by light. Photobiology, photomorphogenesis, phototropism, and certain aspects of photosynthesis. Course offered in alternate years.

**216. Advanced Topics in Mineral Nutrition** (4) III. Lituchy (Land, Air and Water Resources)

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 135 or consent of instructor. Cellular compartmentation of mineral elements, new methods and results; selected topics in absorption, translocation, metabolism and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments. Offered in alternate years.

**217. Membrane Biology of Plants** (3) III. Bennett, Lucas (Vegetable Crops)

Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112 and Biological Sciences 103, or consent of instructor. Structure, biogenesis, and function of plant cell membranes. Emphasis will be placed on the molecular basis of plant membrane functions and on the role played by the enzymes in selected physiological processes. Offered in alternate years.

**218A. Advanced Concepts in Plant Cell Biology: Cell Biogenesis** (3) III. Bennett, Thog

Lecture/discussion—3 hours. Prerequisite: Biological Sciences 102, 103. Survey of molecular mechanisms underlying structural and functional differentiation of plant cell subcellular compartments. Topics include membrane and protein biosynthesis, protein targeting, and turnover; and regulation of nuclear and organelar gene expression as related to the biogenesis of plant cell organelles. Offered in alternate years.

**218B. Advanced Concepts in Plant Cell Biology: Signal Transduction and Interellular Communication** (3) I. Bhandry

Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, or consent of instructor. Intracellular signal transduction pathways in the plant cells as well as longer term, adaptive responses which involve signals transmitted between plant cells. Weekly lectures and student-led discussions on current literature. Offered in alternate years.

**220. Plant Developmental Biology** (4) III. Rost, Jenstedt, Silk

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: Plant anatomy, physiology, and biochemistry. A survey of the concepts of plant development and organization. Examines plant cells, tissues, and organs with special emphasis on experimental evidence for mechanisms regulating developmental processes.

**221. Special Topics in Plant Physiology** (2) III. The Staff

Discussion—1 hour; seminar—1 hour. Analysis in depth of recent advances in plant physiology. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures required. May be repeated for credit. (SU grading only.)

**222. Special Topics in Plant Morphology, Systematics, and Ecology** (2) II. The Staff

Seminar—2 hours. Analysis of recent advances in plant structure and evolution. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures required. May be repeated for credit. (SU grading only.)

**227. Plant Molecular Biology (4)** I. Harada

Lecture/discussion—4 hours. Prerequisite: Molecular and Cellular Biology 121 or 161. Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli.

**228. Plant Molecular Biology Laboratory** (5) II. Harada, Bennett (Vegetable Crops)

Lecture—2 hours; laboratory—5 hours. Prerequisite: Molecular and Cellular Biology 120, a course in molecular genetics and consent of instructors. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Vegetable Crops 228.)

**229. Molecular Biology of Plant Reproduction** (3) I. O'Neill

Lecture—3 hours. Molecular genetic basis of plant reproduction. Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering. Offered in alternate years.

**231. Biological Electron Microscopy** (1) I. Falk

Lecture—1 hour. Prerequisite: consent of instructor. Introduction to biological microscopy. Areas covered are: electron optics, electron specimen interactions, and vacuum systems.

**231L. Biological Electron Microscopy Laboratory** (3) I. Falk

Laboratory—4 hours. Prerequisite: consent of instructor; course 231 (may be taken concurrently). Introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation, limited enrollment.

**233. Biological Nitrogen Fixation** (3) II. Phillips

Lecture—2 hours; seminar—1 hour. Relationship between fundamental and applied nitrogen-fixation research in biochemistry, genetics, physiology, microbiology, and ecology with overall emphasis on increasing agronomic productivity. Former course Agronomy 233.

**255. Principles of Plant Taxonomy** (4)

Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 108; Evolution and Ecology 100 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—anthropology, embryology, biochemistry, etc.—elucidate problems of taxonomic relationships, mainly of genera and higher categories.

**256A. Experimental Plant Taxonomy** (2) II. Kyhos

Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Biology 108; Plant Biology 117 and Evolution and Ecology 100 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Offered in alternate years.

**256B. Experimental Plant Taxonomy** (2) II. Kyhos

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. Continuation of course 256A. Study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cyto-genetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships. Offered in alternate years.

**290A. Faculty Seminar** (1) I. The Staff

Seminar—presented by members of Plant Biology faculty describing their areas of research. Required of all beginning students in the Plant Biology Graduate Group. (SU grading only.)

**290B. Seminar** (1) I, II, III. The Staff

Seminar—2 hours. Analysis of recent advances in plant structure and evolution. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures required. May be repeated for credit. (SU grading only.)

**290C. Research Conference in Botany** (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Present papers and discussion by faculty and graduate students of research projects in botany. May be repeated for credit. (SU grading only.)

**291. Graduate Student Seminar in Plant Biology** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: graduate student standing. Student-given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Topics determined by instructor in charge. May be repeated for credit. (SU grading only.)

**292. Seminars in Plant Biology (1)** I, II, III. The Staff

Seminars—presented by graduate students. 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. (SU grading only.)

**295. Seminar in Mycology** (1) I. Butler (Plant Pathology)

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (SU grading only.) (Same course as Plant Pathology 295.)

**297. Tutoring in Plant Biology (1-5)** I, II, III. The Staff

Tutorial—3-15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (SU grading only.)

**298. Group Study (1-5)** I, II, III. The Staff

Prerequisite: graduate standing.

**299. Research (1-12)** I, II, III. The Staff

Prerequisite: graduate standing. (SU grading only.)

**Professional Course**

**300. The Teaching of Plant Biology** (2) I, II, III. The Staff

Discussion—2 hours. Prerequisite: graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. (SU grading only.)

**Professional Course**

**401. Functioning as a Professional Beyond UCD** (2) I. Phillips

Lecture/discussion—1 hour; seminar—1 hour. Prerequisite: graduate standing. A seminar for graduate students interested in teaching in the UCD system or Ph.D. candidates. Students will develop a letter of application, a curriculum vitae, a statement of teaching and/or research interests, and other information that will increase their appeal to graduate programs.
research interest, and a job interview seminar for a position advertised in their area of professional specialization. Group discussions will provide constructive suggestions for strengthening individual presentations. Offered in alternate years. (SU grading only.) Former course Agronomy 401.

**Plant Pathology**

(College of Agricultural and Environmental Sciences)

James J. Marois, Ph.D., Chairperson of the Department

Department Office, 354 Hutchison Hall

(916-752-0030)

**Faculty**

Richard M. Bostock, Ph.D., Professor

George Bruening, Ph.D., Professor

Michael R. Davis, Ph.D., Lecturer

John M. Dunaway, Ph.D., Professor

Bryce W. Falk, Ph.D., Professor

Robert L. Gilbertson, Ph.D., Assistant Professor

David G. Gilchrist, Ph.D., Professor

Deborah A. Golino, Ph.D., Lecturer

W. Douglas Gubler, Ph.D., Lecturer

Clarence L. Kelly, Jr., Ph.D., Lecturer

Bruce Kirkpatrick, Ph.D., Associate Professor

James D. MacDonald, Ph.D., Professor (Plant Pathology, Environmental Horticulture)

James J. Marois, Ph.D., Professor

Sneak J. Mbm, Ph.D., Lecturer

Pamela C. Ronald, Ph.D., Assistant Professor

Brett M. Tyler, Ph.D., Associate Professor

Jerry K. Uyemoto, Ph.D., Lecturer

Anna C. van Bruggen, Ph.D., Associate Professor

Robert K. Webster, Ph.D., Professor

**Emeriti Faculty**

Edward E. Butler, Ph.D., Professor Emeritus

Robert N. Campbell, Ph.D., Professor Emeritus

James E. Davy, Ph.D., Professor Emeritus

H. W. Harvey, Ph.D., Professor Emeritus

Raymond G. Singan, Ph.D., Professor Emeritus

William B. Hewitt, Ph.D., Professor Emeritus

Bert Lear, Ph.D., Professor Emeritus

Joseph A. Nee, Ph.D., Professor Emeritus

Jack L. O'gurn, Ph.D., Professor Emeritus

**Related Major Program.** See the major in Plant Science.

**Graduate Study.** The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate advisor. See also the Graduate Studies section in this catalog.

**Graduate Advisers.** B. Kirkpatrick, J.D. MacDonald, B.M. Tyler, A.H.C. van Bruggen.

**Courses in Plant Pathology (PLP)**

**Upper Division Courses**

120. **Introduction to Plant Pathology** (4) J. Gilchrist, Bostock, III. The Staff

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 2 recommended. The nature, cause, and control of plant disease.

125. **Diagnosis and Control of Plant Diseases** (4) J. MacDonald

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on disease, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Offered in alternate years.

130. **Physiology of Fungi** (3) J. Gilchrist, Bostock

Lecture—3 hours. Prerequisite: Biological Sciences 1C; Biological Sciences 103 and Plant Biology 119 recommended. Discussion of the nature and interrelationships of fungal structure, growth, spore germination, nutrition, and metabolism with emphasis on responses of fungi to environmental changes. Selected examples of beneficial and destructive roles of fungi will also be considered. Offered in alternate years.

140. **Agricultural/ Biochemistry, Ethics and Public Policy** (4) III. Marois, Jolly (Agricultural Economics)

Lecture—3 hours; term paper or discussion—1 hour. Examination of agricultural biotechnology within a moral/ethical framework. Policy development and implementation. General Education credit: Nature and Environment.

182. **Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Internship—3-36 hours. Prerequisite: course 120 and consent of instructor. Work experience off and on campus, supervised by a member of the faculty. (P/N grading only.)

198. **Directed Group Study** (1-5) 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**

205A-205B. **Diseases of Vegetable and Field Crops** (3-3) I-II. Extra-summer session. Van Bruggen

Lecture—2 hours; laboratory—3 hours; field work—6 hours; research term paper. Prerequisite: course 120; Plant Biology 119 or course 125. Study of vegetable and field crops with emphasis on diagnosis, epidemiology, and control. Lectures on diagnostic techniques, seed pathology, disease assessment and crop loss, and integrated pest management. Field trips and laboratory exercises related to disease diagnosis. (Deferred grading only pending completion of sequence.)

205A-205B. **Diseases of Fruit, Nut, and Vine Crops** (3-3) I-II. Extra-summer session. Kirkpatrick

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Plant Biology 119. Clinical study of fruit, nut, and vine crops with emphasis on etiology, epidemiology, diagnosis, and control. (Deferred grading only pending completion of sequence.)

205A-205B. **Plant Pathogens and Epidemiology of Plant Diseases** (4) I. Dunaway

Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Interaction between higher plants, plant pathogens, and the environment which is important in the occurrence and severity of plant disease. Emphasis is placed on the population dynamics and ecology of plant pathogens in the aerial and soil environment. Offered in alternate years.

290. **Principles of Plant Disease Control** (3) I. Webster

Lecture—3 hours. Prerequisite: course 120 or the equivalent. Discussion of the underlying principles and methods used for the control of plant diseases. Emphasis placed on application of epidemiological principles, biological (including host resistance), and chemical strategies to achieve disease control. Offered in alternate years.

210. **Physiology and Biochemistry of Host-Pathogen Interaction** (4) I. Gilchrist, Bostock

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130 or the equivalent; Biological Sciences 103. Discussion of the nature of host-pathogen interactions, metabolic alterations in plant disease, biochemistry of disease resistance, toxins in plant disease. Offered in alternate years.

215X. **Genetics and Molecular Biology of Plant Pathogens** (4) I. Tyler

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 120 and Biological Sciences 103. Genetic analysis of pathogenicity, cultivar specificity, and host-specificity in plant pathogens, particularly fungi; application of molecular biology to the isolation and characterization of the genes involved; and to aspects of pathogen identification; emphasis on research techniques and problem-solving. Offered in alternate years.

217. **Molecular Genetics of Fungi** (3) I. Holland, Tyler

Lecture—3 hours. Prerequisite: graduate standing in a biological science, Biological Sciences 101, 103. Molecular and Cellular Biology 161, Plant Biology 119, courses 130, 215X. Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation, plant pathogenesis; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. Offered in alternate years. (Same course as Biological Chemistry 217.)

224. **Pathogenic Fungi** (5) I. The Staff

Lecture—2 hours; laboratory—6 hours. Prerequisite: Plant Biology 119. Morphology and taxonomy of plant pathogenic fungi.

226. **Plant Virology** (5) I. Bruening, Falk

Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of vaccine production; techniques for assay and diagnosis; multiplication of viruses; pathological cytology and anatomy; application of equipment and techniques used in research. Offered in alternate years.

228. **Plant Bacteriology** (5) I. Kirkpatrick

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Microbiology 2 or the equivalent. Biological Sciences 102, 103. Study of bacteria which have a saprophytic, symbiotic, or parasitic association with higher and lower plants. Clinical and molecular methods for identification and classification of these bacteria.

290. **Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Review and evaluation of current research in plant pathology. (SU grading only.)

290C. **Advanced Research Conference** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced plant pathology; primarily designed for graduate students. (SU grading only.)

291. **Seminar in Host-Parasite Physiology** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 120. Review and evaluation of current literature and research in host-parasite physiology. (SU grading only.)

292. **Seminar in Plant Virology** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (SU grading only.)

293. **Seminar in Soil Microbiology and Root Disease** (1) I. Van Bruggen, Dunaway

Seminar—1 hour. Prerequisite: course 120. One of the students or faculty members introduces a topic based on one or more papers read by the students, and then leads the discussion on this topic. (SU grading only.)

294. **Seminar on Plant Epidemiology** (1) I. Van Bruggen, Marois

Seminar—1 hour. Prerequisite: course 120. One of the students or faculty members introduces a topic based on one or more papers read on plant epidemiology read by the participants, and then leads the discussion on this topic. (SU grading only.)

295. **Seminar in Mycology** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (SU grading only.) (Same course as Plant Biology 285.)

296. **Special Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Research—1 to 5 hours. The Staff (Chairperson in charge)

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (SU grading only.)
Plant Physiology

See Biological Sciences: Section of Plant Biology; and Plant Biology (A Graduate Group)

Plant Protection and Pest Management (A Graduate Group)

Lester E. Ehler, Ph.D., Chairperson of the Group
Group Office, 567 Briggs Hall (916-752-0475)

Faculty includes faculty members from the Colleges of Agricultural and Environmental Sciences, and Letters and Science.

Graduate Study. The Graduate Group in Plant Protection and Pest Management offers programs of study and research leading to the M.S. degree. Students may conduct independent research or participate in ongoing projects on integrated crop management and sustainable agriculture. Weeds, pests, plant pathogens, nematodes, rodents, and other pests are treated as parts of complex ecosystems and not as isolated problems. Courses include: concepts and systems of plant protection and pest management; diagnosis and control of plant pest problems; toxicology and legal ramifications; and equipment for chemical applications. Detailed information can be obtained from the Group Chairperson and the application for Graduate Admission and Fellowship.

Graduate Adviser. R.F. Norris (Plant Biology).

Courses in Plant Protection and Pest Management (PPP)

Graduate Courses

251. Concepts and Systems of Plant Protection and Pest Management (4) II. Marois (Plant Pathology)

Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: Agricultural Systems and Environment 120; Entomology 110, Plant Pathology 120; Plant Biology 120; may be taken concurrently. Nematology 100; Plant Biology 117 or Evolution and Ecology 101 recommended. Ecological perspectives of agricultural systems, the role of pests and pest management in these systems, and the monitoring and modeling of the systems.

202A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents (4-4) I. Norris (Plant Biology), Ill. Rosenhem (Entomology)

Discussion—1 hour; fieldwork—9 hours. Prerequisite: Entomology 110, Plant Pathology 120, Plant Biology 120, Nematology 100 may be taken concurrently. Problems and assessment of losses caused by insects, pathogens, weeds, nematodes, and other pests. Methods of determining infestation levels and determining economic thresholds, and control of these pests with emphasis on integration of available management practices into programs.

290. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)

(SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Research (1-12) I, II, III, summer. The Staff (Chairperson in charge)

(SU grading only.)

Plant Science

(College of Agricultural and Environmental Sciences)

Faculty. Faculty in the Departments of Agronomy and Range Science, Environmental Horticulture, Lard, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology contribute to teaching courses in the plant science area.

Related Major Programs. Plant Science courses fulfill requirements in several majors, including Agricultural Systems and Environment, Biological Sciences, Environmental and Urban Sciences, International Agricultural Development, and Plant Biology.

Admission into the Plant Science major is temporarily closed for the academic year 1994-95. Students should refer to the major programs listed above.

The Major Program

The plant science major trains students in the biological and natural sciences as they apply to the production, protection, and maintenance of crop plants, and their quality following harvest.

The Program. Students majoring in plant science spend the first two years of study developing the scientific and general background necessary for upper-division work. The science courses include chemistry, biology, botany, physics, and mathematics. General background is provided by course offerings in the school of humanities and sciences (English, rhetoric, and economics) and by courses in areas supportive of plant science, such as entomology (the study of insects), weed science, genetics, water science, plant pathology (plant diseases), and plant physiology (plant processes and functions). At the upper-division level, students may specialize in one of the seven departmentally associated options or may choose general education by electing the general Plant Science option.

Internships and Career Alternatives. Internships are available to local seed companies in farm production, and in extension work with farm advisors. For graduates, job opportunities exist in nursery and greenhouse management, farming, technical, and sales positions in agricultural businesses and associated enterprises, such as banking and equipment and supply companies, as well as in private, state, and federal service in consulting and research.

B.S. Major Requirements:

For convenience in program planning, the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your advisor's approval. Courses shown without parentheses are required.

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<th>Course</th>
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<td>ENGL 134 Composition Requirement</td>
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<td>See College requirement</td>
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<td>Additional English (English 102 in plant science or related area, or English 104)</td>
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<tr>
<td>Preparatory Subject Matter</td>
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<td>Computer science (Agricultural Science and Management 21)</td>
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<td>Economics (Economics 1A or 1B)</td>
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<td>Physics (Physics 1A-1B)</td>
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<td>General chemistry (Chemistry 2A-2B)</td>
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<td>Organic chemistry (Chemistry 8A-8B)</td>
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<tr>
<td>Biological sciences (Biological Sciences 1A, 1B, 1C)</td>
<td>15</td>
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<td>Plant science (Plant Science 2)</td>
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<td>Mathematics (Mathematics 16A-16B)</td>
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<td>Depth Subject Matter</td>
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<td>Statistics (Agricultural Science and Management 190)</td>
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<td>Soil science (Soil Science 100)</td>
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<td>Weed science (Botany 120)</td>
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<td>Entomology (Entomology 110 or 11B)</td>
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<td>Plant pathology (Plant Pathology 120)</td>
<td>4</td>
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<tr>
<td>Plant physiology (Botany 111, 112)</td>
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*Course not offered this academic year.

Genetics (Genetics 100)                       | 4     |
Water science (Water Science 104 or Plant Nutrition 105) | 3-4   |
Plant protection (Botany 125) or Soil Science 135 or Plant Pathology 135 | 4     |

Select one of the following eight options...38-49

Agromony Option
Specific course requirements...25-21
Agromony 100, 100L...5
Agromony 111, 112, 113 (any two courses)...7-8
Plant Science 101...4
Soil Science 109...4

Additional courses to be selected with consent of the adviser from the following...

Agricultural Economics 120, 121, 124, 150
Agricultural Engineering Technology 103, 104A, 105; Agricultural Practices 49, 49; Animal Science 2, 114, 116; Atmospheric Science 105; Nematology 110; Plant Pathology 125; Plant Science 102, 113, 120, 150; Water Science 103, 110, 172.

Courses offered in other production departments (e.g., Vegetable Crops, Pomology, Viticulture and Enology, etc.) or in Range Science may be selected in consultation with adviser to satisfy specific individual needs.

Natural sciences electives, not to exceed 8 units, may also be included.

Floriculture/Nursery Management Option
Specific course requirements...27
Environmental Horticulture 6, 105, 120, 125, 133...19
Plant Science 102, 109...8

Additional courses to be selected with consent of the adviser from the following...

Agricultural Economics 112, 113; Agricultural Engineering Technology 114; Agronomy 100; Botany 105, 111L; Economics 11A, 11B; Environmental Horticulture 107, 130; Geography 3; Landscape Architecture 40, 131, 155; Microbiology 3; Plant Pathology 125; Plant Science 101, 112, 112L, 113; Pomology 102; Psychology 144; Soil Science 103; Vegetable Crops 101; Viticulture and Enology 101, 110, 116.

Courses offered in the natural sciences may be selected in consultation with adviser.

Landscape Horticulture Option
Specific course requirements...30
Environmental Horticulture 6, 105, 120, 130, 133...17
Landscape Architecture 40, 131, 155...9
Plant Science 102...4

Additional courses to be selected with consent of the adviser from the following...

Agricultural Economics 18, 112, Agronomy 100; Botany 105; Economics 11A, 11B; Environmental Horticulture 107, 125; Geography 3; Landscape Architecture 111; Plant Pathology 125; Plant Science 101, 109, 113; Pomology 101; Soil Science 109; Vegetable Crops 101; Wildlife and Fisheries Biology 10.

Courses offered in the natural sciences may be selected in consultation with adviser.

Plant Pathology Option
Specific course requirements...40
Biochemistry 101A, 101B...8
Botany 105, 119...10
Chemistry 1C, 5...9
Microbiology 2, 3...4
Nematology 100...4
Plant Pathology 125, 130...7
Courses in Plant Science (PLS)
Questions pertaining to the following courses should be directed to the instructor.

Lower Division Courses
1. Plants for Garden, Orchard and Landscape (2)
   I, III, The Staff
   Lecture—1 hour; laboratory—3 hours. For non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagating trees and vines, growing flowers and ornamental plants, and the role of plants in human health and well being. Not open for credit to students who have completed Agricultural Systems and Environment 2.

2. Plants and People (3) I. Bradford; II. Bennett, Michelmore; III. Nevin (Vegetable Crops)
   Lecture—3 hours; prerequisite: high school biology. Plants as a resource for food, recreation, and environmental enhancement. Emphasis on how our relationship to plants has changed through history and how the growth and development of plants affect their utility. General Education credit: Nature and Environment.

   Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

   The Staff
   Internship—3-18 hours. Prerequisite: consent of instructor. Work experience off or on campus in subject areas pertaining to plant science. Internships supervised by a member of the faculty. (FINP grading only.)

5. Directed Group Study (1-5) I, II, III, The Staff
   (Rains (Agronomy and Range Science) in charge) Prerequisite: lower division standing. (FINP grading only.)

Upper Division Courses
   Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Systems and Environment 2 and Soil Science 100, or consent of instructor. Ecological processes governing the structure and behavior of crop systems. Emphasis on mechanistic and systems views of the physical environment, photosynthetic productivity, competition, adaptation, nutrient cycling, energy relations and contemporary issues such as climate change.

2. Evolution of Crop Plants (3) II. The Staff
   Lecture—3 hours. Prerequisite: course 10, Biological Sciences 101. Diversity and domestication of economic plants; principles of plant evolution; centers of origin, genetic implications; and implications in new agricultural developments; bioethical issues in relation to genetic resources.

3. Conservation of Plant Genetic Resources (3) I. Bliss
   Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 10 or Biological Sciences 10. Biological, social and ethical issues involved in plant genetic resources will be studied beginning with their historical importance to human welfare and covering germplasm utilization, property rights and strategies for conservation, both on an international and personal scale. General Education credit: Nature and Environment.

4. Plant Genetics (4) I. Wilkins (Agronomy and Range Science)
   Lecture—3 hours; discussion/lab—1 hour. Prerequisite: Biological Sciences 1A or consent of instructor. Basic principles of genetic variation, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations.

5. Plant Cell, Tissue, and Organ Culture (4) II. Burger (Environmental Horticulture), Sutter (Pomology)
   Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: Plant Biology 101, 112 (may be taken concurrently); or consent of instructors. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, embryogenesis, anther culture, protoplast culture and transformation. Offered in alternate years.

6. Plant Propagation (4) II. Sutter (Pomology)
   Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisites: Agricultural Systems and Environment 2 or Biological Sciences 1A-1B. Plant propagation affects plant growth, survival and agricultural sustainability. Course introduces physical, chemical and biological processes which occur at the surface of plant roots. Evolution and modification of the chemical and general bases of rhizosphere ecology are discussed.

7. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology), Reid (Environmental Horticulture), Salvet (Vegetable Crops)
   Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., Agricultural Systems and Environment 2, course 10 or Food Science and Technology 2); concurrent enrollment in course 112 is recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, and controlled atmospheres.

8. Postharvest Physiology and Handling Laboratory (3) I. Kader, Salvet.
   Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112.

9. Plant Breeding (4) I. St. Clair (Vegetable Crops)
   Lecture—3 hours; demonstration-discussion—2-3 hours. Prerequisite: Biological Sciences 101 (may be taken concurrently). The principles of plant breeding applied to economic crops.

10. Biology, Evolution and Systematics in Vegetables (3) I. Kader
    Lecture—2 hours; laboratory—3 hours; one or more field trips; written and oral reports. Prerequisite: upper division standing, Agricultural Systems and Environment 2. Taxonomic and horticultural classification of the more important vegetable cultivars; their origin, morphology; domestication, and description; wild vegetable species, minor and exotic vegetables and trends in development of new cultivars. Not open for credit to students who have completed Vegetable Crops 112.

11. Biological Applications in Pomology (2) II. De Jong
    Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or consent of instructor. Physiology, growth, development and environmental requirements of fruit trees and cultural practices used to maintain them. Course emphasis is on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students who have completed Pomology 101.

12. Principles of Fruit Production (4) III. Weinbaum, Gradziel
    Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C, course 116 recommended. Principles underlying cultural practices associated with...
with fruit and nut production, including morphology and physiology of the developing buds, flowers and fruits. Emphasis on commercially important temperate zone species. Not open for credit to students who have completed Pomology 102.

103. Phylogenetic Genetics of Crop Plants (3) J. Jones (Vegetable Crops)
Lecture—3 hours. Prerequisite: Biological Sciences 101; Plant Biology 111, 112; or consent of instructor. Principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels; genetic control, biochemical regulation and the impact of the environment on development of plants. Offered in alternate years.

126. Physiology of Environmental Stresses in Plants (3) I. Richards, Slik, Läuchli (Land, Air and Water Resources)
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of responses.

135. Mineral Nutrition of Plants (4) I. Richards (Land, Air, and Water Resources), Brown (Pomology)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Biology 111 or the equivalent. Evolution and selection in plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. (Same course as Plant Biology 135.)

140. Principles of Plant Biotechnology (3) I. Dandekar (Pomology)
Lecture—3 hours. Prerequisite: Biological Sciences 1A and 101. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement.

145. Applied Plant Biology (4) I. Brown (Pomology), Napoli (Environmental Horticulture), Rains (Agony and Range Science)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 111, and Botanical Sciences 101 or course 105. Advanced concepts of plant biology with reference to the uses of plants for food, fiber, and other purposes. Current research, applications, and issues in crop improvement, production and biotechnology will be presented and discussed.

191. Undergraduate Research: Proposal (3) I. The Staff
Lecture—1 hour; discussion—1 hour; independent study—3 hours. Prerequisite: upper division standing and consent of instructor. A faculty sponsor will individually assist each student to define a problem, conduct a literature survey, identify objectives, generate testable hypotheses, design experiments, plan data analysis, prepare a working outline, and write and revise a draft proposal. Not open for credit to students who have completed Vegetable Crops 191L. (P/NP grading only.)

191L. Undergraduate Research: Experiment (1-5) I. The Staff
Laboratory—3-15 hours. Prerequisite: course 191 (may be taken concurrently) and consent of instructor. Experimental testing of hypotheses developed in course 191 may be repeated for credit. Not open for credit to students who have completed Vegetable Crops 191L. (P/NP grading only.)

192. Internship (1-12) I, II, III, summer. The Staff (Agronomy and Range Science in charge)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off or on campus in all subject areas pertaining to Plant Science. Internships supervised by a member of the faculty. (P/NP grading only.)

194H. Senior Honors Thesis (1) I, II, III. The Staff
Independent study—3 hours. Prerequisite: course 191L, and consent of thesis adviser. Preparation and submission of honors thesis and presentation of the results in a seminar. Open for credit to students who have completed Vegetable Crops 194H. (P/NP grading only.)

196. Postharvest Technology of Horticultural Crops (3) I. Kader (Plant Science) in charge
Lecture/discussion/demonstration—5 days; field trip—5 days. Prerequisite: completion or graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled for the last two weeks immediately following last day of spring quarter. Considered a spring course for pre-enrollment. (P/NP grading only.)

197. Tutoring in Plant Science (1-4) I, II, III. The Staff (Agronomy and Range Science in charge)
Prerequisite: upper division standing; completion of course being tutored or the equivalent. Leading discussion sections, conducting laboratory exercises or proctoring in personalized-system-of-instruction-format classes under faculty guidance. May be repeated once for credit if different course is tutored. (P/NP grading only.)

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

Graduate Courses
221A-"221B. Applied Crop Physiology (4-4) I. The Staff
Lecture—1 hour; seminar—1 hour; laboratory—6 hours. Prerequisite: course 101 or Plant Biology 111, 112 or consent of instructor. Research methods in applied plant physiology with emphasis drawn primarily from agronomic and vegetable crops. Field and laboratory projects, data reduction, and preparation of suitable reports.

224. Water in Physiology and Ecology of Plants (4) I. Hsiao
Lecture—3 hours; discussion—1 hour. Prerequisite: course 124, or Plant Biology 111 and 117, or consent of instructor. Evapotranspiration and energy balance; water and component potentials; water transport to, within, and from plants; dynamics and regulation of water status; drought resistance; responses to water deficits in salinity; water use efficiency; adaptation to aridity; productivity in relation to water.

270. Reproductive Biology of Flowering Plants (3) I. Wu (Environmental Horticulture)
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 111 and Biological Sciences 101. Fundamental mechanisms of reproductive biology of flowering plants and their influence on genetic variation, evolution, and cultural practices. Offered in alternate years.

291. Seminar in Postharvest Biology (1) I, II, III. Salvest (Vegetable Crops) in charge
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.)

298. Group Study (1-5) I, II, III. The Staff
To be arranged.
Political Science

A.B. Major Requirements:

Preparatory Subject Matter ......................20
Political Science 1 .................................4
Two courses from Political Science 2, 3, 4, 5, 6 ................................8
(Course 7 may not be taken if course 8 is taken.)

Depth Subject Matter .........................36
Select two courses in each of three fields, listed below. The fields must be chosen from at least two groups, A, B, or C .......24
Group A
Field 1 (Political theory): Political Science 111-119, 187
Group B
Field 2 (American government and institutions): Political Science 100-109, 171, 173-175, 180-189, 191, 195
Field 3 (Parties and political behavior): Political Science 130-131
Field (4) Public law: Political Science 150-156
Group C
Field (5) Comparative government: Political Science 126, 140-149, 177-179
Field (6) International relations: Political Science 120-129
Additional upper division units in political science must be counted to achieve a total of 36 .......12
Only 5 units of Political Science 192 (internship) may be counted towards the 36-unit requirement; and Political Science 192A, 192B, or 192W may not be counted toward a field requirement.

Total Units for the Major ......................56

Political Science—Public Service

A.B. Major Requirements:

Preparatory Subject Matter ......................12
One course from Political Science 1, 5, or 7 ...4
Two courses from Political Science 2, 3, or 4 ..................................................8
Research paper: Political Science 193 ..................2

Depth Subject Matter .........................48
Core program ......................................12
Two courses chosen from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 108, 109, 111, 114.
Internship, Political Science 192A, 192B, or 192W ..............................................10
Research paper: Political Science 193 ..................2

Fields of Concentration .........................24
Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science. (Core Program courses may not be counted toward this requirement.)

Fields of Concentration
(2) Policy implementation and evaluation: Political Science 156, 180, 181, 182, 183, 187, 188, 189; Economics 131
(3) Policy interpretation—Substance and procedures (public/pre-law): Political Science 150, 151, 152, 153, 155, 156.

(4) Policy areas:
   a) Urban policy and implementation: Political Science 100, 101, 102, 191; Economics 125, Environmental Biology and Management 110, Environmental Studies 162, 173.
   b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 168A-168B, 179.
   c) Environmental policy and implementation: open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (requires approval of Political Science—Public Service adviser).

Total Units for the Major ......................60

Major Advisers. Consult Departmental Office.

Minor Program Requirements:
Students electing a minor in Political Science may choose one of two plans:

Plan I: Political Science 126, 140-149, 177-179

Plan II: Any 4 courses in Political Science.

Upper Division Courses

100. Local Government and Politics (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or instructor approval. Focuses on how in which different groups have tried to use local government authority to achieve their objectives and why they succeeded or failed.

101. Urban Political Economy (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or instructor approval. Focuses on urban political economy. Discusses the ways in which different groups have tried to use local government authority to achieve their objectives and why they succeeded or failed.

103. American Federalism (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 5 recommended. American politics and policy in the context of the national-state-local relations. Constitutional roots of Federalism, centralizing and decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental programs.

104. California State Government and Politics (4) II. The Staff Lecture—3 hours; research paper. The California political system. Political culture, election results, parties and parties, direct democracy, legislation, governor, executive branch, courts, finance, state-local relations, and policy issues.

105. The Legislative Process (4) II. Segura Lecture—3 hours; discussion—1 hour. Analysis of the legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and their constituents, relations between Congress and other agencies.

106. The Presidency (4) II. James III. Bernard Lecture—3 hours; discussion—1 hour. Prerequisite: the American political culture. The American presidency's origins and development; presidential power and influence as manifested in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections.

*Course not offered this academic year.
107. Environmental Politics and Administration
I. Wadeson-Smith
Lecture—3 hours; discussion—1 hour. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation.

108. Policy Making in the Public Sector
III. Skalaban
Lecture—3 hours; research paper. The theoretical rationale for governmental activity, program evaluation, and decision-making. Stages of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making.

109. Public Policy and the Governmental Process
III. Wade
Lecture—3 hours; research paper. The processes of formulating public policy, including individual and collective decision making, political change, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities.

111. Systematic Political Science
II. Luckman
Lecture—discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected concepts relevant to modern political concerns; and research design and execution.

112. Contemporary Democratic Theory
II. Wadsworth
Lecture—3 hours; discussion—1 hour. Major contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered in alternate years.

113. American Political Thought
II. Sinopoli
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present.

114. Quantitative Analysis of Political Data
III. Skalaban
Lecture—3 hours; term paper. Logic and methods of analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in political science. Offered in alternate years.

115. Medieval Political Thought
I. Peterman
Lecture—3 hours; term paper. Prerequisite: course 118A. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thought of the major political thinkers of the period, rather than upon political history.

116. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher
II. Peterman
Lecture/discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

117. Marxism
II. The Staff
Lecture—3 hours; discussion—1 hour. Examination of the political and social philosophy of Karl Marx, with reference to the evolution of Marxism in the nineteenth and twentieth centuries.

118A. History of Political Theory
I. Peterman
Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.

118B. History of Political Theory
II. Peterman
Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke.

118C. History of Political Theory
III. Sinopoli
Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries—Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre.

119. Modern Political Thought
II. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Study in depth of philosophers considered central to modern political thought, especially nineteenth and twentieth century political thought. Emphasis will be upon individual philosophy or concept rather than upon a survey of modern political thought.

120. Theories of International Politics
I. Siverson
II. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making theory.

121. War
II. Siverson
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare.

122. International Law
III. Wadeson-Smith
Lecture—4 hours. Selected topics in international law, territory, sovereignty, immunity, responsibility, the peaceful settlement or non-settlement of international disputes.

123. The Politics of Interdependence
I. Money
II. The Staff
Lecture—3 hours; term paper. Prerequisite: upper division standing. Study of the relationship between international and political relations and their implications on national policies and politics.

124. The Politics of Global Inequality
I. Money
Lecture—3 hours; term paper. Prerequisite: upper division standing; course 123 recommended. Long-term changes in the distribution of economic and power resources in the world and their impact on global economic and political relations.

126. Ethnic Self-Determination and International Conflict
II. Rothchild
Lecture—3 hours; individual meetings with students to discuss term papers. Prerequisite: one international relations course recommended. Focuses on the claims of nations and nationalities and the effects of these claims on modern international relations.

127. Nationalism and Imperialism
II. The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. A study of the role of nationalism and imperialism in the twentieth century. Offered in alternate years.

128. International Communism
II. Bahry
Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International Communist movement, ideology, organization, strategy, and its role in postwar world politics. Offered in alternate years.

129. Special Studies in International Politics
II. Siverson
Lecture—3 hours; term paper. Prerequisite: upper division standing. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied.

130. Recent U.S. Foreign Policy
II. Nicoll
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. An analysis of the foreign policy of the United States, focusing on the conflict between domestic politics and foreign policy.

131. Analysis of U.S. Foreign Policy
II. Nicoll
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Detailed presentation and examination of the foreign policy of the United States, including the role of the president and key government officials. Offered in alternate years.

132. National Security Policy
II. Gartner
Lecture—3 hours; term paper. Prerequisite: upper division standing. Development of national security policies since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon contemporary alliances and international relations. Offered in alternate years.

133. The American Role in East Asia
II. The Staff
Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role of the United States in East Asia. Emphasis on Asian regionalization and the role of U.S. policy in promoting or preventing regional cooperation and conflict.

134. Africa and U.S. Foreign Policy
II. Rothchild
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Overview of American foreign policy toward Africa. Relationship to global economic and political forces. The impact of African politics on American foreign policy.

135. Russian Foreign Policy
II. Bahry
Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. The making and implementation of foreign policy by the Soviet Union. The role of Russia in contemporary international relations.

136. International Relations in Western Europe
II. Money
Lecture—3 hours; term paper. Prerequisite: upper division standing. Analysis of European unity, problems of the Atlantic Alliance, Atlantic economic policy, Western Europe and the Cold War, the relationship between domestic politics and foreign policy. Offered in alternate years.

137. International Relations in Eastern Europe
II. The Staff
Lecture—4 hours. Prerequisite: upper division standing and course 3 recommended. A study of the history of international relations and diplomacy in East Central Europe. Emphasis upon twentieth century events with examples from the Soviet Union, China, Eastern Europe, and Eastern Europe.

138. Special Studies in Foreign Policy
II. Nicoll
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Intensive examination of one or more special problems in foreign policy. May be repeated once for credit when different topic is studied.

140. Comparative Public Policy
II. Skalaban
Lecture—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, and authoritarian systems.

141. Communist Political Systems
II. Bahry
Lecture—4 hours. Prerequisite: course 2 or consent of instructor. A systematic comparative analysis of the origins, structure, and function of Communist political systems. May be repeated once for credit when different topic is studied.

142. Politics and Inequality
II. Jakaman
Lecture—3 hours; term paper or discussion—1 hour. An examination of the links between politics and the distribution of wealth and economic differences. Includes the impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods.
143. Politics in the Commonwealth of Independent States and the Baltic (4) III. Bahry Lecture/discussion—4 hours. Prerequisite: course 2 and consent of instructor. Historical and contemporary development in political and economic structures in newly independent states: departures from central planning; dilemmas of cooperation; analysis of divergent reform strategies; integration into international political and economic systems.

144. Russian Politics and Policy (4) III. Bahry Lecture/discussion—4 hours. Prerequisite: upper division standing and course 2. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule.

145. Government and Politics in Emergent Nations (4) III. The Staff Lecture—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in "emerging countries" and liberation from colonial oppression. Offered in alternate years.

146. Contemporary African Politics (4) II. Rothchild Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political institutions and political culture in Africa with emphasis on the post-1945 period. Primary attention to nationalism, modernization and political efficacy.

148. Government and Politics in East Asia: China (4) II. The Staff Lecture—4 hours. Prerequisite: course 2 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1945 period. Primary attention to nationalism, modernization and political efficacy.

149. Government and Politics in East Asia: Pacific Rim (4) III. The Staff Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and evolution of political cultures and establishment of political institutions in selected countries of the Pacific Rim, namely Japan, Korea, Taiwan, and Indonesia. Emphasis on post World War II.

149C. Government and Politics in East Asia: Southeast Asia (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 2 recommended. Evolution of political institutions, institutions, economy of selected nations in Southeast Asia, including Vietnam plus two or three other examples. Emphasis on imperialist legacy, nation building in multi-ethnic communities, contrasts between socialist and non-socialist development models. Offered in alternate years.

149. Politics of Development in Africa (4) II. Rothchild Lecture/discussion—4 hours. Prerequisite: course 134 recommended. Analysis of the developmental process in sub-Saharan Africa. Emphasis will be placed upon state and state institution, state-society relations, ethnicity, socioeconomic class, women, ideology, party systems, bureaucracy, military and development choices.

150. Judicial Politics and Constitutional Interpretation (4) I. The Staff; II. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Politics of judicial policymaking; interpretation; historical interpretation and decisionmaking; prerequisite for courses on the politics of constitutional law.

151. The Constitutional Politics of the First Amendment and the Right to Privacy (4) III. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. The constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs, and the right to privacy.

152. The Constitutional Politics of Equality (4) II. Spring Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered in alternate years.

153. The Constitutional Politics of the Justice System (4) III. Spring Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law as an instrument of social control and the relationship between law and morality. Offered in alternate years.

154. Legal Philosophy (4) II. Snopoli Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law as an instrument of social control and the relationship between law and morality. Offered in alternate years.

155. Judicial Process and Behavior (4) III. Gates Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision-making, relationships among courts and other decision-making bodies. Offered in alternate years.

156. Law and Society (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Social basis and origins of law; relations between law, institutions, and social change. Offered in alternate years.

157. American Political Parties (4) II. Costantini Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the structured operations of the party system in the United States: party functions and organizations, roles of political parties, campaigns and elections, party trends and behavior.

158. Comparative Political Parties (4) II. The Staff Lecture—3 hours; discussion—1 hour. Organization, operation, governmental function and social bases of political parties especially in Great Britain and France but with some reference to other Western European countries.

159. Elections and Voting Behavior (4) I. Segura Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group behavior. Offered in alternate years.

160. Group Politics (4) I. Wade; III. James Lecture—3 hours; discussion—1 hour. Groups, institutions, and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic, and sectional groups; to parties, public and legislative groups, bureaucracies.

161. Public Opinion (4) II. Costantini Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and course 1 or 5; consent of instructor. Nature of public opinion in America as it is "supposed to be" and as it is. Distribution of opinions among different publics and the significance of that distribution for political stability and politics. Opinion polling and its problems.

162. Mass Media and Politics (4) III. Costantini Lecture—3 hours; discussion—1 hour. Organization and decision making within the media; media audiences and the economic contexts and political behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation); the media in election campaigns.

163. Women in Politics (4) II. The Staff Lecture—3 hours; discussion—1 hour or seminar—1 hour. The role of women in American politics. Historical experiences; contemporary organizations and strategies; areas of legislative concern; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics.

167. Political Socialization (4) II. Costantini Lecture—3 hours; discussion—1 hour. Prerequisite: course 150 or consent of instructor. An introduction to the study of how people think, talk, and write about politics, and when and how they learn it. The process, content and sources of political learning, particularly in preadolescence, and the significance of such learning for the political system as well as for the development of the political self.

168. Chicano Politics (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 150 or consent of instructor. The study of Chicano political behavior as historically defined by different groups in society and the Chicanos' responses to their political environment.

169. Political Elites (4) I, II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 2, or 4, or consent of instructor. Backstage politics in the United States: elite behavior and political influence. Place of elites in a democratic polity; elite-mass differences; conflict and consensus among elites.

170. Politics and Personality (4) III. Berman Lecture—3 hours; discussion—1 hour. How is conduct in politics influenced by the personal qualities of political actors? Course focuses on developing criteria for analyzing political phenomena in psychological terms by examining selected writings of twentieth-century theorists and psychologists.

171. The Politics of Energy (4) II. Wadsworth-Smith Lecture/discussion—4 hours. Prerequisite: upper division standing. Analysis of nature and performance of policies processes for making energy choices at the international, national and state levels. Emphasizes interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation.

172. Community Power and Change (4) II. Jackman Lecture—3 hours; discussion—1 hour. An examination of the relationship between general community characteristics, the distribution of political power, and policy outcomes in the United States. Alternative models of community political change are presented.

174. Government and the Economy (4) I. Skallerud Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Political bases of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest.

175. Science, Technology, and Policy (4) II, Hill Lecture—3 hours; discussion—1 hour. Analysis of policy-making for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, foreign policy and military, technological risks, technology assessment and scientists and politics.

176. Power and Coercion (4) II. Jackman Lecture—4 hours. Prerequisite: course 1 or Sociology 1 recommended. Examination of the meaning, sources, and diverse expressions of power and coercion in our lives. Concepts are explored by applying them to a broad range of issues, such as sexual harassment, racial violence, legislative policymaking, and ideological hegemony.

177. Modern Dictatorships (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. The development of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest.

178. Political Development in Modernizing Societies (4) I. Jackman Lecture—4 hours; discussion—1 hour. Nature and sequence of political development; its economic and
social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration.

179. Special Studies in Comparative Politics (4). II. Bahry Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more political problems appropriate to comparative politics. May be repeated once for credit.

180. Bureaucracy in Modern Society (4). II. Wandesforde-Smith Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy.

181. The American Administrative System (4). I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Introduction to the development and organization of administrative institutions in the Administration focus on design and reorganization, and the relationship of structure to performance, at the national, subnational, and local levels.

182. Administrative Decision Making and Public Policy (4). II. The Staff Lecture—3 hours; special assignments. Approaches to and models of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administration. May be repeated for credit.

183. Administrative Behavior (4). III. The Staff Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

187. Administrative Theory (4). I. Hill Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and control; an examination of the role of government bureaucrats in the total society.

188. Manpower Policy and Personnel Administration (4). III. The Staff Lecture—3 hours; discussion—1 hour. Politics and economics of effective manpower programs; planning manpower needs; selection, and administration of public personnel; training and development; unions and collective bargaining; affirmative action; ethics and morality in the public service.

189. Politics of Budgeting and Finance Administration (4). III. The Staff Lecture—3 hours; discussion—1 hour. Fiscal role of government in mixed economy and democratic society; politics of revenue and resource allocation; tax policy; inter-governmental financial relations; budget formulation and execution; alternative models of resource allocation; budget as a tool of management.

190. International Relations (4). II. The Staff Lecture—3 hours; fieldwork—1 hour. Prerequisite: consent of instructor. Open to majors in International Relations, or consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current and non-academic periodicals.

191. Special Studies in Local Government and Politics (4). II. The Staff Lecture—3 hours; fieldwork—1 hour. Prerequisite: consent of instructor. Enrollment limited to advanced students. Intensive study of one or more topics relating to urban policy and politics, designed for advanced students. Group projects and field work in one or more communities are emphasized.

192A. Internship in Public Affairs (5). I, II, III. The Staff (Chairperson in charge) Prerequisite: enrollment dependent on availability of intern positions with highest priority assigned to students with special major upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.)

192B. Internship in Public Affairs (5). I, II, III. The Staff (Chairperson in charge) Prerequisite: course 192A; enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science/ Public Service major; upper division standing. Supervised internship in the preparation of a senior honors thesis under direction of faculty adviser. (Deferral grading only, pending completion of sequence.)

193. Research in Practical Politics (2). I, II. The Staff Research project—6 hours. Prerequisite: courses 192A, 192B; open only to Political Science/Public Service Majors. June concentrated in the preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science.

194A-H/194B-H. Special Study for Honors Students (2-3-0) I, II. The Staff Directed research. Prerequisite: major in Political Science or Political Science/Public Service with junior standing and overall grade-point average of 3.5. Directed reading, research, and writing culminating in the preparation of a senior honors thesis under direction of faculty adviser. (Deferral grading only, pending completion of sequence.)

195. Special Studies in American Politics (4). I. Segura, III. The Staff Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to American politics. May be repeated once for credit when different subject matter studied.

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 (1-3-0) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Urban Government and Politics (4). III. The Staff Seminar—4 hours. Survey and analysis of the literature in the field of local government and politics in the United States. Approaches to the study of political reform, local autonomy, community power, representation, expertise, service delivery, policy-making and political change. Offered in alternate years.

202. American State Government and Politics (4). I. The Staff Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Offered in alternate years.

203A. American Government: The Presidency (4). III. Berman Seminar—4 hours. Through an examination of the current research on political executives, with particular emphasis on the American presidency. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.

203B. American Government: Congress (4). I, II. Segura Seminar—4 hours. Thorough overview of the current research on Congress, with particular emphasis on political dynamics and the policy process. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.


205. Field Research in Urban Politics and Policy (4). I, II. The Staff Seminar—2 hours; field research—2 hours. Examination of research design and methodologies appropriate to field research in community-level politics and policy, with an emphasis on skills in interviewing and observation. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

207. Environmental Public Policy (4). II. Wandesforde-Smith Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and representation. Individual research project. The including field research, will parallel discussion of the literature.


211. Research Methods in Political Science (4). I. Jackman Seminar—4 hours. Prerequisite: Statistics 13; graduate standing or permission of instructor. Introduction to the philosophy of science, research design for experimental and quasi-experimental studies, and data analysis. Topics include: logic of empirical research, measurement problems, research design, sampling, descriptive statistics, tabular analysis, measures of association, and introduction to correlation and regression.

212. Quantitative Analysis in Political Science (4). II. Gates Seminar—4 hours. Prerequisite: course 211. Topics usually covered in an introductory statistics course with an emphasis on applications in political science—descriptive statistics for samples, probability and probability distributions, hypothesis testing, ANOVA, bivariate regression, and introduction to multiple regression.

213. Quantitative Analysis in Political Science II (4). II. Garner Seminar—4 hours. Prerequisite: courses 211, 212, 214. More advanced topics in the use of statistical methods, with emphasis on applications. Topics include: properties of least squares estimates, probability in multiple regression, and advanced topics (probabilistic analysis, simultaneous models, time-series analysis, etc.)

214A-214B. Research in Political Science (2-2) I—III. The Staff Seminar—2 hours. Prerequisite: courses 211, 212. Research seminar sequence required of all Ph.D. students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. (Deferral grading only, pending completion of sequence.)

215. Introduction to Modeling Political Behavior (4). II. Garner Seminar—3 hours. Prerequisite: courses 211 and 212. Introduction to formal and game theoretic analyses of politics. Students will learn basic game theory and modeling skills. We examine the benefits of modeling, and look at the examples of formal analysis in a
variety of political science sub-fields. Offered in alternate years.

218. Political Theory (4) III. Sinopoli Seminar—3 hours; term paper.

223. International Relations (4) II. Garther Seminar—3 hours; term paper.

225. The International System (4) S. Siverson Seminar—3 hours; term paper. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data generation and analysis.

230. American Foreign Policy (4) III. Goldman Seminar—3 hours; term paper.

231. U.S. Political Culture and Foreign Relations (4) III. Rothchild Seminar—3 hours; term paper. Relates U.S. political culture to formulation of foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision-making and implementation. Concludes by examining linkages between foreign policy behavior and democratic process. Offered in alternate years.

241. Communist Political Systems (4) II. Bahry Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic analysis of the political process of Communist political systems. *242. Seminar in Comparative Politics (4) II. The Staff Seminar—3 hours; term paper. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

246. Policing and Peace in Third-World Societies (4) II. Rothchild Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of police making processes in Third-World countries are such topics as police organization, institutional resources, decision-making, resource allocation, planning, and budgeting. Implementation, and distribution of world resources. Offered in alternate years.

248. Politics of East Asia (4) III. The Staff Seminar—3 hours; term paper. Selected contemporary problems of government and international relations in East Asia.


261. Political Behavior (4) II. Segura Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion.

274. Political Economy (4) III. The Staff Seminar—4 hours. Politics of economic policy as reflected in legislation, spending and taxation; impact of prices, employment, and growth on political democracy. Government responses to economic conditions; electoral politics and the business cycle. Offered in alternate years.

282. Concepts and Problems in Public Administration (4) I. The Staff Seminar—4 hours. Nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; means of controlling bureaucracy. Offered in alternate years.

283. Organizational Behavior (4) II. The Staff Seminar—4 hours. Organizational behavior as it relates to public sector decision-making.

286. Administrative Values (4) III. The Staff Seminar—3 hours; term paper. Examination of American administrative values. Offered in alternate years.


290B. Research in Political Theory (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

290C. Research in International Relations (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

290D. Research in Judicial Politics (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of judicial politics.

290E. Research in Comparative Government and Policy (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

290G. Research in Public Administration (4) I, II, III. The Staff Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

297. Internships in Political Science (2) I, II, III. The Staff Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. (SU grading only.)

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.)

299D. Directed Reading (1-12) I, II, III. The Staff (Chairperson in charge) (SU grading only.)

Professional Course

300. The Teaching of Political Science (1) I, II, III. The Staff Seminar—1 hour. Prerequisite: graduate standing in Political Science. Methods and problems in teaching political science at the undergraduate level. (SU grading only.)

Pomology

(College of Agricultural and Environmental Sciences)

F. A. Bliss, Ph.D., Chairperson of the Department Department Office, 1045 Wickeon Hall (919-752-0123)

Faculty

Fredrick A. Bliss, Ph.D., Professor
Patrick M. Brown, Ph.D., Assistant Professor
Carol M. Briscoe, Ph.D., Lecturer
Abby A. Dondre, Ph.D., Professor
Theodore M. DeJong, Ph.D., Professor
Louise Ferguson, Ph.D., Lecturer
Thomas M. Gradziel, Ph.D., Associate Professor
Scott Johnson, Ph.D., Lecturer
Adel A. Kader, Ph.D., Professor
John M. Labovick, Ph.D., Professor
George C. Martin, Ph.D., Professor
Gale McGrath, Ph.D., Lecturer
Warren C. Minke, M.S., Lecturer

Elizabeth J. Mitcham, Ph.D., Lecturer
Dan E. Parme, Ph.D., Lecturer
Vito S. Pinto, Ph.D., Professor
David S. Ramos, Ph.D., Lecturer
Kenneth A. Shackle, Ph.D., Associate Professor
Douglas V. Shaw, Ph.D., Associate Professor
Stephen M. Southwick, Ph.D., Lecturer
Ellen G. Sutter, Ph.D., Associate Professor
Steven A. Weise, Ph.D., Professor

Emeriti Faculty

Royce S. Bingham, Ph.D., Professor Emeritus
Dillon S. Brown, Ph.D., Professor Emeritus
Robert M. Carlson, Ph.D., Lecturer Emeritus
Peter B. Catlin, Ph.D., Lecturer Emeritus
Julian C. Crane, Ph.D., Professor Emeritus
William H. Giffin, Ph.D., Professor Emeritus
John J. Hansche, Ph.D., Professor Emeritus
A. J. Hart, Ph.D., Professor Emeritus
Dale E. Kester, Ph.D., Professor Emeritus
Fred G. Mitchell, M.S., Lecturer Emeritus
Roger J. Romani, Ph.D., Professor Emeritus
Kay Ruge, Ph.D., Professor Emeritus
Noel F. Sommer, Ph.D., Lecturer Emeritus
Kyoto Ito, Ph.D., Professor Emeritus

Related Majors

See the majors in Plant Science and in Agricultural Systems and Environment.

Related Courses


Graduate Study

For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Studies section in this catalog.

Concordance

The following courses in Pomology have been transferred to other subject areas.

Former Course Number Equivalent new course and number

101 Plant Science 115
102 Agricultural Applications in Pomology
103 Plant Science 116
107 Principles of Fruit Production
107A Agricultural Systems and Environment 107
107B Agricultural Systems and Environment 170A
170B Fruit and Nut Cropping Systems

Courses in Pomology (POM)

Lower Division Courses

10. The Art and Science of Fruit Production (3) I. The Staff (Pomolo in charge) Lecture—3 hours. Introduction to pomology including: orchard establishment, developmental physiology, and management of the crop through harvest and storage. Two field exercises, on the second and seventeenth Saturdays in the quarter. General Education credit: Nature and Environment.

92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (PNN grading only.)

Upper Division Courses

103. Citrus and Other Subtropical Fruits (3) II. Shackel in charge Lecture—3 hours. Prerequisite: Biological Sciences 1C. Subtropical fruits, particularly citrus, as important
Population Biology (A Graduate Group)

Michael Turelli, Ph.D., Chairperson of the Group
Group Office, 2320 Storer Hall (916-752-8523)

Faculty. Includes 30 members from the Division of Biological Sciences, The Division of Environmental Studies, and the Departments of Agronomy, Entomology, Geology, Philosophy, Veterinary Epidemiology, and Wildlife and Fisheries Biology.

Graduate Study. The Graduate Group in Population Biology emphasizes programs of study and research leading to the Ph.D. degree. The Group concentrates on population biology as the broad discipline that links ecology, evolution, population genetics and systematics into a unified field. The course curriculum consists of first-year core courses offered by the Group faculty, seminars, and advanced courses in population biology, and related disciplines, chosen in consultation with a guiding committee.

Graduate Advisers. Consult the Population Biology Graduate Group Office.

Courses in Population Biology (PBG)

Graduate Courses

2001. Principles of Population Biology (5) I. Botsford, Gillespie. Lecture 3 hours; discussion — 2 hours. Prerequisite: course 231 concurrently and consent of instructor. Principles of single-species ecology and evolution. Topics include ecology of individuals, population growth models, structured populations, life history strategies, stochastic populations, basic population genetics, population genetics, deleterious alleles in natural populations, and molecular population genetics.

2002. Principles of Population Biology (5) II. Quinlan, Socci. Lecture 3 hours; discussion — 2 hours. Prerequisite: course 231B. Principles of multi-species communities. Topics include trophic-level interactions, epidemiology, competition, mutualism, food webs and trophic cascades, interactions between simple ecological communities, island biogeography, succession, and large-scale patterns.


2004. Advanced Evolution (3) G. Lightle. Lecture 1 hour; discussion — 2 hours. Prerequisite: graduate status. Adaptation and speciation, and biochemical and morphological evolution in animals and plants with emphasis on the appropriateness of different methods of analysis. Offered in alternate years.

2005. Ecology of Insect Parasitoids (4) J. Ross. Lecture 3 hours; seminar — 1 hour. Prerequisite: introductory animal ecology or behavior, insect parasitoids will be investigated as model systems to address current topics in behavior, population, and evolutionary ecology. Theory of parasitoids will be synthesized and critical empirical tests of evolutionary hypotheses emphasized. Offered in alternate years. (Same course as Entomology 206.)

2006. Molecular Evolution (3) I. Gillespie, Landis. Lecture 3 hours. Prerequisite: Biological Sciences 103; Evolution and Ecology 100 recommended. Evolution from the molecular standpoint, including the evolution of genome structure and the organization of single genes and gene clusters, evolution of enzymes and metabolic pathways, molecular clocks, transposons and other movable genetic elements, and molecular polymorphisms. Offered in alternate years. (SU grading only.)

2100. Topics in Invertebrate Evolution (2) III. Grosseberg. Seminar 2 hours. Prerequisite: graduate standing or consent of instructor and Evolution and Ecology 112 and 112L. Courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topics differ. (Former course Zoology 212.) (SU grading only.)

2311. Mathematical Methods in Population Biology (3) I. Hastings. Lecture 3 hours. Prerequisite: Mathematics 160C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation- and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology are stressed. (Same course as Ecology 231.)

2701. Research Conference in Evolutionary Biology (1) G. Grosberg, B. Shaffer, M. Turelli. Seminar 1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. (Former course Zoology 270.) (SU grading only.)

2791. Seminar (1) I, II, III. The Staff (Chairperson in charge). Seminar 1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by visiting lecturers, UC Davis graduate students, and faculty. May be repeated for credit. (SU grading only.)

2792. Research Conference in Population Biology (1) I, II, III. The Staff. Discussion 1 hour. Prerequisite: graduate standing and consent of instructor; concurrent enrollment in course 295. Research conference and discussion of faculty and graduate student research in population biology. May be repeated for credit. (SU grading only.)

2793. Seminar in Geographical Ecology (2) III. Shapiro. Seminar 2 hours. Prerequisite: Evolution and Ecology 100 or 101 or consent of instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related issues in systematic, the biology of colonizing species, and related topics. Offered in alternate years. (SU grading only.)

2991. Group Study (1-3) I, II, III. The Staff (Chairperson in charge). Prerequisite: graduate standing and consent of instructor. (SU grading only.)

2992. Research (1-12) I, II, III. The Staff (Chairperson in charge) Prerequisite: graduate standing and consent of instructor. (SU grading only.)

Population Health and Reproduction

School of Veterinary Medicine
Robert H. Bondurant, D.V.M., Chairperson of the Department
Department Office, 1114 Medical Science 1A
(916-752-1358; FAX: 916-752-4078)

Faculty
Robert H. Bondurant, D.V.M., Professor
JoAnne Bookman, M.S.L.S., Lecturer
Ann Trommershausen Bowling, Ph.D., Adjunct Professor
Bruno B. Chomel, D.V.M., Ph.D., Assistant Professor
Thomas B. Farver, Ph.D., Professor
Walter Guellich, D.V.M., Clinician
Lynette A. Hart, M.A., Ph.D., Assistant Professor
Charles A. Holmgren, Ph.D., Professor

Course not offered this academic year.
Courses in Population Health and Reproduction (PHR)

Lower Division Course

92. Internship in Veterinary Science (1-4) I, II, III. The Staff (Chairperson in charge)
Discussion/laboratory—1-4 hours; clinic—3-36 hours; final exam—2 hours. Prerequisite: approval of project prior to period of internship by faculty sponsor. Supervised work experience in reproduction. (P/NP grading only.)

Upper Division Courses

104. History of Veterinary Medicine (3) III
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-nineteenth centuries to the creation of modern medicine.

105. Human-Animal Interactions: Benefits and Issues (2) II, Hart
Lecture—2 hours. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health, and therapeutic perspectives, as well as effects of humans on animals.

111. Animal Hygiene (3) II, West
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and human health, with emphasis upon animal management.

112. Immunogenetic and Electrophoretic Techniques (2) I, Bernoco
Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 100 (or the equivalent), or consent of instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins, and enzymes of domestic animals.

150. Food-Borne Infections and Intoxications (4) III. Genigeorgis, Riemann
Lecture—4 hours. Prerequisite: Food Science and Technology 173 or Veterinary Microbiology and Immunology 217. Prevalence and characteristics of diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

192. Internship in Veterinary Science (1-12) I, II, III. The Staff
Discussion/laboratory—1-12 hours; clinic—3-36 hours; final exam—2 hours. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in reproduction. May be repeated for credit. (P/NP grading only.)

196. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only.)

Graduate Courses

202. Sampling in Health-Related Research (3) I, Farver
Lecture—3 hours. Prerequisite: Epidemiology and Preventive Medicine 403 or the equivalent; consent of instructor. Advanced coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling, and sequential sampling. Emphasis is on the application of the sampling methods. Offered in alternate years.

203. Multivariate Biostatistics (3) I, Farver
Lecture—3 hours. Prerequisite: Epidemiology and Preventive Medicine 403 and 404, or the equivalent; consent of instructor. Multivariate procedures covered are principal component analysis, factor analysis, two-group and k-group multivariate ANOVA, multivariate regression, two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Offered in alternate years.

212. Epidemiology of the Zoonoses (4) I, Chomel
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing or third-year standing in School of Veterinary Medicine, or consent of instructor. Epidemiological, biological, and ecological features of some major infections shared by man and animals. Wildlife and domestic animals zoonoses of major health significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures.

220. Advanced Avian Medicine (3) III, Lam, Wakenel
Lecture—3 hours. Instruction on the methods of prevention of the major diseases of domestic poultry.

225. Preventive Avian Medical Practice (3) II, III. The Staff (Chairperson in charge)
Lecture—3 hours. Prerequisite: enrollment in avian medicine option of MPVM program, third- or fourth-year standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic structure of the broiler, commercial egg and turkey industries, and the delivery of preventive veterinary medical services within these industries. Specific prevention and eradication programs pertaining to diseases of economic importance are covered.

231. Pathophysiology of Mammalian Reproductive Processes (3) II, III. Lashey
Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathophysiological aspects of reproductive failure in the mammal, concentrating gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior. Offered in alternate years.

254. Public Health Aspects of Meat and Meat Products Technology (3) III. Genigeorgis
Lecture—3 hours. Prerequisite: course 150 or consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

290A. Seminar (1) I, II, III. The Staff
Seminar—1 hour. Discussion of current topics in animal reproduction and medicine, as well as presentation of research findings by graduate students and faculty. May be repeated for credit. (SU grading only.)

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. (SU grading only.)

296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

298. Research (1-12) I, II, III. The Staff (SU grading only)

Professional Courses

404. Herd Health Management (1) 1/2 per week. I, II, III. Hjerpe in charge
Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents apply their knowledge of veterinary medicine, animal nutrition, genetics, husbandry, management, and economics on a herd basis toward the improvement of food animal production efficiency through control and prevention of disease. (SU grading only.)

420. Zoonoses of Primates (2) II, Chomel, Lerche
Lecture—2 hours. Prerequisite: second-, third-, or fourth-year standing in the School of Veterinary Medicine or School of Medicine, or consent of instructor. Epidemiological, clinical, and biological features of zoonoses of non-human primates. Emphasis given to major zoonoses which are threatening human health and their treatment and control. Focus also on management of non-human primates in research, zoological gardens and in the world.

429A. Herd Health Management of Beef, Cattle, Swine, Sheep, and Goats (4) II. East
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary service to feedlot, cow-calf, stocker, swine, sheep, and goat production units are considered, with emphasis on prevention and control of disease.

429B. Dairy Herd Health Management (4) III. Weaver
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduation degree credit. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and production control. Lectures supplemented with visits to dairy farms to evaluate feeding programs and health management.

430. Beef Cattle Nutrition (1) III. The Staff
Lecture—10 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Emphasis on the feeding requirements of feedlot and pasture beef cattle (including computer-assisted methods). Strategies for presenting nutritional and ration-associated diseases of beef cattle.

445A. Food Animal Theriogenology (3) II, BonDurant
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symtomatology, pathophysiology, treatment, control, prevention, and herd health application.

445B. Equine Theriogenology (3) II, Liu
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings.

*Course not offered this academic year.
Section of Preventive Veterinary Medicine

466A. Food Animal Reproduction (1) III. Rowe
Lecture—6 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approves for graduate degree credit. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on endocrinology, pathophysiology, treatment, control, prevention, and herd health applications.

466B. Equine Reproduction (1) III. Lu
Lecture—6 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approves for graduate degree credit. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings.

466C. Reproduction of Non-Domestic Animals (1) III. Lasley
Lecture—1 hour. Prerequisite: third-year standing in the School of Veterinary Medicine. Follows course 466A and provides information relating to reproduction in non-domestic mammals, birds, and reptile species. Concepts relating to the evaluation of reproductive status, diagnosis of infertility, assisted reproduction and contraception will be presented.

Hart
Discussion/laboratory—3-6 hours. Prerequisite: veterinary student status. Training and experience in responding to pet loss hotline callers who are experiencing grief associated with an animal's death. Students gain proficiency in supportive listening and providing community resources and increase effectiveness in dealing with upset pet owners. (SU grading only.)

Preventive Veterinary Medicine (A Graduate Program)

Group Office, 112 Surge-Iv 916-752-2375/59174
Graduate Study. The School of Veterinary Medicine offers a program of study and research leading to the Master of Science in Preventive Veterinary Medicine (M.P.V.M.). Detailed information on this program may be obtained by writing the Director, Department of Population Health and Reproduction.

Director, Thomas B. Farver (Population Health and Reproduction).

Courses in Preventive Veterinary Medicine (MPM)

Professional Courses

400. Orientation to Statistics (4) I.
Lecture—40 hours total. Prerequisite: enrollment in MPVM degree program. Introduction and overview to the concepts basic to biostatistics and epidemiology. (SU grading only.)

401. Biomedical Information Resources and Retrieval (3) I. Bookman
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: enrollment in MPVM Program or consent of instructor. Introduction to the skills and tools needed to find information in the biomedical sciences with an emphasis on veterinary medicine. Emphasis will be placed on selection of appropriate sources to solve a particular information need using both print and electronic reference and bibliographic sources.

402. Medical Statistics I (4) I, III.
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: Fall quarter: course 400 or Statistics 13 (or the equivalent), and consent of instructor; Spring quarter: consent of instructor; restricted to students entering the DVM/MPVM dual degree program. Use of statistics in clinical, laboratory, and population medici-ine; graphical and tabular presentation; probability; binomial, Poisson, normal, t-, F-, and Chi-square distributions; elementary nonparametric methods; multiple linear regression and correlation tables.

403. Medical Statistics II (4) II.
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: course 402. Continuation of course 402. Analysis of variance in biomedical sciences; non-parametric methods; multiple linear regression; biomedical applications of statistical methods.

404. Medical Statistics III (4) III.
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: course 403. Continuation of course 403. Analysis of covariance, variable selection; analysis of multivariate data, contingency tables, logistic regression; discriminant analysis; time dependent variation trends; biomedical applications.

405. Principles of Epidemiology (5) I
Lecture—5 hours; discussion—5 hours. Prerequisite: a degree in veterinary medicine, medicine, or dentistry, or consent of instructor. Approves for graduate degree credit. Combination of lectures, class discussions, and problem solving. Topics are methods of study design and analysis. Full course. (SU grading only.)

406. Epidemiologic Study Design (3) II.
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: course 405 or the equivalent; course 403 or the equivalent (may be taken concurrently). Approved for graduate degree credit. Design and interpretation of clinical trials, cohort and case control studies. Critical review of published epidemiologic studies. Principles of association and causality.

407. Analytical Epidemiology (3) III. Kass
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 406 and 404 (may be taken concurrently). Approved for graduate degree credit. Uses of multiple regression, discriminant analysis, factor analysis, path analysis and other multivariate techniques in epidemiology. Approaches for handling the analysis of large data sets.

408. Research Methodology and Research Reports (3) I.
Lecture—1 hour; discussion—2 hours. Prerequisite: enrolled in MPVM degree program or consent of instructor. Approves for graduate degree credit. Application of the experimental method to solving specific epidemiologic field problems involving disease of animals. Students must identify and select a problem and complete all work preparatory to the actual field collection of data or specimens.

409A-409B. Topics in Data Analysis (2-3) II-III.
The Staff (Chairperson in charge)
Discussion—2 hours (409A); discussion—3 hours (409B). Prerequisite: course 406 (may be taken concurrently) or consent of instructor. Approved for graduate degree credit. emphasis on decision making with respect to the type and amount of data required for solving epidemiologic problems and the selection and use of appropriate data in statistics and economics for processing, analyzing, and interpreting these data. (Deferred grading only, pending completion of course.)

410A-410B. Topics in Applied Epidemiology (3-2) II-III.
The Staff (Chairperson in charge)
Discussion—3 hours (410A); discussion—2 hours (410B). Prerequisite: course 406 (may be taken concurrently) or consent of instructor. Approved for graduate degree credit. Collection of data, and/or specimens from field studies, serum banks, or data banks. Laboratory examination of specimens and recording of results. Alternative approaches to presentation and conclusions and formulations of recommendation for further investigations. (Deferred grading only, pending completion of course.)

411. Disease Control and Eradication (3) III. Riehle
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Veterinary Medicine 409 or course 405. Studies of various approaches to control eradicate diseases in animal populations. Design and economic evalua- tion of control programs.

412A. Use of Microcomputers: Level 1 (3) I.
Stevens
Lecture—2 hours; laboratory—3 hours. Prerequisite: orientation to microcomputers or consent of instructor. Introduction to and development of skills in modern microcomputers for students involved in epidemiologic studies. Research. Level one topics include microcomputer software, operating systems, file handling, fundamental word processing, spread sheeds, and statistical analysis software. (SU grading only.)

412B. Use of Microcomputers: Level 2 (3) II.
Stevens
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 412A or consent of instructor. Development of intermediate skills on modern microcomputers for students involved in epidemiologic studies and research. Level two topics include advanced use of word processing and spreadsheet software, and introduction to database management programs. (SU grading only.)

412C. Use of Microcomputers: Level 3 (3) III.
Stevens
Lecture—1 hour; laboratory—4 hours. Prerequisite: course 412B or consent of instructor. Development of advanced skills on modern microcomputers for students involved in epidemiologic studies and research. Level three topics include advanced use of database management programs, and development of application programs to facilitate the students' research efforts. (SU grading only.)

413. Microcomputer Programs in Epidemiology (1) I. Gardner
Laboratory—3 hours. Prerequisite: introductory course in epidemiology (course 405 or Veterinary Medicine 409) and basic understanding of MS-DOS and IBM-compatible microcomputers. Applications of Epifino to epidemiologic research and disease outbreak investigation, including questionnaire design, data checking and validation, statistical analysis, sample size calculations, and design of a surveillance system. (SU grading only.)

421. Veterinary Public Health (3) III. Chomel
Lecture/discussion—3 hours. Breadth coverage of the various functions of the veterinary profession towards human health with special emphasis on zoonoses and major livestock diseases prevention and control, food safety and hygiene and new environmental issues as well as animal welfare.

Psychiatry

See Medicine, School of

Psychology

College of Letters and Science
Phillip R. Shaver, Ph.D., Chairperson of the Department
Department Office, 149 Young Hall (916-752-1880)

Faculty
Linda P. Acredolo, Ph.D., Professor, Academic
Senate Distinguished Teaching Award
Lee M. Chalupa, Ph.D., Professor
Richard G. Coats, Ph.D., Professor
Alan C. Emhs, Ph.D., Professor
Robert A. Emmens, Ph.D., Associate Professor
Karen P. Erickson, Ph.D., Professor
Michael S. Gazzaniga, Ph.D., Professor (Center for Neuroscience)
Gail S. Goodman, Ph.D., Professor
Albert A. Harrison, Ph.D., Professor
Kenneth R. Henry, Ph.D., Professor

*Course not offered this academic year.*
The Major Programs

Psychology provides knowledge of and means of studying human and animal behavior. The Program. The department offers the Bachelor of Arts degree for students interested in the liberal arts and the Bachelor of Science program designed for students with an interest in either biology or mathematics. The psychology program is extremely broad and represents a wide variety of topics. The courses are centered around three focal points: Personality/Developmental psychology, child development, and social psychology. The program in psychology emphasizes the individual's role in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. Psychology emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. Perception/Cognition emphasizes how information from the physical world is sensed, perceived, and used, and examines the role of consciousness, language, perception, and learning in behavior.

Preparatory Requirements. Before declaring a major in psychology, students must complete the following courses with a combined grade point average of at least 2.50 (all courses must be taken for a letter grade):

- Psychology 1, 41......................6 units
- Statistics 13 or 102....................4 units
- Biological Sciences 1A or Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology and Physiology and Behavior 10................4 or 5 units
- Sociology or cultural anthropology................4 units

Career Alternatives. A degree in psychology provides broad intellectual foundations which are useful to the development of careers in a variety of areas, including social work, ministry, teaching, business, and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in psychology, or may go on to professional schools for training in veterinary and human medicine, law, and other professions.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>21-25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology 1 or the equivalent</td>
<td>4</td>
</tr>
<tr>
<td>Psychology 41</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematical Sciences 1A or Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology and Physiology and Behavior 10</td>
<td>4 or 5 units</td>
</tr>
<tr>
<td>Sociology or cultural anthropology</td>
<td>4 units</td>
</tr>
</tbody>
</table>

Psychology 41......................4 units
Statistics 13 or 102....................4 units
Biological Sciences 1A or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology and Physiology and Behavior 10................5-8 units

One course in sociology or cultural anthropology (may be lower or upper division)................4 units

Recommended: Psychology 41, and Statistics 13 or 102 should be completed in the first year.

Depth Subject Matter

Two courses from the following three groups and one course from the remaining group:

**Psychology 105, 206, 207**

Additional units to achieve a total of 40 upper division units in psychology..................19-19 units

Total Units for the Major..................81-66 units

B.S. Major Requirements:

**Biology Emphasis**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>52-61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology 1 or the equivalent</td>
<td>4</td>
</tr>
<tr>
<td>Psychology 41</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematical Sciences 1A or Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology and Physiology and Behavior 10</td>
<td>4 or 5 units</td>
</tr>
<tr>
<td>Sociology or cultural anthropology</td>
<td>4 units</td>
</tr>
</tbody>
</table>

Psychology 41......................4 units
Statistics 13 or 102....................4 units
Biological Sciences 1A, 1B................10 units
Chemistry 2A, 2B......................10 units
Chemistry 8A-8B or 114A-114B or 128A-128B................6-8 units

One course in sociology or cultural anthropology (may be lower or upper division)................4 units

Recommended: Psychology 41, and Statistics 13 or 102 should be completed in the first year.

**Depth Subject Matter**

Seven Psychology courses as specified: Group A: two courses from 130, 131, 132, 136................8 units

Group B: three courses from 108, 129, 134, 150................15 units

Group C: two courses from 112, 143, 145, 147, 148................18 units

Additional units to achieve a total of 40 upper division units in psychology................9 units

Psychological 101........................4 units

Total Units for the Major..................101-110 units


**Mathematics Emphasis**

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>44-58</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology 1 or the equivalent</td>
<td>4</td>
</tr>
<tr>
<td>Psychology 41</td>
<td>4</td>
</tr>
<tr>
<td>Statistics 13 or 102</td>
<td>4</td>
</tr>
<tr>
<td>Mathematical Sciences 21A, 21B, 21C, 21D, 21E, 21F</td>
<td>12 units</td>
</tr>
<tr>
<td>Computer Science Engineering 30 or Engineering 5</td>
<td>3 units</td>
</tr>
<tr>
<td>Chemistry 10 or 2A-2B or 2AH-2BH</td>
<td>4-10 units</td>
</tr>
<tr>
<td>Physics 10 or 5A-5B</td>
<td>4-8 units</td>
</tr>
<tr>
<td>Biological Sciences 1A or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology, Physiology and Behavior 10</td>
<td>5-8 units</td>
</tr>
</tbody>
</table>

Additional units to achieve a total of 40 upper division units in psychology..................19-19 units

**Graduate Study**

The Department offers programs of study and research leading to the Ph.D. degree. Details information regarding graduate study may be obtained by writing the Graduate Advisor, Department of Psychology.

Graduate Advisor. See Class Schedule and Room Directory.

Courses in Psychology (PSC)

Lower Division Courses

1. General Psychology (4), I, II, III. The Staff Lecture–4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality, and social psychology, and psychological aspects of animal behavior. Only 2 units if two or more have been taken as 15 or 16; no credit allowed to those who have both courses 15 and 16.

Lecture—4 hours. Prerequisite: courses 1, 41. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

114. Gender and Social Development (4) III, Shields

Lecture—4 hours. Prerequisite: courses 1, 41. Biological, cognitive, environmental, and social aspects of the human life span between early maturity and death, in its theoretical, methodological, and empirical aspects.

120. History of Psychology (4) Lecture—3 hours; term paper. Prerequisite: courses 1, 41; upper division standing or consent of instructor. Development of psychological thought and research in context of history of philosophy and science.

129. Sensory Processes (5) I, II, III, Henry, Mendola, Mangun

Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: course 1 or Biological Sciences 15, 25, 35, and 45, and course 41. Psychology of sensory systems in man and other animals. Relationship of behavior to physiology, structure, and function of the senses.

130. Human Learning and Memory (4) I, II, III, Kroll, Parks, Goodman

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 41, and either Statistics 13 or 102; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant empirical data.

131. Perception (4) I, II, III, Natoucas, Parks, Port

Lecture—3 hours; independent library work. Prerequisite: courses 1, 41. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

132. Language and Cognition (4) I, III, Long

Lecture—4 hours. Prerequisite: course 1 or the equivalent, course 150 or 102, and upper division work in psychology or linguistics. Zoological, cultural, and individual perspectives of linguistic actions; their production, perception, cognitive significance, and their roles in human conduct, enculturation, and cognitive development.

134. Animal Learning and Motivation (5) II, Coss

Lecture—5 hours. Prerequisite: course 1 or 15 or consent of instructor; course 41. General theories of phylogenetic differences in learning and motivation drawing upon data from laboratory and field observations. Innate physiological mechanisms, developmental changes, effects of conditioning and other constraints on these processes are examined.

135. Psychology of Consciousness (4) I, II, III, Natoucas

Lecture—4 hours. Prerequisite: courses 1, 41. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.


Lecture—4 hours; term paper. Prerequisite: courses 1, 41. Introduction to human information processing, mental representation and information, imagery, attention, concept formation, problem solving, and computer simulation.

137. Altered States of Consciousness (4) I, Tart

Lecture—4 hours. Prerequisite: courses 1, 41. Characteristics, uses, and abuses of altered states of consciousness from experimental, behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, dreams, meditation, hypnosis, autohypnosis, marijuana intoxication, psychedelic drugs, and mystical experiences.

143. Human Emotion and Feeling (4) I, II, Natoucas, Shields, Shaver

Lecture—4 hours. Prerequisite: introductory psychology course, and course 41. An introduction to current theories and research on human emotional and bodily feelings with special reference to self-knowledge.

144. Environmental Awareness (4) I, II, Sommier, Coss

Lecture—4 hours. Prerequisite: course 1. Interactions of people with built environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology.

145. Social Psychology (4) I, II, Simorton, Johnson, Shaver

Lecture—4 hours. Prerequisite: courses 1, 41. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction: group tensions, norm-development, attitudes, values, public opinion, status.

147. Personality Theory (4) I, II, Elms, Emmons, Erickson

Lecture—4 hours. Prerequisite: courses 1, 41. The theories of Freud, Jung, and other major twentieth-century approaches to personality.

149. Gender and Human Reproduction (4) III, Erickson

Lecture—4 hours. Prerequisite: courses 1, 41. The social psychology of human reproduction. Examines gender relations over the course of the individual's reproductive cycle.

150. Comparative Psychology (5) I, II, III, Owings, Mitchell

Lecture—4 hours; discussion or project—1 hour. Prerequisite: course 1 or 15 or consent of instructor; course 41. Perspectives in animal behavior: psychological, ethological, and social systems, with an emphasis on functional behavioral categories from the standpoint of adaptation and evolution.

154. Primate Psychology (4)

Lecture—4 hours. Prerequisite: course 41; course 15 or 102 or an equivalent course in biological sciences, and consent of instructor. Comparative survey of primate psychology, based primarily on laboratory experimentation in learning, communication, cognition, sensation, motivation, emotion, perception, and effects of early experience in many species of primates.

160. Health Psychology (4) I, II, Emmons

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 15, course 41 Psychological factors influencing health and illness. Topics include stress and coping, personality and disease, emotion and perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Application of principles in laboratory exercises.

165. Introduction to Clinical Psychology (4) I, II, III, The Staff

Lecture—4 hours. Prerequisite: courses 1, 41, 168, and either 112 or 145. Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey, based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

168. Abnormal Psychology (4) I, II, III, Emmons, Murphy, Sommer, Waller

Lecture—4 hours. Prerequisite: courses 1, 41. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior.

171. Humanistic and Transpersonal Psychology (4) I, Tart

Lecture—4 hours. Prerequisite: courses 41; course 165 or the equivalent and consent of instructor. Survey, including lectures and demonstrations, of humanistic, and transpersonal movements in contemporary psychology: theory, data, and techniques in the work of Maslow and others who emphasize cre-
ativity, self-actualization, and realization of human potential.

175. Genius, Creativity, and Leadership (4) I. Simonton
Lecture—4 hours. Prerequisite: course 1 or 16; course 41. The title of instructor of genius is examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity and leadership in art, music, literature, philosophy, science, war, and politics. General Education elective in Contemporary Society.

177. Psychobiography and Life History (4) II, III. Emms
Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor; course 41. Case-history research as a novel methodology approach to studying personality. Psychobiological interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. General Education credit: Contemporary Society.

180A. Research in General Experimental Psychology (4) III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in general experimental psychology (general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary to quarter. May be repeated once for credit when the content differs.

180B. Research in Psychology (4) III. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in psychology (animal learning and motivation, comparative psychology, physiological psychology, sensory psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the content differs.

180C. Research in Personality and Social Psychology (4) II. The Staff
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

181. Interactive Computer Programming for Psychological Experiments (4) III. Kroll
Lecture—2 hours; laboratory—4 hours. Prerequisite: computer programming and one of courses 130, 132, or 136. Instruction in programming with an emphasis on programming desk-top computers as an interactive research tool.

183. Organizational Psychology (4) II. Harrison
Lecture—2 hours. Prerequisite: junior or senior standing; major in psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.

190X. Upper Division Seminar (1-2) I, II, III. The Staff
Seminar—1–2 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Psychology. Enrollment limited to permit participation in learning. May not be repeated for credit. Limited enrollment.

192. Fieldwork in Psychology (1-6) I, II, III. Murphy, Sommer
Internship—3–8 hours; term paper. Prerequisite: upper division standing in psychology and consent of instructor. Supervised internship, off- and on-campus, in community and institutional settings. Credit not applicable toward 40 units of upper division psychology required of majors. May be repeated once for credit. Limited enrollment (P/NP grading only).

194A-194HB. Special Study for Honors Students (3-3) II, III. The Staff
Independent study—5 hours. Prerequisite: senior standing in Psychology and qualifications for admission into the honors program, and consent of instructor: at least one course from 180A, 180B, 180C or 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty member of the student's choice. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Psychology (1-3) I, II, III. The Staff
Prerequisite: upper division standing and consent of instructor. Tutoring in Psychology Department courses. This course is intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. No more than 8 units may count toward the Psychology major requirement. (P/NP grading only)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)
(P/NP grading only)

Graduate Courses

200. Proseminar in Psychology (3) I. The Staff
Seminar—2 hours; independent study—1 hour. Prerequisite: graduate standing in Psychology or consent of instructor. Introduces matriculating graduate students to research activities of departmental faculty. (SU grading only)

201. Research Preceptorship (4) I, II, III. The Staff
Laboratory/discussion—6–9 hours. Prerequisite: consent of instructor. (SU grading only)

Lecture—4 hours. Prerequisite: course 41, 103, Statistics 13. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory.

205. Advanced Statistical Inference from Psychological Experiments (5) II, Kroll
Lecture—5 hours; project and term paper. Prerequisite: graduate standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and hypothesis testing. A term paper will be required. Multivariate data analysis paper proposal with a detailed discussion of the statistical techniques to be employed.

206. Statistical Analysis of Psychological Experiments (4) I. Simonton
Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square and analysis of covariance, and factorial designs.

207A. Causal Modeling of Correlational Data (4) I. Simonton
Lecture—4 hours. Prerequisite: course 205, 206 or consent of instructor. Examination of how to make causal inferences from correlational data, in the behavioral sciences. Emphasis is on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques.

207B. Applied Multivariate Analysis of Psychological Data (4) I, II. Wailer
Lecture—4 hours. Prerequisite: course 205, 207A or consent of instructor. Review of the major methods of multiple analysis for psychological data. Students will program statistical routines using a linear algebra-based computing language. Contemporary methods, such as LISREL, will also be covered.

208. Physiological Psychology (4) II. Chalupa, Henry
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

212. Developmental Psychology (4) I. Accredido, Shields, Goodman
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

220. History of Psychology (4) III. The Staff
Seminar—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A lecture-seminar on the history of psychology and on the applicability of early psychological theory and research to contemporary investigations. Offered in alternate years.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the mental processes by which knowledge is acquired, manipulated, stored, retrieved and used. Offered in alternate years.

231. Sensation and Perception (4) II. Post
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of sensory processes and perception in experience and their effects on behavior. Offered in alternate years.

245. Social Psychology (4) II. Johnson
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

247. Personality (4) II. Emmons, Erickson
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

250. Comparative Psychology (4) I. The Staff
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

251. Topics in Genetic Correlates of Behavior (4) II. Murphy, Wailer
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior. May be repeated for credit when topic differs. Offered in alternate years.

252. Topics in Psychology (4) II. Chalupa, Owing, Mendoza
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Critical study in a selected area of psychology. May be repeated for credit when content differs. Offered in alternate years.

263. Topics in Cognitive Psychology (4) I. Accredido, Goodman, Kroll, Long, Parks, Post, Tart
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes. May be repeated for credit when content differs. Offered in alternate years.

264. Topics in Psycholinguistics (4) I. Long
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Discussion of fundamental issues in the psychology of language. May be repeated for credit when content differs. Offered in alternate years.

265. Topics in Psychology of Consciousness (4) Nitius
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Theory and research in the psychology of consciousness. May be...
repeated for credit when content differs. Offered in alternate years.

270. Topics in Personality Psychology (4) III. 
Elms, Emmons, Erickson, Shaver
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Critical study of a selected area of personality psychology. May be repeated for credit when content differs.

290. Seminar (4) I, II, III. The Staff
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students.

291. Current Research in Psychology (2) I, II, III. The Staff (Chairperson in charge)
Seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. Topics relevant to current research in psychology will be discussed and methods employed in contemporary research will be evaluated. Students present a seminar on their own research. May be repeated for credit. (S/U grading only.)

296. Group Study (1-5) I, II, III. The Staff
(S/U grading only.)

299. Research (2-9) I, II, III. The Staff
(S/U grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course
390A-390B-390C. The Teaching of Psychology (4-2-4) I, II, III. Murphy
Seminar—2-4 hours. Prerequisite: graduate standing in psychology and consent of instructor. Practical experience in teaching. Problems and methods 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.)

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Radiation Oncology
See Medicine, School of

Radiology
See Medicine, School of

Range and Wildlands Science
See Range and Wildlands Science; below; and Range Science

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Range and Wildlands Science
(College of Agricultural and Environmental Sciences)
Admission into the Range and Wildlands Science major is temporarily closed for the academic year 1994-95. Interested students should refer to the Environmental and Resource Science major.

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 areas, and other services. The Program. 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. Career Alternatives. Range and wildlands science graduates, especially those with some experience, may be employed as consultants, extension specialists, ranch managers, or ranchers. They may also qualify for the position of Range Conservator in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired, it is recommended that trainee or apprenticeship experience with that agency be included in the major program of study as an internship. In addition, the training provided by this major should give an excellent background for natural resource management positions.

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
English Composition Requirement..................................0-6
See College requirement
Preparatory Subject Matter........................................63-67
Animal science (Animal Science 2).................................4
Biological sciences (Biological Sciences 1A, 1B, 1C)...........15
Mathematics (Mathematics 1A, 1B, 8A, 8B)...................16
Computer science (Agricultural Science and Management 1)
Computer Science Engineering 5, or Computer Science Engineering 10)......................................................3
Economics (Economics 1, Economics 1A, or 1B)..................4-5
Geology (Geology 1-1L)...................................................4
Mathematics (Mathematics 2A; 2B; 2C; 2D)...................3-6
Physics (Physics 1A, 1B)....................................................6
Soil science (Soil Science 100)...........................................4
Statistics (Agricultural Science and Management 150)...........4
Breath/General Education...........................................6-24
Satisfaction of General Education requirement to include two non-introductory courses in Agricultural Economics, Environmental Studies, or Geography

Depth Subject Matter..........................................51-56
Plant physiology (Botany 111 or Water Science 104)............3
Plant ecology (Botany 117 or Plant Science 101)................4
Meteorology (Geography 3, Atmospheric Science 103).........3
Soil science, two upper division courses..........................6-8

Watershed management (Water Science 141).........................3
Animal nutrition (Nutrition 115).....................................4
Wildlife ecology or management, one upper division course in wildlife and fisheries biology or zoology, except...3-4
Forage crops (Agronomy 112)........................................6
Select units from Range Science:.................................18
Range and wildlands plants (Range Science 100)..............30
Range ecology (Range Science 133, 134, 135)......................40
Range field course (Range Science 105)...........................40
Range livestock production (Range Science 160)............70
Revegetation of disturbed lands (Range Science 145)...........30
Range Science 192, 198, 199 (not more than a total of 3 units can be counted)...............................................40
Aerial photo interpretation and remote sensing (Geography 106).........................................................4

Restricted Electives....................................................6-8
Two upper division natural science or applied biological science courses in one or two of the following: animal science, botany, entomology, genetics, geography, mathematics, meteorology, plant pathology, plant science, environmental and resource sciences, water science.

Unrestricted Electives..............................................17-47
Total Units for the Major............................................180

Major Advisor. Contact department office.

Advising Center for the major is in 133 Hunt Hall.

Graduate Study. See under Ecology Graduate Group.

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Range Science
(College of Agricultural and Environmental Sciences)
Faculty. See under the Department of Agronomy and Range Science.


Courses in Range Science (RMT)
Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 132 Hunt Hall.

Lower Division Course
92. Range Science Internship (1-12) I, II, III, summer. The Staff (Department Chairperson in charge). Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses
100. Range and Wildlands Plants (4) III. Rice Lecture—2 hours; laboratory—6 hours; two Saturday field trips. Prerequisite: Biological Sciences 1C and junior standing recommended. Systematics, evolution, ecology and use of plants within range and wildland ecosystems. Taxonomy and identification of range and wildland grasses, woody perennials, legumes, and forbs.

*105. Field Course (2) II. Menke Lecture—10 hours total; laboratory—30 hours total (given week following end of spring quarter). Prerequisite: course in plant or range ecology. Field studies of rangeland vegetation as a livestock grazing resource and as wildlife habitat. Range management and improvement strategies for enhancing multiple use carrying capacity: grazing systems, water
developments, seeding of improved species, and prescribed fire. Considered a spring quarter course for preenrollment. Offered in alternate years.

*133. Grassland Ecology (3) II. The Staff
Lecture—3 hours; one Saturday field trip. Prerequisite: course in plant ecology or consent of instructor. Structure, function, and environment of North American grasslands, with emphasis on the California annual type. Concepts and problems in measuring primary and secondary productivity. Principles of grassland and management including vegetation improvement, utilization by animals, and recreation and aesthetic values. Offered in alternate years.

134. Comparative Ecology of Major Rangeland Systems (3) II. Merke
Lecture—3 hours; one Saturday field trip. Prerequisite: course 100 or the equivalent; general ecology course recommended. Study of vegetation structure, composition, and succession in representative North American rangeland plant communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of management strategies used in these systems today. Offered in alternate years.

135. Ecology and Community Structure of Grassland and Savannah Herbivores (3) I. Demment
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or the equivalent; general ecology course recommended. Feeding ecology of grassland herbivores and its importance in evolution of herbivore communities and social systems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savanna systems. Offered in alternate years.

The Staff (Department Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (PNP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff
Prerequisite: consent of instructor. (PNP grading only.)

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Department Chairperson in charge) Prerequisite: senior standing and consent of instructor. (PNP grading only.)

Graduate Courses

*206. Computer Modeling in Range and Crop Management (3) I. The Staff
Lecture—3 hours. Prerequisite: one course from Agronomy 206B, Agricultural Science and Management 121, Animal Science 129, or Environmental Studies 128. Development of computer models involving dynamic simulation and optimization modes for range and crop management problems. Modeling philosophy, assumptions, implementation, validation, and experimentation emphasized. Offered in alternate years. (SU grading only.)

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

Religious Studies

(College of Letters and Science)
Walen W. Lai, Ph.D., Program Director
Program Office, 922 Sprout Hall (916-752-9032)

Committee in Charge
John R. Hall, Ph.D. (Sociology)
Lincoln D. Hurst, Ph.D. (Religious Studies)
Naomi Janowitz, Ph.D. (Religious Studies)
Phyllis Justse, Ph.D. (History)
Whalen Lai, Ph.D. (Religious Studies)
Jay Meckling, Ph.D. (American Studies)
Jacob Dulpot, Ph.D. (African American and African Studies)
Aram A. Yengoyan, Ph.D. (Anthropology)

Faculty
Lincoln D. Hurst, Ph.D., Associate Professor
Naomi Janowitz, Ph.D., Associate Professor
Whalen Lai, Ph.D., Professor
Barbara Metcalf, Ph.D., Professor (History)

The Major Program
Majoring in religious studies provides an opportunity to explore and analyze the great written and oral traditions of the world's religious traditions: Hinduism, Buddhism, Taoism, Confucianism, Judaism, Christianity, Islam, ancient Egypt, Mesopotamia, and modern (contemporary religious groups in the U.S.).

The Religious Studies major offers a broad choice of courses covering the history, philosophy, sociology, anthropology, American studies, classics, and medieval studies. For some students, religious studies is an appropriate second major and might combine well with anything from physics to international agricultural development, from history to international relations. The religious studies program has also designed four options for minor programs: religious studies, oriental religions, Judaism, and Christian studies.

Career Alternatives. The emphasis in religious studies courses on developing analytical thinking skills and clear written expression is an asset for many career goals. As a strong liberal arts program, religious studies offers an excellent background for graduate programs, especially in the humanities, and for professional schools including law, business, and foreign service.

A.B. Major Requirements:

UNITS
Preparatory Subject Matter .................................................. 24
Religious Studies.......................................................... 20
At least one course from each of the following groups:
(a) Religious Studies 1, 2
(b) Religious Studies 21, 23, 40, 60, 70, 75
Additional requirements .................................................. 4
Anthropology or, with approval from adviser, a lower division course related to religion from Philosophy, Native American Studies, African American and African Studies, American Studies, or other departments

Depth Subject Matter ...................................................... 40
Religious Studies.......................................................... 24
Five upper division courses plus Religious Studies 100 to be taken in junior/senior year

History ............................................................................... 8
Two upper division courses related to religion

Sociology, philosophy, anthropology ........... 8
Two upper division courses related to religion in the above disciplines such as Philosophy 105, 145, Sociology 146, 148, Anthropology 124; or, with approval from adviser, in other disciplines such as Medieval Studies, Native American Studies, African American and African Studies, Classics, or other departments

Total Units for the Major .................................................. 64

Course Equivalents

The major provides a list of lower and upper division courses that can be substituted for courses suggested above.

Recommended

A reading knowledge of a foreign language is highly recommended. Consult major adviser for a complete list of recommended upper division courses.


Minor Program Requirements:

The following minor program options and others responsive to students' needs are subject to approval by the major adviser or the Curriculum Committee.

The four areas of emphasis are Religious Studies, Oriental Religions, Judaism, and Christian Studies.

UNITS
Religious Studies ...................................................... 20
Lower division courses..................................................... 4
Upper division courses.................................................... 16

Sociology, philosophy, anthropology ........... 8
Two upper division courses related to religion in the above disciplines such as Philosophy 105, 145, Sociology 146, 148, Anthropology 124; or, with approval from adviser, in other disciplines such as Medieval Studies, Native American Studies, African American and African Studies, Classics, or other departments

Some substitutions from other departments or programs allowed with consent of adviser.

Preministerial Training

Seminar and professional theological schools, as a rule, do not prescribe any specific major program and give equal consideration to all qualified applicants completing a course of study that gives them a broad cultural background. A program combining the Preparatory Subject Matter for the A.B. degree in Religious Studies, with one of the A.B. degree curricula in the College of Letters and Science is an excellent preparation for most seminaries and professional theological schools. A reading knowledge of a foreign language is highly recommended.

Students interested in applying for admission to a theological school should consult the Religious Studies office and make an appointment with the preministerial adviser.

Students are encouraged to take as part of their preministerial training one of the canonical languages: Hebrew, Greek, or Latin.

Preministerial Adviser. L. D. Hurst.

Courses in Hebrew (HEB)

Lower Division Courses

1. Elementary Classical Hebrew (5) I. The Staff
Lecture—4 hours; discussion—1 hour. Introduction to Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from the Bible. Students who have successfully completed, with a C- or better, Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/N grading basis only. If passing grade will be charged to the student's P/N grading only. No petition is required. All other students will receive a letter grade unless a P/N petition is filed.

2. Elementary Classical Hebrew (5) II. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisites: course 1 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible. Continuation of course 1.

3. Elementary Classical Hebrew (5) III. The Staff
Lecture—4 hours; discussion—1 hour. Prerequisites: course 2 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax.
Courses in Religious Studies (RST)

Lower Division Courses

1. *Survey of Religion* (4) II, III, Lai and staff Lecture—3 hours; discussion—1 hour. Basic concepts and a survey of the major religious traditions of the world. General Education credit: Rational and Historical

2. *Myth, Ritual, and Symbolism* (4) II, III, Lai, Janowit Lecture—3 hours; discussion—1 hour. Myths, rituals, and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena; validity of different approaches to the study of religion. General Education credit: General Education credit: Historical

3. *Comparative Religion* (4) II, III, Lai, Janowit Lecture—3 hours; discussion—1 hour. Introduction to the major religions of the world in their historical context. The major world religions: the philosophies of religion as they have developed in the different cultural traditions. General Education credit: General Education credit: History

4. *Eastern Religions* (4) II, III, Lai Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism, Taoism, and Confucianism, as they relate to their historical and cultural contexts. General Education credit: General Education credit: History

5. *Introduction to Religious Studies* (2) II, III, Lai Lecture—2 hours; discussion—1 hour. Topic of importance in more than one religious tradition as an illustration of the problems methods, and methods of religious studies. May be repeated for credit in a different subject area. General Education credit: General Education credit: History

6. *Old Testament* (4) I, Lai, Janowit and staff Lecture/discussion—4 hours. Religion of Ancient Israel from the time of Abraham to the post-exilic period, as contained in the Hebrew Bible. Emphasis on the role of Biblical themes and institutions as monotheism, revelation, law, covenant, holiness, justice, prophecy, priesthood, wisdom, and apocalypse. General Education credit: General Education credit: History

7. *Introduction to Judaism* (4) I, Lai, Janowit Lecture/discussion—3 hours; term paper. Introduction to the study of Judaism using examples from the rituals, art, and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. General Education credit: General Education credit: History


9. *Introduction to Islam* (4) III, Metcalf Lecture/discussion—4 hours. Introduction to topics and issues of Islamic tradition including Muhammad, the Qur’an, Islamic law, Sufism and sects as well as selected topics including Islamic revival. General Education credit: General Education credit: History

10. *Introduction to Buddhism* (4) I, Lai Lecture—3 hours; term paper (30 hours minimum preparation). Lectures, readings, and discussions of the development of Buddhism in India, China, and Japan; its influence on various Far Eastern art forms. General Education credit: General Education credit: History

11. *Chinese Philosophy* (4) III, Lai Lecture—2 hours; discussion—1 hour. Introduction to Chinese philosophy from classical to modern times: emphasis on basic metaphysics and its change over time, including Confucian humanism, Taoist cosmology, the Han synthesis of Tao, Yi-yang and Five Elephants; its impact on Buddhism, Sung new synthesis and conflict with the West. Offered in alternate years. General Education credit: General Education credit: History

12. *Tyrondale and the Beginnings of the English Bible* (4) II, III, Schaefler Lecture/discussion—3 hours; term paper. Prerequisite: course 40 recommended. Study of Tyrondale’s New Testament translation as a literary and cultural monument in the context of previous Biblical translation, the historical situation in the 14th century, and the influence of this version on the English language and its literature. Offered in alternate years. General Education credit: General Education credit: History


14. *Religious Ethics* (4) II, Lai Lecture/discussion—4 hours. Prerequisite: course 4. Study of the religious bases to ethics through concentration on the ethical tracts of one major tradition, or through a comparison of the attitudes of two or more traditions to a common ethical issue. Offered every three years.

15. *Hinduism* (4) I. The Staff Lecture—3 hours; term paper. Prerequisite: course 4. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with an orientation towards the comparative study of Eastern religious traditions and the sociology of religion. Offered in alternate years.

16. *Buddhism* (4) I. The Staff Lecture—3 hours; term paper. Prerequisite: course 4. Study of Buddhism in its pan-Asian manifestations, from its beginning in India to its development in Sri Lanka and Southeast Asia, Central Asia, China and Japan; teachings and practices, socio-political and cultural impact. Offered in alternate years. General Education credit: General Education credit: History

17. *Ch'an (Zen) Buddhism* (4) II, Lai Lecture/discussion—3 hours; term paper. Prerequisite: course 4. Recommended. The development of the Ch'an (Zen) school of Buddhism in China and Japan. General Education credit: General Education credit: History


Course not offered this academic year.
Minor Program Requirements:

**Rhetoric and Communication**

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<tr>
<th>Requirement</th>
<th>Units</th>
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<td>Rhetoric and Communication 1</td>
<td>3, 115, 116</td>
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<td>Rhetoric and Communication 103, 105, 130, 134, 136, 138, 152</td>
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<td>Rhetoric and Communication 113, 121, 122, 124, 125, 126, 151</td>
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<td>Mass communication: Rhetoric and Communication 140, 141, 143, 145, 152</td>
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**Upper Division Courses**

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<th>Topic</th>
<th>Units</th>
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<td>Analysis of Message Systems</td>
<td>3, 115, 116</td>
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<td>Rhetoric and Communication 103</td>
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<td>Rhetoric and Communication 113</td>
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<td>Mass communication: Rhetoric and Communication 140, 141, 143, 145, 152</td>
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**Letter Grades**

Courses to satisfy major requirements should be taken with letter grades, except for variable unit courses.

**Major Advisers**

Contact the department for advising services.

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113. Current Humanistic Trends in Rhetorical Theory (4) I. One
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) I, II. The Staff
Lecture/discussion—4 hours. Rhetorical as a social science, characteristics of social theories, components of theories, development and testing of hypotheses, general models, theories, and research.

115. Empirical Methods in Communication (4) I. The Staff; II. The Staff
Lecture—4 hours. Interpretation of formal and informal scientific reports via the logic and methods of scientific inquiry, with an emphasis on experimental and descriptive research in communication.

120. Rhetorical Criticism (4) I. Blair; II. The Staff
Lecture—4 hours. Survey of critical methods and their use in the interpretation of rhetorical discourse.

121. Public Address in Western Culture (4) II. The Staff
Lecture—4 hours. Major individuals, movements, and media. Case studies of rhetorical as it has contributed to and is influenced by American culture. Variable content; may be repeated once for credit.

124. Rhetoric of Social Issues (4) I, II. The Staff

125. Freedom of Speech (4) I. Abbott
Lecture—4 hours. Historical developments of and contemporary controversies in freedom of speech. Political dissent, symbolic speech, slander and obscenity. Offered in alternate years.

126. Rhetorical Criticism Practicum (4) I, II. The Staff
Lecture—4 hours. Prerequisite: course 120. Practice in critical analysis and evaluation of rhetorical events. Application of various critical theories and perspectives in understanding rhetorical situations, genres, ideological positions, effects, and language functions.

130. Group Communication Processes (4) I. Vohs; II. The Staff
Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership, as they relate to communication processes.

134. Intercultural Communication (4) I, II. Motley
Lecture—4 hours. Prerequisite: courses 1, 3, or 10, or the equivalent. Communication between two individuals in social and task settings. One-to-one communication, verbal and nonverbal, in developing relationships. Consideration of theory and research on relevant variables such as shyness, self-disclosure, reciprocity, games, and conflict.

135. Nonverbal Communication (4) I, II. Berger
Lecture—4 hours. Examination of the interaction between nonverbal communication and verbal communication channels in influencing outcomes in interpersonal and mass-mediated communication contexts. Underlying functions served by nonverbal communication will also be considered.

136. Organizational Communication (4) I, II. Vohs
Lecture—4 hours. Examines communication in various organizational situations. Focuses on the use of effective communication strategies for achieving organizational and individual goals. Emphasis is placed on identifying and amending ineffective communication within organizations.

138. Communication and Cognition (4) I. Berger
Seminar—4 hours. Prerequisite: upper division standing. Relationships between communication and cognition. Models of discourse comprehension and production, the influence of language attitudes on
social judgments, and the effects of information processing on decision making are explored. Offered in alternate years.

140. Mass Communication and the Public (4) I, II, III. The Staff Lecture–4 hours. Current issues in mass communications policy, with emphasis on the broadcast media. Examination of the economic and legal influences on media performance; the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites.

141. Mass Communication Theory and Research (4) II. Alcalay Lecture–4 hours. Prerequisite: course 115, or the equivalent, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the broadcast media, as examined by a practicing professional.

142A. New Policies and Practices in Television (2) II. The Staff (Chairperson in charge) Lecture–2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing, and reporting the news in the broadcast media, as examined by a practicing professional.

142B. New Policies and Practices in the Press (2) Lecture–2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing, and reporting the news in the print media, as examined by a practicing professional.

143. Media Criticism: Broadcast (4) II. The Staff Lecture–1 hour; discussion–3 hours; one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic and iconographic criticism, and theories of popular culture.

145. Mass Communication and Social Change (4) I. Alcalay Lecture–4 hours. Prerequisite: course 115 or the equivalent. Study of communication campaigns as a way to effect social change. Effect on people’s behaviors which occur via mass media and interpersonal communication channels. Focus on theory and practice of campaigns in areas such as health, intercultural and international communication.

151. Methods of Advocacy (4) II. The Staff Lecture–4 hours. Prerequisite: course 51 or consent of instructor. Study and practice of methods involved in social issues advocacy. Emphasis on current controversial issues. Relation of inquiry and explanation to advocacy. Consideration of logical and nonlogical means of persuasion.

152. Theories of Persuasion (4) I, II. Bell Lecture–4 hours. Prerequisite: course 114 or 115 recommended. Theory and research on the effectiveness of various communicative techniques used to influence the perceptions and behaviors of others. Focuses on scientific research into the principles of persuasion and resistance to persuasion in various contexts.

180. Current Topics in Rhetoric (4) I, II, III. The Staff Seminar–4 hours. Prerequisite: upper division standing with a major in Rhetoric and Communication or consent of instructor. Study of a special topic in Rhetoric and Communication. May be repeated once for credit. Enrollment limited.

180X. Upper Division Seminar (1-4) I, II, III. The Staff (Chairperson in charge) Seminar–1-4 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Rhetoric and Communication. Emphasis upon student participation in learning. May not be repeated for credit. Limited enrollment.

192. Internship in Rhetoric and Communication (1-6), II, III. The Staff Internship–3-18 hours. Prerequisite: declared major in Rhetoric and Communication and 20 units of upper division Rhetoric and Communication courses. Work research projects, usually at off-campus sites under departmental supervision. May be repeated for credit up to 12 units. UNO to count toward major requirements. (P/NP grading only.)

194H. Senior Honors Thesis (4), I, II, III. The Staff (Chairperson in charge) Seminar–1 hour; individual tutoring on research project–3 hours. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty advisor.

197T. Tutoring in Rhetoric and Communication (2-4), I, II, III. The Staff (Chairperson in charge) Seminar–2-4 hours. Prerequisite: upper division standing with major in Rhetoric and Communication and consent of department. Chairperson. Tutoring in undergraduate Rhetoric and Communication courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

Seniors may take graduate courses with consent of instructor.

210. Contemporary Rhetorical Theory (4) III. Alcott Lecture–4 hours. Prerequisite: upper division course in rhetorical theory/criticism or the equivalent. Rhetorical thought in the twentieth century. Processes of rhetorical invention, arrangement, style, and delivery in the works of Kenneth Burke, I.A. Richards, Richard Weaver, Chaim Perelman, and Stephen Toulmin.

212. Practices of Inquiry in Rhetoric (4) II, Blair Seminar–4 hours. Prerequisite: graduate standing in Rhetoric and Communication. Extensive alternative modes of inquiry in contemporary rhetorical studies. Explores both philosophical grounds and political entailments of research and writing standards and practices.

213. Theory Development in Communication Inquiry (4) II. The Staff Seminar–4 hours. This course explores meta-theoretical approaches to developing social-scientific theories of human communication. Perspectives include covering theories, systems, rules, axiomatic theory construction, causal modeling, scientific realism and grounded theory. Research design and measurement implications of these perspectives are examined.

214. Mass Communication Theory and Research (4) III. Alcalay Seminar–4 hours. Prerequisite: course 220 or the equivalent. Examinations of mass communication theory, models, and assumptions of mass communication. Reviews the current state of this discipline and major research developments. Special emphasis on research regarding media and violence, women and minorities, political communication, and new media.

215. Mass Communication and Social Change (4) I. Alcalay Seminar–4 hours. Prerequisite: course 220 and 214, or the equivalent. To gain an understanding of current theories and concepts in persuasion and mass communication. To explore how principles of persuasion are used in communication campaigns. To acquire skills in the planning, implementation, and evaluation of campaigns. Offered in alternate years.

220. Empirical Methods in Communication Research (4) II. Motley Lecture–4 hours. Prerequisite: course 115 or consent of instructor. Introduction to the use of experimental and descriptive research methods in communication research. Topics include survey research, interviewing, experimental and quasi-experimental design, and statistics.

222. Practicum in Rhetorical Criticism (4) II, Blair Seminar–4 hours. Prerequisite: course 120, an equivalent course in criticism, or consent of instructor. Analysis of selected persuasive messages. Particular attention to the rhetorical situation and to elements in the rhetorical process.

240. Advocacy in Contemporary Society (4) III. The Staff Seminar–4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocacy studies. Analysis of the persuasive impact of argumentation occurring in current public controversies. Offered in alternate years.

242. Proseminar in Symbolic Behavior (4) II. Seminar–4 hours. Prerequisite: course 220. Examination of language and other symbols in communication. Investigated phenomena may include stylistic variation, speech acts, cognitive processing, communication rules, and audience effects. Offered in alternate years.

243. Persuasion Theory (4) III. Bell Lecture–4 hours. Prerequisite: course 152, 212, or consent of instructor. Major scientific theories of persuasion. Research programs related to persuasion.

244. Organizational Communication (4) II. Voss Seminar–4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

245. Classical Rhetorical Theory (4) I. Abbott Lecture–4 hours. Prerequisite: course 110 or the equivalent. Recurrent issues in Greek and Roman rhetorical theory, particularly those in the works of Plato, Aristotle, Cicero, and Quintilian. Special attention to problems of invention and style. Frequent seminar reports involving propositions derived from readings.

246. Perspectives on Relational Communication (4) II. Lecture–4 hours. Prerequisite: course 212. Critical survey of the current state of inquiry on communication in personal relationships, i.e., friendship, romantic, and marital relationships. Issues examined include the role of communication in constructing, maintaining, and dissolving relationships.

247. Theories of Rhetorical Criticism (4). Lecture–4 hours. Prerequisite: one course in rhetorical theory and/or criticism. Historical evolution of critical standards from the pre-Socratic to the twentieth century. Emphasis on contemporary questions of textuality, objectivity, intentionality, and justification.

248. Media Criticism (4) I. Oro Seminar–4 hours. Prerequisite: a course in criticism. Examination of broadcasting, print, and visual media by means of rhetorical, psychological, semiotic, sociological, and cultural studies and perspectives. Comparison of media and of critical theory in understanding media messages. Offered in alternate years.

249. Interpersonal Communication Theory (4) I. Bell Lecture–4 hours. Prerequisite: course 134, 212, or consent of instructor. Major theories of interpersonal communication and related research.

250. Special Topics in Rhetoric (4) I. Discussion–4 hours. Selected topics in rhetoric and communication. May be repeated for credit when a different topic is studied.

251. Special Topics in Interpersonal Communication (4) II. Berger Seminar–4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in interpersonal communication. May be repeated for credit with topic changes.

252. Special Topics in Mass Communication (4) III. Seminar–4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in mass communication theory and research. May be repeated for credit when topic changes.
The Program. The department offers a choice of three emphases. The common basis for the first two is extensive training in the Russian language. The Russian Literature emphasis concentrates on the evaluation of Russian literary movements and cultural trends. The second area of study, the Russian Language emphasis, focuses on linguistics and practical language skills. The third area, the Russian Area Studies emphasis, involves interdisciplinary programs offering training in the Russian language and literature and in the historical developments and contemporary social, political, and economic conditions of the former Soviet Union.

Internships, Study Abroad, and Career Alternatives. Students who have completed two years of Russian language study can participate in the Education Abroad Program in Moscow. Many of our students also participate in summer, semester, and year programs sponsored by CIEE and ACTR in St. Petersburg and Moscow. Russian majors may participate in internships where they can serve as translators and interpreters for schools and business firms throughout Northern California. Upon graduation, many Russian majors enter the business world or enter graduate programs in Slavic studies and international relations. The department encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, or economics in order to maximize their career possibilities.

A.B. Major Requirements:

Preparatory Subject Matter.........................0-38

Literature/Language emphasis
Russian 1 through 6 (or the equivalent): .30
Russian 41, 42: .................8
Recommended: Linguistics 1.

Area Studies emphasis
Russian 1 through 6 (or the equivalent): .30
Russian 41 or 42 or the equivalent course in basic literary analysis: .4

Depth Subject Matter............................36-44

Russian Literature emphasis
Russian 101A, 101B, 101C: ..................12
Russian 102 or 103 or 105: .................4
Russian 121, 123: .................8
Russian 127 or 128: .................4
Additional upper division units chosen in consultation with adviser: .................8

Russian Area Studies emphasis
Russian 105: .................4
Russian 101A, 103, or 104: .................4
Russian 150: .................4

Three literature courses to be chosen from
Russian 121, 123, 126, 128, 140, 141: .................12
History 137A, 138, 102F: .................2
Social sciences—Political Science 136, Economics 117, Geography 124: .................12
(To meet special interest course needs, a student should obtain written approval from an adviser.)

Total Units for the Major: ......................44-78

Major Adviser. J. Gallant.
Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

UNITs

Russian language emphasize..................20
Russian 8: .................4
Russian 101A, 101B, 101C: ..................12
One course from Russian 102, 103, 104, 105, 160: .................4
Russian literature emphasize..................20
Russian 41 or 42: .................4
Russian 121, 128, or 143 or 141: .................12
One course from Russian 120, 126, 150, 154: .................4

Russian Area Studies emphasize..................30
Three courses to be chosen from Russian 121, 123, 126, 150, 154.
Russian 41 or 42 or the equivalent course in basic literary analysis required: .................12
One course from History 137B, 137C: .................4
One course from Political Science 136, Economics 117, Geography 124: .................4
Teaching Credential Subject Representative. J. Gallant. See also under Teacher Education Program.

Graduate Study. The department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser. Admission to the graduate program in Russian is closed for the 1994-95 academic year.

Graduate Adviser. D. Rancour-Laferriere. Prerequisite credit. Credit normally will not be given for a course if that course is the prerequisite for a course already completed.

Courses in Russian (RUS)

Lower Division Courses
Course Placement. Students who have learned Russian at home must consult the department for placement instructions. Students with two years of Russian in high school normally continue in Russian 2; those with three years, Russian 3; those with four years, Russian 4.

1. Elementary Russian (5). I. The Staff Discussion—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. A passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

2. Elementary Russian (5). II. The Staff Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.

3. Elementary Russian (5). III. The Staff Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.

4. Intermediate Russian (4). I. The Staff Discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.


6. Intermediate Russian (4). III. The Staff Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature.

Russian (College of Letters and Science)

James Gallant, Ph.D., Program Director
Program Office, 422 Sproul Hall (916-752-4171)

Committee in Charge
Robert O. Crumey, Ph.D. (History)
James Gallant, Ph.D. (Russian)
Harriet Murav, Ph.D. (Russian)
Daniel Rancour-Laferriere, Ph.D. (Russian)

Faculty
Yuri Druzhnikov, Ph.D., Associate Professor
James Gallant, Ph.D., Lecturer
Lisa Little, M.A., Lecturer
Harriet Murav, Ph.D., Associate Professor
Daniel Rancour-Laferriere, Ph.D., Professor
Emeriti Faculty
Valerie A. Tumins, Ph.D., Professor Emerita

The Major Program

The Russian major exposes students to a culture rich in art, language, and literature and presents an important skill needed to enter the fields of foreign affairs, world politics, and international trade, to begin graduate work in literature, history, and international relations.
10. Elementary Conversation (2) II. III. The Staff Discussion—2 hours. Prerequisite: course 1; course 2 or 3 (concurrently). Conversational practice to improve pronunciation and master spoken idioms. May be repeated for a maximum of 6 units.

41. Survey of Nineteenth-Century Russian Literature (in English) (4) I. Murav
Lecture—3 hours. Introduction to dominant literary trends, major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Realism and Naturalism to the beginnings of Modernism. Offered in alternate years.

42. Survey of Twentieth-Century Russian Literature (in English) (4) I. Rancour-Lafonniere
Lecture—3 hours. Introduction to major literary trends such as Symbolism, Futurism, Neorealism, and Socialist Realism. Readings from representative writers such as Gorky, Bely, Pasternak, Solzhenitsyn, and Tertz. Offered in alternate years.

44. Children's Literature in Russia (4) III. Druzhnikov

98. Direct/Group Study (1-5) I, II, III. The Staff Discussion—1-5 hours. (P/NP grading only.)

99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Upper Division Courses

101A. Advanced Russian (4) I. Gallant
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 6. Topics in Russian grammar for advanced students. Reading and discussion of contemporary literary and journalistic texts. Conversational exercises utilizing literary and colloquial variants of current Soviet speech.

101B. Advanced Russian (4) II. Gallant
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversational exercises utilizing literary and colloquial variants of current Soviet speech.

101C. Advanced Russian (4) III. Gallant
Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101B. Continuation of course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversational exercises utilizing literary and colloquial variants of current Soviet speech.

102. Russian Composition (4) I. The Staff
Discussion—3 hours; individual tutorial with instructor. Prerequisite: course 6. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Soviet and American lifestyles; current events. Conducted in Russian. Offered in alternate years.

103. Literary Translation (4) I. Murav
Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in alternate years.

104. Scientific Translation (4) III. Rancour-Lafonniere
Discussion—3 hours; individual translation projects—1 hour. Prerequisite: course 101A. Techniques of translating Russian scientific texts. Science students will work in their fields of interest. Russian students will work on materials assigned by instructor. Offered in alternate years.

105. Advanced Russian Conversation (4) II. Druzhnikov
Conversation—3 hours; preparation of texts—1 hour. Prerequisite: course 6. Intensive conversational prac-
tice and discussion based on current events and contemporary texts. Offered in alternate years.

121. Nineteenth-Century Russian Prose (in English) (4) I. Rancour-Lafonniere
Lecture—3 hours; term paper. Development of prose from Pushkin to Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected sequentially: Turgeniev, Goncharov, Peshemski, Sostykov, Chekhov. Realism, Romanticism, the Natural School, critical realism. Psychological realism are covered. Offered in alternate years.

123. Twentieth-Century Russian Prose (in English) (4) II. The Staff
Lecture—3 hours; term paper. Examination of various trends including Acmeism, Symbolism, Neorealism, and Social Realism. A selection of prose. Readings from such writers as Gorky, Zamyatin, Solzhenitsyn, Pasternak, and Solzhenitsyn. Offered in alternate years.

126. The Russian Theater (in English) (4) III. The Staff
Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present including Turgeniev, Tolstoy, Chekhov, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in alternate years.

127. Nineteenth-Century Russian Poetry (4) I. Rancour-Lafonniere
Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian ver-
sification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovski, Pushkin, Delvig, Baratynski, Lermontov, Nekrasov, Turgenev, and Fut. Conducted in Russian. Offered in alternate years.

128. Twentieth-Century Russian Poetry (4) II. Rancour-Lafonniere
Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to principles of Russian ver-
sification followed by historical and poetic analysis of the following figures: Brjusov, Blok, Akhmatova, Mandelstam, Esenin, Mayakovsky, Khlebnikov, Pasternak, Evdushenko, Voinovski, and Brodsky. Conducted in Russian. Offered in alternate years.

130. Contemporary Soviet Culture (4) I. Murav
Lecture—3 hours; written work. Prerequisite: upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the intricate relationship between artists and the government. Topics include: history of censorship, official and dissident art, recent changes in the cultural scene. Offered in alternate years. General Education credit: Civilization and Culture.

131. Literature of Revolution (4) II. Murav
Lecture—3 hours; essays. Prerequisite: History 3 or 4C, and/or any introductory literature course. Study of Russian literature on society and culture; the major artistic, political and historical works surrounding the Russian revolutions of 1905 and 1917. Offered in alternate years. General Education credit: Civilization and Culture.

132. Nature and Culture in the Soviet Union (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course in environmental studies. Presents an historical and social analysis of environmental movements from the 1920s to the present, showing the influence of Stalinism on environmental ethics, concepts of society and nature in Soviet literature and film, and international implications of Soviet environmental policy. No knowledge of Russian required. General Education credit: Contemporary Societies.

140. Dostojevski (in English) (4) I. Murav
Lecture—3 hours. Reading and analysis of Dostojevski's principal works such as Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political views as reflected in Dostojevski's works. Offered in alternate years.

141. Tolstoy (in English) (4) II. Murav
Lecture—3 hours. Study of Tolstoy's literary evolu-
tion and moral quest. Readings include his Confessions, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. Offered in alternate years.

142. Women's Autobiography (in English) (4) I. Murav
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: any introductory course in Russian. An examination of Russian women's autobiography from the 18th through the 20th centuries, emphasizing the way in which the genre of autobiography serves as a means of the writer's realization of herself, as opposed to her definition by others. Offered in alternate years.

150. Russian Culture (4) III. The Staff
Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nine-
teenth and twentieth century, focusing on the develop-
ments in music, art, music, philosophy, church, traditions, and daily life. Offered in alternate years.

151. Soviet Writers and Censorship (4) II. Druzhnikov
Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course from the GE Literature Prepara-
tion List or consent of instructor. Literature and censors-

154. Russian Folklore (4) III. Rancour-Lafonniere
Lecture—3 hours; term paper. Knowledge of Russian not required. Russian folklore, rituals, and history will be analyzed and compared with folklore of other peo-
oples. Sociological implications of attitudes toward family units, children, etc. Influences of folklore on Russian literature and historiography. Offered in alternate years.

160. Russian Phonology and Morphology (4) II. Gallant
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 101A, 101B, or consent of instructor. Linguis-
tic analysis of the Russian sound system and of Russian word-formation. Offered in alternate years.

166. Representations of Sexuality in Russian Lit-
erature (4) I. Rancour-Lafonniere
Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written literature from a dual, femi-
nist-psychological perspective. Monogamy, free love, loneliness, homosexuality, incest, androgyny, and others as depicted by such writers as Pushkin, Gogol, Tolstoy, Dostojevski, Akhmatova, Blok, Tolstoy, and others. General Education credit: Civilization and Cul-
ture.

192. Research Essay (2-5) I, II, III. The Staff
Prerequisite: a Russian literature course (may be taken concurrently). A research essay, bited on pri-
mary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit.

194. Special Study for Honors Students (1-5) I, II, III. The Staff (Chairperson in charge)
Prerequisite: open only to honors students. Guided research leading to an honors paper.

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

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

200. Old Church Slavonic (4) I. Gallant
Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic. Offered in alternate years.

202. History of the Russian Language (4) II. Gallant
Seminar—3 hours; individual reading projects—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and develop-
ment of the Russian literary language. Reading in the orig-
inal texts from eleventh to eighteenth century. Offered in alternate years.
204. Descriptive Russian Grammar (4) III. Gallant Lecture—4 hours; reading projects—1 hour. Introduction to modern Russian phonology and morphology. Offered in alternate years.

210A. Style and Syntax (4) I. Druzhnikov Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

210B. Style and Syntax (4) II. Druzhnikov Discussion—3 hours; reading projects—1 hour. Prerequisite: 210A or consent of instructor. Examination of stylistic differences between spoken and written Russian.

210C. Russian Style and Syntax (4) III. Druzhnikov Discussion—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and talks on political, economical, social, and cultural topics, lead and participate in discussions. Conducted in Russian.

220. Old Russian Literature (4) II. The Staff Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as The Song of Igor's Campaign, Zadonschina, Epifany's Lives, Ivan IV's cycle of epitaphs. May be repeated for credit when different topics are studied. Offered in alternate years.

221. Eighteenth-Century Russian Literature (4) II. The Staff Seminar—3 hours. Advanced study of literary movements and literary styles in prose or poetry. The works of such writers as Kantemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit when different topics are studied. Offered in alternate years.

222. Nineteenth-Century Russian Literature (4) I. Rancour-Latierie, Murav Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when different topics are studied. Offered in alternate years.

223. Early Twentieth-Century Russian Literature (4) I. Rancour-Latierie Seminar—3 hours. Advanced study of one or more of the modernist movements in Russian literature, including Symbolism, Ahetism, and Futurism. May be repeated for credit when different topics studied. Offered in alternate years.

224. Soviet Russian Literature (4) III. Rancour-Latierie, Druzhnik Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the evolution of genres, styles, techniques, and various formal elements. May be repeated for credit when different topics are studied. Offered in alternate years.

226. Pushkin Studies (4) I. Druzhnikov Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: graduate standing or consent of instructor. The life and works of Pushkin; the history of Pushkin studies up to and including present-day controverties about Pushkin. Evaluations of Pushkin by both Russian and Western scholars. Images of Pushkin and the official myths that surround him. Conducted in Russian readings in Russian and English.

231. Humor and Satire (4) III. Druzhnikov Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Origin and value of humor and satire in 18th-20th century Russian literature. Humor and satire as psychological phenomena and in literary theory. Classical writers as satirists. Link between satire and democratization of Russia. Conducted in Russian; readings in Russian and English. Offered in alternate years.

252. Languages of Culture: Formalism, Semiotics, and Dialogue (4) II. Murav Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Critical paradigms of formalism, semiotics, and "post-Structural" methods of M. Bakhtin, viewed in their historical and philosophical contexts. Extensions and critical evaluations of these paradigms in literary criticism, history, anthropology.

Courses in Science and Society (SAS)

Lower Division Courses

1. Pathways to Discovery: Science and Society (3) I, II, III. The Staff Lecture/discussion—3 hours. Introduction to diverse discovery processes pertaining to Science and Society. Course varies with topic offered. May be repeated for credit.

2. Feeding the Planet: Influence on the Global Food Supply (3) II. Reid Lecture—2 hours; lecture/discussion—1 hour. Scientific principles and dynamic interactions involved in food production, food processing, distribution, trade, and marketing from differing viewpoints. Physical, biological, and social science issues influencing the availability and safety of the food supply worldwide.

90X. Lower Division Seminar (1-4) I, II, III. The Staff Seminar—1-4 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Science and Society through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. Limited enrollment. May be repeated for credit.

28. Directed Group Study (1-5) I, II, III. The Staff Prerequisite: Consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Special Topics: Science and Society (3) I, II, III. The Staff Lecture/discussion—3 hours. Prerequisite: Varies with topic; consent of instructor. Group study of a special topic emphasizing integrative systems approaches in Science and Society. Course varies with topic offered. May be repeated for credit.

190X. Upper Division Seminar (1-4) I, II, III. The Staff Seminar—1-4 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Science and Society. Emphasis upon student participation in learning. May be repeated for credit. Limited enrollment.

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

Social Theory and Comparative History

William W. Hagen, Ph.D., Program Director
Program Office: 2231 Social Sciences and Humanities Building, 752-7577

Graduate Study. The program comprises coursework and research leading to the Ph.D. with a designated emphasis in Social Theory and Comparative History. The program provides theoretical training and interdisciplinary perspective to Ph.D. candidates in the five participating departments (Anthropology, Economics, History, Political Science, Sociology). Students must fulfill all Ph.D. requirements of their home department. The additional requirement examination is designated emphasis include: 1) four graduate courses (Social Theory and Comparative History 250 or History 204, Sociology 242A, and two courses sponsored by the Social Theory and Comparative History program, one of which must be offered by a department other than the student's home department); 2) presentation of a Social Theory and Comparative History field as one area of specialization in the department Ph.D. qualifying examination; 3) an oral examination, following passage of the Ph.D. qualifying examination, based on the student's dissertation prospectus; 4) completion of the dissertation to the satisfaction of the student's thesis committee, one of whose members

*Course not offered this academic year.
Sociology

(College of Letters and Science)
Fred Block, Ph.D., Chairperson of the Department of Sociology, Office, 113 Young Hall (916-752-0784)

Faculty
Nicole W. Biggert, Ph.D., Professor
Fred Block, Ph.D., Professor
Lawrence E. Cohen, Ph.D., Professor
James C. Cramer, Ph.D., Associate Professor
Diane H. Feinleib, Ph.D., Associate Professor
Jack A. Goldstone, Ph.D., Professor
Bruce M. Hackett, Ph.D., Associate Professor
John R. Hall, Ph.D., Professor
Frank Hirtz, Ph.D., Assistant Professor
Mary Jackman, Ph.D., Professor
Carole E. Joffe, Ph.D., Professor (Sociology, Women's Studies)

Emeriti Faculty
Edwin M. Lernert, Ph.D., Professor Emeritus
Leon H. Mayhew, Ph.D., Professor Emeritus

The Major Programs
Sociology is the study of human society in all its manifestations. Its aim is to discover the process and structure of human interaction, to identify the main forces that sustain or weaken social groups, and determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellectual quest for knowledge about the fundamental nature of things.

The Program
The Department of Sociology offers two major programs: Sociology and Sociology/Organizational Studies. Students selecting the Sociology major may choose from four options offered within this major:

1. General/Sociology emphasizes students to obtain a broad understanding of the concepts, methods, and theories of sociology. This option is designed for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. Students with a special interest in the areas of Law and Society or Social Services may choose a more specialized program of courses and practical experience within the sociology major. These options are designed to prepare students for careers in such areas as law, corrections, and welfare counseling.

2. The Comparative Studies and World Development emphasis provides a sociological perspective on social and economic changes throughout the world, with a stress on relationships between "developed" and "underdeveloped" societies. It can prepare students for graduate training leading to careers in international fields. Students are encouraged to consider the Education Abroad Program for their junior year, especially one in a developing country.

3. The Sociology/Organizational Studies major is designed to develop a broad understanding of the political, social, and economic organizations that comprise modern society. This major emphasizes a sociological perspective, but incorporates a multidisciplinary field of study. The major introduces students to a range of theories and methods that social scientists use in the analysis of organizations. Majors in Sociology/Organizational Studies will be prepared for a variety of career options, particularly in the field of management. The major has been specifically designed to meet the requirements for graduate professional training leading to a Masters degree in public or private management, and may also lead to further study in any of the disciplinary areas incorporated in the major.

The Department of Sociology sponsors the interdisciplinary minor in War-Peace Studies. Composed of courses from several departments, it is not a minor in Sociology and is entered in transcripts as "War-Peace Studies." For requirements and other details see War-Peace Studies.

SOCIOLOGY MAJOR

A.B. Degree Requirements:

General emphasis:

Preparatory Subject Matter
Sociology 1, 2, or 3; 46A and 46B (or the equivalents) 12-13

Select units from Anthropology 2, 4 4

Select units from History 3, 4A, 4B, 4C, 6, 9A, 9B, 10, 15, 17A, 17B 4

Select units from Philosophy 1, 5, 14, Political Science 4 4

Depth Subject Matter
Sociology 125, 140, 165A, 165B, 170, 190A, 44

Select two courses each from one of the following seven clusters and one additional course from a third cluster 20

Family, Gender, and Social Interaction Sociology 122, 127, 131, 132, 143B

Law and Social Services Sociology 120, 150, 152, 154, 155, 156, 157, 158


Race and Ethnicity Chicano Studies 110

Comparative Studies and World Development emphasis:

Preparatory Subject Matter
Sociology 1; 46A and 46B (or the equivalents) 13

Economics 1A, 1B 10

*Course not offered this academic year.
### Minor Program Requirements:

Students in other disciplines may elect to minor in Sociology by choosing a sociological subject emphasis listed below. On transcripts, the minor will appear as a minor in Sociology.

<table>
<thead>
<tr>
<th>Units</th>
<th>Sociology-General</th>
<th>20</th>
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<tbody>
<tr>
<td></td>
<td>Select units from Sociology 126, 140, 165a, 170a, 170c, 170d</td>
<td>20</td>
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<tr>
<td></td>
<td>One course from each of three clusters (see cluster lists under Sociology Major—General Emphasis)</td>
<td>12</td>
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<tr>
<td>Sociology-Organizational Studies</td>
<td>20</td>
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<tr>
<td>Sociology 103A and 103B</td>
<td>8</td>
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<tr>
<td>Select units from Agricultural Economics 112, American Studies 125, Applied Behavioral Sciences 152, 163, 164, Economics 100, Political Science 180, 181, 183, 187, 188, Psychology 183, Rhetoric and Communication 134, 136</td>
<td>8</td>
<td></td>
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<tr>
<td>Sociology- law and society</td>
<td>20</td>
<td></td>
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<tr>
<td>Sociology 155, plus 4 units selected from Sociology 120, 150, 152</td>
<td>8</td>
<td></td>
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<tr>
<td>Four units from Sociology 120, 130, 131, 132, 133, 134, 132</td>
<td>4</td>
<td></td>
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<tr>
<td>Four units from Sociology 118, 129, 140, 141, 145a or 145b, 180a or 180b, 185</td>
<td>4</td>
<td></td>
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<tr>
<td>Four units from Sociology 122, 124, 126, 128, 143 or 143b, 156, 157, 165a or 165b</td>
<td>4</td>
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</table>

**Minor Advisers:** Consult the departmental Advising Office, 109 Young Hall.

**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 students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Women's Studies, Social Theory and Comparative History, or Native American Studies. See these headings for further details on these interdisciplinary programs.

**Graduate Advisers:** Consult the Graduate Administrative Assistant, 111 Young Hall.

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**Courses in Sociology (SOC)**

<table>
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<tr>
<th>Lower Division Courses</th>
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<tbody>
<tr>
<td><strong>Introduction to Sociology</strong> (3) I, II</td>
<td>The Staff Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and social class, and personality.</td>
</tr>
<tr>
<td><strong>Self and Society</strong> (4) I</td>
<td>The Staff; II: L. Lottland 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, and social interaction. General Education credit: Contempory Societies.</td>
</tr>
<tr>
<td><strong>Social Problems</strong> (4) I, Jorgensen; II: The Staff Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociological change and programs for improvement. General Education credit: Contemporary Societies.</td>
<td></td>
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<tr>
<td><strong>Immigration and Opportunity</strong> (4) I</td>
<td>Cramer Lecture—3 hours; term paper; discussion—1 hour. Social and demographic analysis of immigration; experiences and views of immigrants; immigration and social mobility; immigration, assimilation, and social change; multicultral societies. Detailed study of immigration into the U.S., comparing studies of Europe, Australia, and other host countries. General Education credit: Contemporary Societies.</td>
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**Upper Division Courses**

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<thead>
<tr>
<th>103. Evaluation Research Methods</th>
<th>4</th>
<th>Lectures—4 hours; discussion—1 hour. Research methods and statistical analysis of data, emphasizing the logic and use of statistical measures, procedures, and mathematical models especially relevant to sociological analysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seminar in Sociological Analysis</strong> (4) I</td>
<td>Jorgensen Seminar—3 hours; to be arranged—1 hour. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.</td>
<td></td>
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<tr>
<td><strong>Political Sociology</strong> (4) I: Jackman; II: Goldstein Lectures—4 hours; discussion—1 hour or term paper or research project. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of national and local power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.</td>
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**119. Peace Institutions** (4) II. L. O'Donnell Lecture—3 hours; discussion—1 hour or term paper or project. Survey and analysis of private and public groups and organizations working for world peace by means other than preparing for war or supporting such preparations. Particular focus on peace institutions in the political, economic, scientific, religious, and educational realms.

**120. Deviation and Society** (4) I. The Staff; II. Malossi Lecture—3 hours; discussion—1 hour or term paper or research project. Theory and studies of deviation in relation to societal reaction, group processes and social deviant behavior. Topics: conformity, non-conformity, conformity defect. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativeness and society.

**122. Sociology of Adolescence** (4) II. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The formation of social groups. Generational succession as a cultural problem.

**123. American Society** (4) I. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. The demographic and social structure of America and the changing composition of the population. Emphasis on ethnic and class groups as bases for political and economic interest. Attention to selected current social controversies.

**124. Sociology of Education** (4) II. Scott Lecture—3 hours; term paper or discussion—1 hour (instructor's option). Education and the social structure. Class size, curricular, and economies of scale. Relations between families and schools in socialization; familial apsidal and educational achievement. Education and socialization. Organizational and occupational structure of schools. Discussion of selected controversies.

**126. Social Interaction** (4) I. The Staff; III. L. O'Donnell Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 2. Everyday interaction in natural settings; ethnographic approaches to the understanding of significant social settings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis.

**127. Sociology of Death** (4) III. L. O'Donnell Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1. An analysis of attitudes toward, social effects of, and methods of coping with death and death-related behaviors. Particular attention to social psychological aspects of death and dying, to death as an event in the life cycle, and to death in various cultures.

**128. Interclass and Intersocietal Dynamics** (4) III. Jorgensen Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: one course from courses 1, 2, 3, 5, American Studies 1, 10, Asian American Studies 1, 2, 10, Native American Studies 1, 2, 10. Analysis of the influence of class differences and social stratification on the development of social institutions (e.g., work, education, political action) and social structures (e.g., friendship, love, marriage, family). Minority-majority relationships.

**129. Sociology of Black Experience in America** (4) II. Hall Lecture—2 hours; discussion, research, or term paper (instructor's option). Survey of historical and contemporary theoretical and sociological perspectives on the Black experience in the United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologists.

**130. Race Relations** (4) II. Jorgensen Lecture—3 hours; discussion—1 hour or term paper or research project. Functions of the social definitions of race and race categories. Analysis of racial conflict, oppression, and other forms of ethnic stratification.

Models of ethnic interaction and social change. Emphasis on racial relationships within the U.S.

**131. The Family** (4) I. The Staff; II. Stacey; III. Wolf Lecture—3 hours; discussion—1 hour. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the implications of family transformation.

**132. The Sociology of Gender** (4) I. The Staff; II. Robnett; III. Stacey Lecture—3 hours; discussion—1 hour. Analysis of psychological, social, and cultural conditions underlying the status and roles of men and women in contemporary society, focusing on a historical and comparative perspective. Offered in alternate years.

**133. Sexual Stratification and Politics** (4) II. Joffe Lecture—3 hours; discussion—1 hour. Prerequisite: course 122 or the equivalent or consent of instructor. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theoretical perspectives such as Engels, Freud, J.S. Mill, de Tocqueville, and others. Emphasis on selected issues of social movements for and against sexual equality.

**134. Sociology of Racial Ethnic Families** (4) I. Robnett Lecture—3 hours; discussion—1 hour or term paper. American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are considered in relation to socio-historical dynamics. Offered in alternate years.

**135. Social Relationships** (4) II. Felmlee Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3, and upper division standing. Social and cultural factors influencing friendship and other intimate relationships. Topics include relationship development, relationship maintenance, and relationship loss. Offered in alternate years.

**136. Economic Sociology** (4) II. Block Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or 1B and upper division standing in the social sciences. Overview of the rapidly growing field of economic sociology. Focus on variations in the ways that markets are organized. The relationship between individual actors and collective rationality will also be emphasized. Offered in alternate years.

**139. Corporations and Society** (4) I. Goldstone; III. Block Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or 3, and upper division standing. The study of the history and power of the modern corporation; corporate organization; politics, the state, and the corporation; labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism.

**140. Social Stratification** (4) I. Jackman; II. The Staff; Jr. Goldstone Lecture—3 hours; discussion—1 hour or term paper or research project (instructor's option). Systems of social ranking, theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure.

**141. Industrialization and Social Change** (4) II. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Selected technological and social factors. Prerequisites: course 1, 2, or 3, and upper division standing. Industrialization, social, political, and cultural factors at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries.

**142. Sociology of Transportation** (4) III. Scott Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological factors in transportation. Consequences of transport mode choice on social organization, sociological influences in transport mode choice. Transportation issues in public policy.

**143A. Urban Society** (4) I. L. O'Donnell Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Theories of city origins. Analysis of the historical process of urbanization and of varying city types. Comparison of American and European experience, metropolis, city, urbanization, and peri-urbanization, and peri-urban growth. Consideration of competing theories of urban growth and change and competing visions of the urban future. Offered in alternate years.

**143B. Sociology of City Life** (4) I. L. O'Donnell Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Course 143A recommended. Critical dissection of the "loss of community" issue. Analysis of the organization of primary ties in the city, of the culture of urban public life and of the learning of city skills. Offered in alternate years.

**144. Agriculture and Society** (4) Walton, Wolf Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: advanced standing in the social sciences or one year of course work in agricultural and environmental sciences. Development of agriculture as a major enterprise in modern society. The contemporary need to develop the labor force and family farming. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. Offered in alternate years.

**145A. Sociology of Third World Development** (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; upper division standing. Introduction to theories and contemporary issues in the sociology of development. Topics such as urbanization, rural agrarian change, class and status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes are analyzed within a comparative-historical framework.

**145B. Gender and Rural Development in the Third World** (4) II. Wolf Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; upper division standing. Political-economic analysis of women and the process of socioeconomic change in the world with particular attention to the family/household context. Offered in alternate years.

**146. Sociology of Religion** (4) II. Hall Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. Offered in alternate years.

**148. Collective Behavior** (4) The Staff Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Study of behavior of human crowds and masses in extraordinary situations, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, and fads.

**149. Religion and American Society** (4) III. Hall Lecture—3 hours; discussion—1 hour. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Civil religion, religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social control function, domestic politics, and sociological stratification. Offered in alternate years.
150. Criminology (4) I. III. Cohen Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of criminal behavior in relation to social structure and the criminalization process.

152. Juvenile Delinquency (4) I, II. Cohen; III. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional setting. Consideration of processing of the delinquent by formal agencies of control.

154. Sociology of Health Care (4) I. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Conceptual and sociological analysis in medicine and health care, with emphasis on the organizational, institutional, and social psychological aspects.

155. Sociology of Law (4) I. The Staff; III. Melosi Lecture—3 hours; discussion—1 hour or term paper or research project. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform.

156. Social Movements (4) I. III. Lofland Lecture—3 hours; discussion—1 hour or term paper or project (Instructor’s option). Analysis of several aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, and effects. Frequency of use of sound and film materials.

157. Social Conflict (4) I. III. Lofland Lecture—3 hours; discussion—1 hour or term paper or project. Analysis of the causes, dynamics, and regulation of social conflict, within and between various kinds of social groups with particular reference to nonviolent methods of waging and regulating conflict.

158. Consumer-Vendor Relationships (4) I. III. Rohe Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of instructor. Development and management, addressing the alternative psychological and economic models, and involve students in the practice of organizational analysis.

180A. Complex Organizations (4) I. Biggart; II. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: consent of instructor. Development and management, addressing the alternative psychological and economic models, and involve students in the practice of organizational analysis.

180B. Complex Organizations (4) I. Hackett; III. The Staff Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of instructor. Development and management, addressing the alternative psychological and economic models, and involve students in the practice of organizational analysis.

181. Social Change Organizations (4) I. III. Lofland Lecture—3 hours; discussion/term paper—1 hour. Prerequisite: course 180A or consent of instructor. Development and management, addressing the alternative psychological and economic models, and involve students in the practice of organizational analysis.

182. Experimental and Utopian Communities (4) I. III. Hackett Lecture—3 hours; discussion—1 hour. The social structure of intentional, experimental or Utopian settlements and communitarian movements, including comparison with other small settlement forms: villages, neighborhoods, monasteries, encampments and nongovernmental communities based on occupation, ethnicity, or ideology.

183. Comparative Organizations (4) I. III. Biggart Lecture/discussion—3 hours; term paper. Prerequisite: course 180A or 180B; upper division standing. Examination of economic and political organizations of major industrial nations. Discussion of historical, cultural, social, and political influences on industrial patterns and practices, alternative theoretical models for explaining differential development. Societies may include Sweden, Japan, Germany, Taiwan, and South Korea. Offered in alternate years.

185. Sociology of Social Welfare (4) I. The Staff; II, III. Joffe Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of the evolution and current organization of welfare functions in modern societies.

188. Social Science Writing (4) I. Walton Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: consent of instructor. Development of upper-division standing, and 12 units of social science. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing. Offered in alternate years.

190X. Upper Division Seminar (1-2) I. The Staff; II. Wolf; III. The Staff Seminar—1-2 hours. Prerequisite: upper-division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Sociology. Emphasis on student participation in learning. May not be repeated for credit. Limited enrollment.

191. Internship and Research Practicum (2-12) I. The Staff; II. Wolf; III. The Staff Internship—3-33 hours; discussion—1 hour. Prerequisite: upper-division standing; course 48A approval of proposed internship. Supervised internship and study in an agency, organization or institution; application of core concepts in sociology to the work experience. May be repeated for credit only by permission. Maximum of four units of 192 may be counted toward the Sociology major. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4) I. III. Lofland Seminar—3 hours; term paper. Prerequisite: senior standing and admission to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty adviser. (Deferred grading only pending completion of course.)

197T. Tutoring in Sociology (1-4) I, II, III. The Staff Tutorial—3-12 hours. Prerequisite: upper-division standing; completion of appropriate course with distinction. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, and leading discussion groups. (P/NP grading only.)

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

200. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Block in charge) Prerequisite: open to seniors only. (P/NP grading only.)

Graduate Courses

201. Social Research (4) I. Goldstone Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing, or consent of instructor. Survey of sociological research design and method. Sampling, measurement, and statistical analysis; standard and nonstandard analytical techniques; introduction to research design and methodology. (S/U grading only.)

207A-207B. Methods of Quantitative Research (4-4) I-II. Cohen, Feinlee Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 or the consent of the instructor. This course will cover the design and execution of quantitative research methods, including data collection, data analysis, and the interpretation of results. (Deferred grading only, pending completion of sequence.)

215. Economy, Polity, and Society (4) I. Block Seminar—3 hours; paper. Prerequisite: consent of instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy.

*Course not offered this academic year.
Soil and Water Science

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 teaches graduates sound scientific principles for managing soil and water resources to benefit both agriculture and the environment.

The Program. Major 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, and related environmental problems. (For example, the emphasis on water quality would include more than the minimum number of units in physical and biological sciences, while an emphasis in resource allocation and land-use planning would include more courses in the social, political, and economic areas.)

Internships and Career Alternatives. Before they graduate, many students receive practical work experience through student internships with state and federal agencies, soil and plant labs, and growers. Students also have the opportunity to engage in research projects with faculty members and to develop individual research or study topics. Graduates are qualified for managerial and technical positions with environmental and agricultural consulting firms. They are also prepared for positions in advising, planning, land appraisal, and research and teaching with private, government, and international organizations involved with soil and water development, use, and conservation. Some graduates also continue in master’s and doctoral programs in soil science, water science, ecology, and plant physiology.

B.S. Major Requirements:
(For convenience in planning a regular 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.)

UNITS

English Composition Requirement
4-12
See College requirement
0-8
Oral expression (Rhetoric 1)
4

Preparatory Subject Matter
74
Biology sciences (Biology 1A, 1B, 1C)
15
Chemistry (Chemistry 2A-2B-2C and a more advanced course)
18
Computer science (Agricultural Systems and Environment 21, Engineering 5)
3
Economics or agricultural economics (Economics 1A, 1B)
5
Geology (Geology 50)
3
Mathematics (Mathematics 16A, 16B)
6
Physics (Physics 5A-5B-5C)
12
Statistics (Statistics 13, Agricultural Systems and Environment 120)
4
Additional physical sciences, biological sciences, and/or mathematics with approval of advisor
3

Breadth/General Education
15-33
Satisfaction of General Education Requirement
6-24
At least one upper division course from each of the following areas with approval of advisor: (1) resource management and environmental law, (3) environmental economics and decision making
9

Depth Subject Matter
30
Soil Science
20
Hydrologic Science
5
Additional upper division units in soil science and hydrologic science
21
92. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Principles of Soil Science (4) I. Singer Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-1B, Physics 1A-1B, Biological Sciences 1A, and consent of instructor; Geology 50, Biological Sciences 1C, Microbiology 2, and Chemistry 8A recommended. Formation, properties and behavior of soils. Nature and interactions of solid, aqueous, gaseous, and biotic components. Soil-plant-atmosphere relationships. Soil development and geography, management, and conservation.

102. Soil and Water Chemistry (5) II. Zasoski Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in introductory earth science or consent of instructor. Chemical nature of the mineral and organic constituents of soil and the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbiological processes in soil.

105. Field Studies of Soil Resources (8) Extra session summer. Dahlgren, Singer, Southard On campus—daily 1 week; study tour—daily, 5 weeks. Prerequisite: consent of instructor; course 120 recommended. In situ study of the interactions between soil characteristics and kinds of land use. Field identification and evaluation of soils for agricultural, range, forest, urban, and other uses.

107. Soil Physics (4) I. Roistacher Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Water Science 100, Mathematics 16A, or the equivalent. Description of soil physical properties. Principles of water, gas, heat, and solute movement in soil with emphasis on examples related to soil in water management. Influence of soil physical properties on transfer processes.

109. Soil Fertility and Fertilizers (4) III. The Staff Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in introductory earth science. Soil fertility and quality of soil. Soil nutrients and their role in plant nutrition. Nutrient cycling in soil.

111. Soil Microbiology (4) II. Scow Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1C and Biological Sciences 1C. Major topics include microorganisms in soil, their interaction with the environment, and their role in soil fertility. Role of microorganisms in cycling of nutrients. Plant-microbe interactions. Transformation of organic and inorganic pollutants.

119. Soils in Land Use and the Environment (4) III. Singer Lecture—3 hours; discussion—1 hour; two one-day field trips. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation.

120. Soil Genesis, Morphology, and Classification (5) III. Southard Lecture—4 hours; laboratory—3 hours (includes five one-day weekend field trips). Prerequisite: course 100; Geology 50 recommended. Recognition and description of soil surface and physical properties of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field.

122. Soil Science Internship (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off

Graduate Study

207. Transport Processes in Soils (4) II. Roistacher, Hopmans Lecture—3 hours; discussion/computer laboratory—2 hours. Prerequisite: course 107 and Mathematics 262, knowledge of a computer programming language. Physical and mathematical description of nonsteady transport processes in soil and the unsaturated zone. Emphasis on analytical and numerical solutions to water, gas, solute (contaminants), and heat transport processes and the chemical and biological interactions influencing solute movement. Offered in alternate years.

208. Soil-Plant Interactions (3) II. Richards Lecture—3 hours. Prerequisite: course 100, Plant Biology 111B, or consent of instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics; nutrient assimilation and crop quality. Offered in alternate years.


214. Soil Mineralogy (5) III. Dahlgren Lecture—3 hours; laboratory—6 hours. Prerequisite: course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the common minerals in soils and rocks. Weathering reactions and stability of minerals in the weathering environment. Application of analytical methods in mineral analysis, including x-ray, microscopic and chemical analysis for characterization of mineral systems. Offered in alternate years.

216. Disequilibria and Aquous Geochemistry (3) I. Casey Lecture—3 hours. Prerequisite: course 102 or Chemistry 110A or Geology 115, and Mathematics 115. First half emphasizes thermodynamic principles, including choices of standard states, ideal solutions, and the Gibbs-Duhem equation. Second half covers geochemical kinetics including simple rate laws, transition state theory, solute diffusion, and experimental methods.

218. Soil Erosion and Conservation (3) II. Singer Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in alternate years.

219. Ecosystem Biogeochemistry (4) III. Dahlgren, Bedose Lecture—3 hours; laboratory/computer laboratory—2 hours. Prerequisite: introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of the role of biosphere, lithosphere, and hydrosphere. Laboratory sections use biogeochemical modeling tools to examine case studies. (Same course as Ecology 218.)

228. Paedology (3) Lecture—3 hours. Prerequisite: consent of instructor; course 120 recommended. Topics selected from studies of soil-forming processes, soil-geomorphic relations, mineral weathering, new developments
Soil Science (A Graduate Group)

Randal J. Southard, Ph.D., Chairperson of the Group
Group Office, 140 Hoagland Hall (916-752-1669)

Faculty. Includes faculty members from the Departments of Biological and Agricultural Engineering; Agronomy and Range Science; Civil and Environmental Engineering; Land, Air, and Water Resources; Entomology; Forestry; Vegetable Crops; and Viticulture and Enology.

Graduate Study. The Graduate Program in Soil Science offers programs of study and research leading to the M.S. and Ph.D. degrees. Soil science focuses on the physical, chemical and biological processes that govern the quality and distribution of soils in relation to landform evolution, geochemical environments, and organism habitats. Research in soil science includes the study of soil as a global natural resource, as a critical component of the environment, and as a resource to support agricultural and wildland ecosystems. Students may specialize in: environmental quality; soil physics; soil chemistry; soil genesis; morphology and classification; soil fertility and plant nutrition; soil microbiology and biochemistry; soil-water relationships; or general soil science. For detailed information regarding the programs, address the chairperson of the group.

Graduate Advisers. Consult the Group Office.

Spanish (College of Letters and Science)

Manfred Kusch, Ph.D., Chairperson of the Department
Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0038)

Faculty
Martín E. Altschul, Ph.D., Associate Professor
Samuel G. Armstead, Ph.D., Professor
Robert Blake, Ph.D., Professor
Cecilia Colombi, Ph.D., Assistant Professor
Linda Egan, Ph.D., Assistant Professor
Zuliana Gertz, Ph.D., Professor
German Guillén, Ph.D., Professor
Almendra Ojeda, Ph.D., Associate Professor

Emeriti Faculty
Donald G. Castaniere, Ph.D., Professor Emeritus
Maria González, Ph.D., Lecturer Emeritus
Didier J. T. Jänes, Ph.D., Professor Emeritus
Daniele Mascolo, Ph.D., Professor Emeritus
Antonio Sánchez-Romeralo, Ph.D., Professor Emeritus

The Major Program
The major program is designed to assure proficiency in all four language skills—speaking, understanding, reading, and writing—and to acquaint students with the intellectual and cultural contributions of the Spanish-speaking world through a study of its language, literature, and traditions.

The Program. The department’s lower division program gives students a solid foundation in the Spanish language, either through the traditional elementary and intermediate language series or through an accelerated three-course sequence of Spanish for native speakers. Linguistics 1 introduces students to a systematic study of language in general and serves as an introduction to upper division courses in Spanish linguistics. At or above the upper division level, students receive a broad introduction to basic concepts and the practice of literary criticism and to the four areas of study represented in the department’s curriculum: Spanish linguistics, Spanish literature, Spanish-American literature, and Hispanic literatures and cultures in the United States. Students are encouraged to work closely with the department’s academic advisers in designing a program of study tailored to their individual needs and interests. Many students combine the Spanish major with another major in the humanities or social sciences. The department encourages its majors to consider an upper-division study in a Spanish-speaking country or to spend their junior year with the Education Abroad Program in Spain, Mexico, or other Spanish-speaking countries.

Career Alternatives. The program, alone or in combination with other majors or minors, may lead to advanced study of the language or literature of Spain and Spanish America, and to careers not only in teaching, but also in other professions such as library science, law, medicine, and in government, social service, or business.

A.B. Major Requirements:

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<th>Requirement</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Preparatory Subject Matter</td>
<td>4-37</td>
</tr>
<tr>
<td>Spanish 1, 2, 3, 21, 22, 23, and 24</td>
<td>0-33</td>
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<tr>
<td>or Spanish 31, 32, 33</td>
<td>0-15</td>
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<tr>
<td>Linguistics 1</td>
<td>4</td>
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<tr>
<td>In consultation with a departmental adviser and with the consent of the department, students may elect Linguistics 1 to be taken concurrently with upper division courses.</td>
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<th>Requirement</th>
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<tr>
<td>Depth Subject Matter</td>
<td>45-48</td>
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<tr>
<td>One course in each of the following five areas</td>
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<tr>
<td>or Spanish 100</td>
<td>19-20</td>
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<tr>
<td>or Spanish 111N, 115N, or 116</td>
<td>3-4</td>
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<tr>
<td>or Spanish 130, 131N, or 134N</td>
<td>4</td>
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<tr>
<td>or Spanish 150N, 151N, or 157</td>
<td>4</td>
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<tr>
<td>or Spanish 117, 174, or 176</td>
<td>4</td>
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<tr>
<th>Requirement</th>
<th>UNITS</th>
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<tr>
<td>Seven elective courses to be chosen in consultation with the student’s major adviser</td>
<td>28-28</td>
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<tr>
<td>Students are strongly encouraged to concentrate their elective courses in one or two of the following areas (other combinations are possible with the approval of the adviser):</td>
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<tr>
<td>a) Spanish literature</td>
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<td>b) Spanish-American literature</td>
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<td>c) Chicano literature</td>
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<tr>
<td>d) Spanish linguistics</td>
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Students may, with the approval of their adviser, take up to three elective courses outside the Spanish department in such programs as Anthropology (e.g., Anthropology 144), Chicano Studies (e.g., Chicano Studies 154, 164, 165, Comparative Literature, History and Sociology (e.g., History 161A, 161B, 165, 166, 166A, 166B, 166W, 169A, 169B, 170), and Linguistics (e.g., Linguistics 115, 116). Given the great flexibility in the Spanish major, it is important that students design their programs in close consultation with their major adviser. This is especially important for students who intend to use their major as preparation for graduate studies or who are planning a teaching career. |

Total Units for the Major | 49-55 |


Minor Program Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>Spanish</td>
<td>23-24</td>
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<tr>
<td>or Spanish 100</td>
<td>4</td>
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<tr>
<td>or Spanish 111N, 115, or 116</td>
<td>3-4</td>
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<tr>
<td>or Spanish 130, 131N, or 134N</td>
<td>4</td>
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<tr>
<td>or Spanish 150N, 151N, or 157</td>
<td>4</td>
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<tr>
<td>or Spanish 117, 174, or 176</td>
<td>4</td>
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</table>

Prerequisite credit. Credit normally will not be given for courses in Spanish taken after the completion of the minor program. Exceptions can be made by the Department Chairperson only.

Honors Program. Candidates for high or highest honors in Spanish must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of Spanish 194H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of their junior year (135 units), have attained a cumulative grade-point average of 3.5 in courses required for the major will be eligible for the honors program. The requirements for each high and highest honors in Spanish are in addition to the regular requirements for the major in Spanish.

Teaching Credential Subject Representative. C. Colombi. See also Under Teacher Education Program.

The Master of Arts Degree. The Master of Arts degree in Spanish is designed for students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate study in Spanish provided they meet the requirements of the Graduate Studies Office 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 Advisers. Consult department.

Courses in Spanish (SPA)

Course placement: Students with two years of high school Spanish normally take Spanish 2, those with three years take Spanish 3, and those with four years take Spanish 21. It is recommended that transfer students who have successfully completed a two-year sequence at the junior college level continue their study by taking Spanish 24 or 100.

Lower Division Courses

1. Elementary Spanish (5) I, II, III. The Staff

  (Samaniego in charge)

  Discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with the special emphasis on communication. (Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student’s P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

*Course not offered this academic year.*
2. Elementary Spanish (5) I, II, III. The Staff
(Sanangelo in charge)
Discussion—5 hours; laboratory—1 hour. Prerequisite:
course 1. Continuation of course I in the areas of
grammatical and basic vocabulary.
3. Elementary Spanish (5) I, II, III. The Staff
(Sanangelo in charge)
Discussion—5 hours; laboratory—1 hour. Prerequisite:
course 2. Completion of grammar sequence and
continuing practice of all language skills through
natural texts.
4. Elementary Spanish Conversation (2) I, II, III.
The Staff
Discussion—3 hours. Prerequisite: course 3. Course
21 (Conversacion) recommended. Development of oral
communication skills. Emphasis on increasing
vocabulary, improving listening comprehension,
punctuation, accuracy, and grammar control.
Practise of everyday situations. Not open to native
speakers or to upper division students.
5. Intermediate Spanish (5) I, II, III. The Staff
Lecture—discussion—5 hours; laboratory—1 hour. Prereq-
quisite: course 3. Designed to review and develop the
grammatical and vocabulary acquired in the first
year of study and reading of modern
Spanish. It is recommended that students transfer-
ing from other institutions start the second-year
program at this point. (Former course 4.)
6. Intermediate Spanish (5) I, II, III. The Staff
Lecture—discussion—5 hours; laboratory—1 hour. Prereq-
Focus on more difficult grammatical concepts and
further practice in composition. Development of all
language skills through exercises and reading of modern
Spanish. (Former course 5.)
7. Spanish Composition I (4) I, II, III. Colombi in
charge
Lecture—3 hours; frequent writing assignments. Prereq-
quisite: course 6. Development of writing skills by
way of reading, discussion, and analysis of authentic
materials, literary texts, and videos. Selective review of
grammar, composition, journals, individual and
group projects.
8. Spanish Composition II (4) I, II, III. Colombi in
charge
Lecture—3 hours; term paper. Prerequisite: course 7.
Development of advanced level writing skills, with
particular emphasis on how to write argumentative
papers, essays, and research papers. Introduction to the
analysis of literary genres. Compositions, journals,
individual and group projects.
9. Intermediate Spanish Conversation (2) I, II, III.
Blake in charge
Discussion—3 hours. Prerequisite: courses 8 or 22.
Continuation of course 8. Designed to develop oral
communication skills at a more advanced level.
Practise in more complex situations. (Former course 8.)
10. Intermediate Spanish for Native Speakers I (5)
I, II, III. The Staff
Discussion—3 hours; tutorial—1 hour; frequent
writing assignments. Prerequisite: course 8 or
equivalent. Course 22. Designed for one of a number of
Spanish students whose native language is Spanish with
the linguistic and learning skills required for successfully
compensating upper division courses in Spanish. Inten-
tive study of grammar and composition. (Former course 7A.)
11. Intermediate Spanish for Native Speakers II
(5) I, II, III. The Staff
Discussion—3 hours; discussion—3 hours; tutorial—1 hour; frequent
writing assignments. Prerequisite: course 22 or
equivalent of instructor. Course 22. Designed for
students whose native language is Spanish. (Former course 7B.)
12. Intermediate Spanish for Native Speakers III
(5) I, II, III. The Staff
Lecture—discussion—3 hours; course—23 hours; fre-
quent writing assignments. Prerequisite: course 32 or
equivalent of instructor. Development of writing skills,
with emphasis on experimenting with various writing
styles: analytical, argumentative, and creative. Analys-
tical review of literary genres. Written essays will be
assigned. Students will write a research paper. Designed for
students whose native language is Spanish. (Former course 7C.)
13. Directed Group Study (1-5) I, II, III. The Staff
(Chairperson in charge)
Prerequisite: consent of instructor and Department
Chairperson. Primarily for lower division students. (P/NP
grading only.)
14. 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
Course 100 is prerequisite to all upper division litera-
ture courses.
100. Principles of Hispanic Literature and Criti-
icism (4) I, II, III. Alsos, Gómez, Gómez, Varneri
Lecture—3 hours; term paper. Prerequisite: course 24
or 33. Principles of literary criticism applied to the
study of fiction, drama, poetry and essay of major lit-
ary writers of the Hispanic world.
110. Advanced Spanish Composition (4) I, II, III.
Carri
Lecture—3 hours; frequent writing assignments. Prereq-
quisite: course 24 or 33. Practice in expository writ-
ing with emphasis on clarity and idiomatic expression.
Practical application and review of selected gram-
matic topics. (Part of former courses 110A and 108B.)
111N. The Structure of Spanish: Sounds and
Phrases (3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Linguistics 1 and
course 24 or 33, or consent of instructor. A linguistic
description of the sound patterns of Spanish and how
these sounds can be used to form larger units, such as
morphemes and words. Theoretical and practical
comparisons with English and with other Romance
languages. (Former course 32.)
112N. The Structure of Spanish: Words and
Phrases (3) I, II, III. Blake, Ojeda
Lecture—3 hours; course 111N. A study of Span-
ish word and phrase structure, with special
emphasis on the constituent structure of noun and verb
phrases. Theoretical and practical comparisons with
English and with other Romance languages. (Former
course 131.)
113N. Spanish Pronunciation (3) I, II, III. Treleanche
Lecture—3 hours. Prerequisite: course 24 or 33, or
consent of instructor. The sound structure of modern
Spanish; theoretical analysis of selected problems in
pronunciation. Strongly recommended for prospec-
tive teachers. (Former course 133.)
114N. Contrastive Analysis of English and
Spanish (4) I, II, Colombi, Ojeda
Lecture—3 hours; term paper. Prerequisite: course 24
or 33, or consent of instructor. Contrastive analysis of
English and Spanish, error analysis, introduction of
definitions of grammatical and stylistic categories.
Individual and group conferences; substantial written
work. (Former course 137.)
115N. How Spanish Grew: Its Origins and Devel-
opment (4) I, II, Blake, Torelance
Lecture—3 hours; term paper. Prerequisite: course 24
or 33 and Linguistics 1, or consent of instructor. The
Spanish language from its roots in spoken Latin to
modernity. Course stresses the close relationship
between historical events and language change as
well as the role that literature plays in language stan-
dardization.
116. Applied Spanish Linguistics (4) I, II, Blake,
Colombi
Lecture—3 hours; term paper. Prerequisite: course 24
or 33, or consent of instructor. An exploration of the
major theoretical and practical issues concerning
learning Spanish as a second language. Especially

course not offered this academic year.

117. Teaching Spanish as a Native Tongue in the
U.S.: Praxis and Theory (4) I, Colombi, Alarcon
Lecture—3 hours; term paper. Prerequisite: course 24
or 33, or consent of instructor. Course 116 and Ling-
guistics 116 recommended. Designed for students
interested in teaching Spanish to native speakers.
Focus on cultural diversity of the main Spanish-speak-
ing populations in the U.S.; specialized language-teach-
ing methodologies in the context of teaching Spanish
to native speakers at different levels. Conducted
primarily in Spanish.
118. Topics in Spanish Linguistics (4) I, III. The
Staff
Lecture—3 hours; term paper. Prerequisite: courses 111
and 112. A study of specialized topics in Span-
ish linguistics, for example: language and use; text
and context; language and society; bilingualism;
Spanish dialectology; syntax and semantics. May be
repeated once for credit when topic differs.
123. Creative Writing in Spanish (4) I, II, Alarcon
Discussion—4 hours. Prerequisite: course 24 or 33,
or consent of instructor. Intensive writing of poetry or
fiction. Focus on the stylistic and formal elements of
the written word. (Former and current course 131.
Bilingual English-Spanish format. Students will write both
in prescribed forms and in experimental forms of their own choosing. Offered
in alternate years.
130. Survey of Spanish Literature to 1700 (4) I.
Gómez
Lecture—3 hours; term paper. Prerequisite: course 100.
Survey of Spanish literature (narrative, poetry and
drama) to 1700. Emphasis on the multicultural
makeup of the Spanish culture, the formation and
growth of the Spanish language. Survey through its written
records and the literature of the early period. (Part
of former courses 103A and 103B.)
131N. Survey of Spanish Literature 1700 to
Present (4) I, II, Gómez
Lecture—3 hours; term paper. Prerequisite: course 100.
Survey of modern Spanish literature, providing an
overview of main literary movements (romanticism,
realism, naturalism, modernism, avant-garde). Emphasis
on the philosophical and historical background and
on the European context for modern Spanish literature.
(Former of former courses 104A and 104B.)
132N. Medieval and Renaissance Spanish Litera-
ture (4) I. Amstutz
Lecture—3 hours; term paper. Prerequisite: course 100.
Introduction to the study of the principal works and
authors of Medieval and early 16th-century Span-
ish literature. (Part of former courses 112 and 103A.)
133N. Golden Age Literature of Spain (4) I, Allsens
Lecture—3 hours; term paper. Prerequisite: course 100.
Introduction to the study of the principal authors
and literary movements of 16th- and 17th-century
Spain and Spanish American colonial literature. (Part
of former courses 103B, 109, and 115.)
134N. Don Quijote (4) I, II, Gómez
Lecture—3 hours; term paper. Prerequisite: course 100.
A critical reading of Don Quijote by Cervantes.
Focused interpretations of important passages and
characters in the context of the socio-cultural back-
ground of the period. Don Quijote as prototype for the
modern novel. (Former course 111.) Offered in alter-
native years.
135N. Spanish Romanticism (4) I, II, Gómez, Scari
Lecture—3 hours; term paper. Prerequisite: course 100.
Romanticism as a philosophical concept, and as
a literary movement in Spain, with emphasis on its
distinctive, specific "Romatic" qualities and its litera-
ry expression in its leading authors in the early nine-
teenth century. (Former course 114.)
136N. The Spanish Novel of the 19th Century
(4) I, II, Scari
Lecture—3 hours; term paper. Prerequisite: course 100.
Literary realism in Spain, focusing on the work of
Alonso Ruar (Clarín), Esteri Pablo Bazán and Benito Pérez
Galindo. The unique characteristics of Spanish realism
and its historical roots in Cervantes and the picaresque.
(Former course 119.)
13TN. Twentieth-Century Spanish Fiction (4) III. Allsient Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the main literary trends and authors of the 20th-century novel and short story. Selected works by Unamuno, Valle-Inclán, Sender, Cela, Matute, Ayala and others. (Former course 120A.)

138H. Modern and Contemporary Spanish Poetry (4) III. Allsient Lecture—3 hours; term paper. Prerequisite: course 100 or 131. Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selections by Miguel de Unamuno, Machado, Juan Ramón Jiménez, Garcia Lorca, Guiffre, Alexandre, Hernández, Hierro and others. (Former course 120C.) Offered in alternate years.

139. Modern Spanish Theater (4) I. Allsient Lecture—3 hours; term paper. Prerequisite: course 100. Study of the main dramatic trends and playwrights of modern Spanish theater. Selected works by Valle-Inclán, Garcia Lorca, Mihura, Buero-Valléejo, Arrabal and others. (Former course 120B.) Offered in alternate years.

140N. Modern Spanish Essay (4) II. Scari Lecture—3 hours; term paper. Prerequisite: course 100. Ortega, Unamuno and the modern Spanish essay. Principe concept of Spain and their relations with other movements and thinkers.

141. Spanish Culture (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 24 or 33. The development of Spanish culture(s) from the Romans to the present, focusing on important historical periods. Topics include art, history of ideas, and everyday cultural manifestations. (Former course 134.) Offered in alternate years.

142. Special Topics in Spanish Cultural and Literary Theory (4) III. The Staff Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Special topics in the study of Spanish literature and culture. May be repeated twice for credit when topic differs. (Part of former course 151.)

149. Latin American Literature in Translation (4) II, Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Latin American literature from prehispanic texts and the Chronicles of the Conquest to Romanticism and Modernism. Reading selections include fiction, poetry, drama and essays. (Former course 105A.)

150N. Survey of Spanish-American Literature to 1900 (4) II. The Staff Lecture—3 hours; term paper. Prerequisite: course 100. Spanish American literature from prehispanic texts and the Chronicles of the Conquest to Romanticism and Modernism. Reading selections include fiction, poetry, drama and essays. (Former course 105B.)

153. Spanish-American Short Story (4) I. Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Spanish-American short story during the 19th and 20th centuries. Emphasis on the contemporary period. (Former course 128.) Offered in alternate years.


155. Mexican Novel (4) II. Gertel, Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. The evolution of the Mexican novel during the 19th and 20th centuries. Emphasis on the narrative of the Revolution and significant contemporary works. (Former course 129.)

156. Darío, Modernism and Its Legacy (4) II. Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Modernism as an authentic expression of Latin American literature and its influence on 20th-century poetry and prose. In depth analysis of the works of Darío and of other modernist writers. (Former course 125.) Offered in alternate years.

157. 20th Century Masters in Spanish-American Literature (4) III. Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Study of significant 20th century Spanish American writers and their cultural and literary milieu. (Part of former courses 127 and 136.) Offered in alternate years.

158. Spanish-American Poetry: From Vanguardism to Surrealism and Beyond (4) II. Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 100. Study of vanguardism, surrealism, and more recent movements of 20th-century poetry. An in-depth analysis of the works of poets. Major topics include modernism and postmodernism, and everyday cultural manifestations. (Former course 134.) Offered in alternate years.

160. Special Topics in Spanish-American Literature and Culture (4) II, III. Gertel, Scari Lecture—3 hours; term paper. Prerequisite: course 100. Special topics in the study of Spanish-American literature and culture. May be repeated twice for credit when topic differs. Offered in alternate years.

161. Spanish-American Culture (4) III. Colombe Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Major developments in the arts and social institutions of Spanish America and areas other than Mexico. Readings, lectures and discussions in Spanish. (Former course 136.)

162. Mexican Culture (4) III. Gertel, Verani Lecture—3 hours; term paper. Prerequisite: course 24 or 33. The development of Mexican culture from the Aztec-Mayan era to the present. Study includes important periods such as the Conquest and Colonialism, the Independence movement, and changes from the Revolution to contemporary Mexico. Reading lectures and discussions in Spanish. (Former course 136.)

164. Chicano Culture (4) II. Acker Lecture—3 hours; term paper. Prerequisite: course 24 or 33. An interdisciplinary survey of Chicano culture. Topics include literature, art, folklore, oral tradition, music, politics, as well as everyday cultural manifestations. (Former course 128.)

166. Literature in Spanish Written in the United States (4) III. Alarcon Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Survey of the literary and cultural contributions of Mexican and Chicano writers in the United States. (Former course 124.)

192L. Internship in Spanish (1-12) II, III. The Staff (Chairperson in charge) Independent study—3-36 hours. Prerequisite: course 23; junior standing; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, community service, translating-interpreting). May be repeated for credit for a total of 8 units. Units will not count toward the Spanish major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5) II, III. The Staff Independent study—3-15 hours. Prerequisite: only available to majors with senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Hispanic literature, civilization, or language studies. (P/NP grading only.)

197T. Tutoring in Spanish (1-4) II, III. The Staff Tutorial—1-4 hours. Prerequisite: Upper division standing and permission of the chair. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Tutoring in the Community (2-4) I, II, III. The Staff Tutorial—2-4 hours. Prerequisite: Upper division standing and permission of the chair. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) II, III. The Staff Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

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

Graduate Courses

201. Literary Theory I (4) II. Allsient, Gertel, Gullón Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Basic theories and practical approaches to modern and contemporary Hispanic literature. Emphasis on formalism, poststructuralism, socio-cultural discourses, and ideologies.

201. Literary Theory II (4) II. Gertel, Gullón, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major contemporary critical theories including formal and poststructural approaches to Hispanic literature and culture. Readings from Semiotics and Deconstructionism to Psycholinguistics and Sociological approaches. Emphasis on Postmodernism and Neo-colonialist discourse.

205. Spanish Phonology (4) II. Torreblanca Seminar—3 hours; term paper. Prerequisite: some knowledge of phonetics is required and consent of instructor. Linguistics 109 and 139 highly recommended. Analyzes the sound patterns of Spanish from both linear and non-linear perspectives. Students will develop a clear understanding of what phonology is and the nature of Spanish phonology, as defined by modern linguistic analysis.

206. Spanish Syntax (4) I. Blake, Ojeda Seminar—3 hours; term paper. Prerequisite: Linguistics 140 and 165. An examination of Spanish word order within the framework of general linguistic theory. The student will investigate how to write a grammar of Spanish with particular attention to the structure of noun and verb clauses.

207. History of the Spanish Language (4) I, I. Blake, Torreblanca Seminar—3 hours; term paper. Prerequisite: Latin 1. (Former course 220A.)

208. Old Spanish Texts (4) II. Torreblanca, Blake Seminar—3 hours; term paper. Prerequisite: course 207. An in-depth linguistic examination of Old Spanish texts from the 12th to the 15th centuries, with particular attention to the significance of orthographic changes.

211. Hispanic Dialectology (4) III. Torreblanca Seminar—3 hours; term paper. Prerequisite: course 220 or consent of instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects. (Former course 221.)

212. Applied Linguistics (4) II. Colombe, Blake Seminar—3 hours; term paper. Prerequisite: graduate standing and course 215 and 216. Focuses on the relevant linguistic aspects of teaching Spanish. Designed for graduate students who have an interest in second-language learning and teaching.

215. Special Topics in Hispanic Linguistics (4) III. The Staff Seminar—3 hours; term paper. Prerequisite: courses 205, 206 and consent of instructor. Specialized topics
in Hispanic linguistics (e.g., pragmatics, sociolinguistics, topics in syntax, semantics, or dialectic studies). May be repeated for credit when topic differs.

222. Critical Approaches to Spanish Literature I: Prose and Essay (4) II. Altissent, Armistead, Guillón, Scari Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. A review of the main critical approaches to Spanish narrative and the essay.

223. Critical Approaches to Spanish Literature II: Poetry and Drama (4) II. Altissent, Armistead, Guillón, Scari Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. A review of the main critical approaches to Spanish poetry and drama.

224. Studies of a Major Writer, Period, or Genre in Spanish Literature (4) III. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of the major genres of Medieval Spanish prose from its origins to 1450.

225. Medieval Spanish Literature: Epic (4) II. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Medieval Spanish epic narratives. Major theoretical perspectives on the genre, diffusion, and character of the Medieval epic. Relationship of epic to ballad literature.

226. Medieval Hispanic Lyric (4) II. Armistead Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis of the most representative lyric poetry in the various Peninsular languages and in provençal, troubadour poetry, kharjas, villancicos, cantigas de amigo, and courtly lyric.

227. Spanish Literature of the Early Renaissance (4) I. Armistead Seminar—3 hours; term paper. Spanish Literature, 1450-1550, with emphasis on La Celestina. (Former course 229.)

228. Spanish Literature of the Renaissance and Golden Age: Poetry (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive critical study of the main currents of Renaissance and Baroque Spanish poetry through its language structures, styles ("Culturismo-Conceptismo"), rhetorical devices, myths, and themes (love, death, time).

229. Spanish Literature of the Renaissance and Golden Age: Drama (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of major 16th and 17th century literary and cultural developments through the study of selected dramas.

230. Spanish Literature of the Renaissance and Golden Age: Prose (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The origins and development of the Spanish novel during the Renaissance and the Spanish Golden Age.

231. Cervantes and the Novel (4) I. Altissent, Armistead, Guillón Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The narrative works of Miguel de Cervantes with special emphasis on Don Quijote.

232. Modern Spanish Literature (4) I. Guillón, Scari, Altissent Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920.

233. Contemporary Spanish Literature: Poetry (4) I. Guillón, Altissent Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical analysis of modern Spanish poetry from a wide spectrum of poetic currents.

234. Contemporary Spanish Literature: Narrative (4) I. Altissent, Guillón Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the 20th-century novel, and short story, with emphasis on the avant-garde, existentialism, social realism, and postmodern trends.

235. Contemporary Spanish Literature: Drama (4) I. Altissent Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years.

236. Contemporary Spanish Literature: Essay (4) II. Guillón, Scari Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major thinkers from Gaviel to Unamuno and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in alternate years.

237. Women Writers of Spain (4) I. Altissent, Guillón Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Introduction to the development of a feminine consciousness in the Spanish contemporary literary scene. Selected texts represent particularly innovative typologies of feminine discourse in the realm of the historical, psychoanalytical, and metafictional, erotic, and allegorical fiction.

272. Critical Approaches to Spanish-American Literature: Narrative (4) I. Eganz, Gertel, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive critical study of the development of Spanish-American literary periods and currents in narrative (novel, short story, and essay), from early Colonial times to the present.

273. Critical Approaches to Spanish-American Literature: Poetry and Drama (4) I. Eganz, Gertel, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive critical study of the development of Spanish-American literary periods and currents in poetry and drama, from early Colonial times to the present.

274. Studies of a Major Writer, Period, or Genre in Spanish-American Literature (4) I. The Staff Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Spanish-American writer and his/hers intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit.

275. Colonial Literature (4) I. Eganz, Gertel, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An examination of pre-Hispanic and Colonial narrative, poetry and theatre. Emphasis on historical, anthropological, and ethnographic approaches to Colonial discourse.

276. Twentieth-Century Spanish-American Drama (4) III. Gertel Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sánchez to the present. Offered in alternate years. (Former course 240.)

277. Spanish-American Novel, 1900-1950 (4) I. Gertel, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Spanish-American in the first half of the 20th century. Offered in alternate years. (Former course 241A.)

278. New Trends in Spanish-American Fiction (4) II. Gertel, Verani Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent developments in Spanish-American narrative. Emphasis on innovative language and structure. Offered in alternate years. (Former course 241B.)

Speech
See Rhetoric and Communication
Statistics
(Intercollege Division)

George G. Roussas, Ph.D., Chairperson of the Division and Associate Dean of Statistics
Division Office, 469 Kerr Hall (916-752-2361)

Faculty
P.K. Bhattacharya, Ph.D., Professor
Prabir Burman, Ph.D., Associate Professor
Christiana Drake, Ph.D., Assistant Professor
Alan P. Fenich, Ph.D., Associate Professor
Wesley O. Johnson, Ph.D., Professor
Yue-Pok (Ed) Mack, Ph.D., Professor
Hans-Georg Mueller, Ph.D., Professor
George G. Roussas, Ph.D., Professor
Francisco J. Samaniego, Ph.D., Professor
Robert H. Shumway, Ph.D., Professor
Jessica M. Utts, Ph.D., Professor, Academic Senate Distinguished Teaching Award
Jane-Ling Wang, Ph.D., Professor

Emeriti Faculty
Alvin D. Wiggins, Ph.D., Professor Emeritus

The Major Program
Statistics enables us to make inferences about entire populations, based on samples extracted from those populations. Statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, social, engineering, and medical sciences.

The Program. Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree. The A.B. degree is very flexible, facilitating a double major or extensive elective coursework in a field in which statistics is applied. The B.S. degree program has two options: one emphasizes mathematics and is especially recommended for preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied coursework and underscore the strong interconnectedness of statistical theory and the applications of statistics.

Preparatory Requirements. Before applying for either the A.B. or B.S. major in Statistics, students must ordinarily complete the following courses with at least C grades:

- Calculus 21A, 21B, 21C
- Mathematics 22A, 22B
- Computer Science Engineering 30 or Engineering 31

Statistics 32

In addition, due to space limitations in the B.S. major, students admitted to this major will normally be chosen from those having at least a 3.0 grade-point average in the above courses. For further information, please contact a Statistics adviser.

Career Alternatives. Probability models and statistical methods are used in a great many fields, including the biological and social sciences, business and engineering. The wide applicability of statistics has created in both the public and private sectors a strong demand for graduates with statistical training. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial series within an insurance company or in the data management unit in a health science facility), and teaching positions.

A.B. Major Requirements:

Preparatory Subject Matter ........................................... 24-25
Calculus, Mathematics 21A, 21B, 21C ..................... 12
Linear algebra, differential equations, Mathematics 22A, 22B ..................... 6
Computer science, Computer Science Engineering 30 or Engineering 31 ..................... 3-4

Statistics through computers, Statistics 32 ..................... 3

Depth Subject Matter ........................................... 38-39
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent ..................... 8
Probability and mathematical statistics, Statistics 131A, 131B, 131C ..................... 12
Three Statistics courses with Statistics 131B as a prerequisite ..................... 9-10
Related elective courses ..................... 9
Three upper division courses approved by major adviser. They may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major ........................................... 62-84

B.S. Major Requirements:

(Options: Statistics—General; Statistics—Computer Science)

Preparatory Subject Matter ........................................... 24-31
Calculus, Mathematics 21A, 21B, 21C ..................... 12
Linear algebra, differential equations, Mathematics 22A, 22B ..................... 6
Computer science, General option ..................... 3-4
- Computer Science Engineering 30 or Engineering 31 (or the equivalent) ..................... 10
Computer Science option ..................... 10
- Computer Science Engineering 30 and 40 and Electrical and Computer Science Engineering 70
Statistics through computers, Statistics 32 ..................... 3

Statistics—General option

Depth Subject Matter ........................................... 51-54
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent ..................... 8
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C or the equivalent ..................... 12
Four Statistics courses having Statistics 131B as a prerequisite ..................... 12-13
Linear algebra, Mathematics 167 ..................... 3
Three upper division Mathematics courses selected from 108, 127A-127B-127C, 128A-128B-128C, 168 (Mathematics 127 strongly recommended for students considering graduate work in Mathematics or Statistics) ..................... 10-12
Related elective courses ..................... 6
Two advanced courses approved by major adviser. These may be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major ........................................... 75-86

Statistics—Computer Science option

Depth Subject Matter ........................................... 49-53
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent ..................... 8
Introduction to probability, mathematical statistics, Statistics 131A, 131B, 131C or the equivalent ..................... 12
Two courses having Statistics 131B as a prerequisite ..................... 6-7
Statistical computing, Statistics 141 ..................... 3
Operating systems and System programming, Computer Science Engineering 150 ..................... 4
Data structures, Computer Science Engineering 110 ..................... 4
Data base systems, Computer Science Engineering 165 or Mathematics 160 ..................... 3-4
Computer Science Engineering 122, or Computer Science Engineering 175 ..................... 3

Total Units for the Major ........................................... 73-84

Computer Science option


*Course not offered this academic year.

Students are encouraged to meet with an adviser to plan a program as early as possible. Sometime before or during the first quarter of the junior year students planning to major in Statistics should consult with a faculty adviser to plan the remainder of their undergraduate programs.

Minor Program Requirements:

The Division offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

UNITS
Statistics 106, 108, and 130A-130B or 131A-131B ........................................... 16
Other course in Statistics having Statistics 130B or 131B as a prerequisite ..................... 3-4
Preparation: Statistics 13 or 32.

Graduate Study. The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on financial support, is available from the Division of Statistics.

Graduate Adviser. R.H. Shumway.

Statistical Consulting. The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-6066).

Courses in Statistics (STA)

Lower Division Courses

10. Statistical Thinking (3) III. Ults

Lecture—3 hours. Prerequisite: two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting, and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies, etc.; understanding probability, risk and odds. General Education credit. Nature and Environment.

*12. Introduction to Discrete Probability (3) I. The Staff

Lecture—3 hours. Prerequisite: two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poison, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. Offered in alternate years.

13. Elementary Statistics (4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. (Students who have had courses 130A or 131A may not receive credit for Statistics 13.)

*13AT. Self-Paced Modular Instruction in Elementary Statistics (4) I, II. Wiggins

Autotutorial—4 hours. Prerequisite: two years of high school algebra, no prior knowledge of computers assumed. Computer tutorial. Corresponds to course 13. Students working at computer solve randomly chosen problems until they qualify to take examinations. Computer-timed examinations present a fixed number of problems for solution. Exams may be repeated.

32. Basic Statistical Analysis Through Computers (3) III. The Staff

Lecture—3 hours. Prerequisite: Mathematics 160 or 21B; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical estimation; problem solving through mathematical analysis and computer simulation. Recommended as alternative to course 13 for
students with some knowledge of calculus and computer programs.

90X. Seminar (1-2) II, I, III. Roussas Seminar—1-2 hours. Prerequisite: high school algebra and consent of instructor. Examination of a special topic in a small group setting.

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

Upper Division Courses

100. Applied Statistics for Biological Sciences (4) I, II, III. The Staff Lecture—3 hours. Prerequisite: Math 16B or its equivalent. Introduction to probability computation and modeling, estimation, hypothesis testing, contingency tables, ANOVA, regression, and to implementation of statistical methods using a computer package. Students who have taken course 13 may receive only 2 units credit.

102. Introduction to Probability Modeling and Statistical Inference (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: 101 or 102 in algebra and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Topics include: probability models—binomial, Poisson, geometric; normal and exponential distributions; random variables; descriptive data analysis; parametric and nonparametric estimation and testing; analysis of variance; regression; computing with Minitab package. Students who have had course 13 may receive only 2 units of credit for course 102.

103. Applied Statistics for Business and Economics (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102, and Mathematics 16A, 16B. Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions; central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package.


106. Applied Statistical Methods: Regression Analysis (4) I, II, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages.


120. Probability and Random Variables for Engineers (4) I, III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Basic concepts of probability theory with applications to electrical engineering, decision tree, networks and random variables, conditional probability, combinations, multinomial distributions, random variable, large numbers, central limit theorem, and approximations.

130A. Mathematical Statistics: Brief Course (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B. Probability and distribution, mean, variance, covariance, Chebyshev's inequality, expectation, sampling distributions, central limit theorem and large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, correlation, correlation matrix, and testing hypotheses.

130B. Mathematical Statistics: Brief Course (4) II. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Transformed random variables, large sample properties of estimates, test statistics, testing hypotheses, likelihood ratio test, goodness-of-fit tests. General linear model, least squares estimates, Gauss-Markov theorem, analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics.

131A. Introduction to Probability Theory (4) I. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Students who have had Mathematics 131 may not receive credit for Statistics 131A.

131B-131C. Introduction to Mathematical Statistics (4-4) II-III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A, or Mathematics 22A and 131. Fundamental concepts of probability theory, sampling, and central limit theorem; likelihood methods; methods of hypothesis testing, goodness-of-fit tests, tests based on the t-distribution and the chi-square distribution.

140B. Introduction to Biostatistics II (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A or 131B. Introduction to statistical methods and applications in the medical field. Probability and inferential methods. Numerical foundations of statistical procedures. Computer analysis of data. Offered in alternate years.

144. Bayesian Statistical Inference (3) II. The Staff Lecture—3 hours. Prerequisite: course 130A or 131B. Description and analysis of sample surveys with applications in the social and biological sciences. Stratiﬁed and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in alternate years.

146. Sampling Theory of Surveys (3) I. The Staff Lecture—3 hours. Prerequisite: course 130A or 131B. Description and analysis of sample surveys with applications in the social and biological sciences. Stratiﬁed and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in alternate years.

190X. Seminar (1-2) I, II, III. Roussas Seminar—1-2 hours. Prerequisite: one of courses 13, 32, 100, or 102. In-depth examination of a special topic in a small group setting.

191X. Internship in Statistics (1-2) I, II, III. The Staff (Chairperson in charge) Internship—3-36 hours. Term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (P/NP grading only.)
194HA-194HB. Special Studies for Honors Students (4-4) I-II. The Staff (Chairperson in charge)
Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research, and writing, culminating in the completion of a senior honors project or oral defense of a faculty advisor. (Deferred grading only, pending completion of sequence.)

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

199. Special Study for Advanced Undergraduates (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (PINP grading only.)

Graduate Courses
205. Statistical Methods for Research (3) III. The Staff
Lecture—3 hours. Prerequisite: course 106 or Agricultural Science and Management 150, or the equivalent. Topics in experimental design include: Latin squares; Youden squares, balanced and partially balanced incomplete block designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, and designs based on various criteria, analysis of covariance.

221. Biostatistics (3) I. The Staff
Lecture—3 hours. Prerequisite: one of the following courses: 232A, 231B, 130B, or 133, and either course 136 or 137 and 106 and 106. Clinical trials, cross-over design, randomization models, sequential monitoring methods, applications to clinical trials, observational studies, estimation of risks, diagnostic procedures, disease-free survival, and combination of drugs, low-dose extrapolation.

222. Biostatistics II (3) II. The Staff
Lecture—3 hours. Prerequisite: course 231A, 231B, and 231C, or course 230 and consent of instructor. Parametric survival models, nonparametric survival models, applications of survival methods in epidemiology, data analysis, computer packages.

223. Biostatistics III (3) III. The Staff
Lecture—3 hours. Prerequisite: course 231A, 231B, and 231C, or course 230 and consent of instructor. Generalized linear models, longitudinal studies, stochastic models in epidemiology and medicine, advanced biostatistical topics, advanced biostatistical data analysis.

236. Brief Advanced Mathematical Statistics (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131A, 131B, 131C, and Mathematics 167, or their equivalents. Distribution theory, modes of convergence, laws of large numbers, central limit theorem, Slutsky’s theorem, delta-method, consistency and asymptotic normality of maximum likelihood estimates, method of scoring, hypothesis testing based on likelihood ratios, Pitman efficiency, concepts of decision theory, Bayesian inference. Students who have received credit for courses 231A, 231B, or 231C may receive only 2 units, 1 unit, or no credit respectively for course 230.

231A-231B-231C. Mathematical Statistics (4-4-4) I-II-III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C and Mathematics 127A-127B or the equivalent. Distribution theory, decision theoretical methods, estimation and hypothesis testing, multivariate techniques, large sample theory.

232A-232B. Linear Model Theory (4-4) II-III. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

233. Design of Experiments (3) II. The Staff
Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorial designs, and response surfaces. Offered in alternate years.

235A-235B-235C. Probability Theory (3-3-3) I, II, III. The Staff
Lecture—3 hours. Prerequisite: Mathematics 127C and courses 131A-131B or the equivalent. Measure theoretic foundations, abstract integration, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Mathematics 235A-235B-235C.)

237A. Time Series Analysis: Foundations (3) I. The Staff
Lecture—3 hours. Prerequisite: course 131A or Mathematics 131 or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in alternate years.

237B. Time Series Analysis: Statistical Inference (3) II. The Staff
Lecture—3 hours. Prerequisites: courses 131B-131C and 237A. Multivariate normal processes, spectral estimation, tests of hypotheses, regression, discrimination, filtering, spectral analysis of variance, ARMA processes, state space models, and maximum likelihood estimation. Offered in alternate years.

238. Theory of Multivariate Analysis (3) II. The Staff
Lecture—3 hours. Prerequisites: courses 135 and 136. The theory of vectors and matrices, characteristic functions; multivariate normal; multiple and canonical correlation; Cochran’s theorem; multivariate GLM; growth curves; Wishart distribution; likelihood ratio and union-intersection tests; simultaneous inference; spatial linear models; projection pursuit; Bayesian multivariate methods; Stein and shrinkage estimators. Offered in alternate years.

240A-240B. Nonparametric Inference (3-3) II-III. The Staff
Lecture—3 hours. Prerequisite: course 231C. Recommended. Comprehensive two-quarter sequence on nonparametric statistical inference, including the most basic materials from: classical nonparametrics, robustness, nonparametric estimation of a distribution function from incomplete data, curve estimation, and theory of resampling methodology. Offered in alternate years.

241. Asymptotic Theory of Statistics (3) III. The Staff
Lecture—3 hours. Prerequisite: course 231C; courses 235A-235B-235C recommended. Theoretical and statistical methods, estimation and hypothesis testing, multivariate techniques, large sample theory.

250. Advanced Data Analysis (4) I. The Staff
Lecture—3 hours; discussion—1 hour. Prerequisites: courses 141, 232A, and either course 230 or 231A. Resampling methods and one to three additional topics selected from nonparametric and semi-parametric methods, nonparametric data analysis, diagnostics, nonstandard multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis. Offered in alternate years.

251. Topics in Advanced Theory of Statistics (3) II. The Staff
Lecture—3 hours. Prerequisite: course 231C. Bayesian, regression, sequential and survival analysis; bootstrap and reliability theory; change-point problems; empirical processes; asymptotic inference under dependence; asymptotic theory in linear, parametric and semiparametric models. Offered in alternate years.

260. Orientation to Statistical Research (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: consent of instructor. Guided orientation to original research statistics papers, and oral presentations in class of such papers by students under the supervision of a faculty member. (SU grading only.)

290. Seminar in Statistics (1-6) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (SU grading only.)

292. Graduate Group in Statistics Seminar (1) I, II, III. The Staff
Seminar—1 hour. Prerequisite: graduate standing. Statistics seminars, mostly in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (SU grading only.)

296. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)
Prerequisite: consent of instructor. (SU grading only.)

299D. Dissertation Research (1-12) I, II, III. The Staff
Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (SU grading only.)

Professional Course
390. Methods of Teaching Statistics (2) I. The Staff (Chairperson in charge)
Lecture/discussion—2 hours, workshop—1 hour. Training in teaching methodology at the undergraduate level. Emphasis is on practical teaching exercises which are utilized to evaluate skills and improve these skills. Lecture exercises will be videotaped and critiqued. (SU grading only.)

Professional Course
401. Methods in Statistical Consulting (3) I, II. The Staff
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: graduate standing in Statistics. Introduction to consulting; in-class consulting as a group; individual or team consulting under supervision. (SU grading only.)

Statistics
(A Graduate Group)

George G. Roussas, Ph.D., Chairperson of the Group
Office 469 Kerr Hall (916-752-2361)

Faculty. The Group has approximately 38 faculty members from all colleges, schools, and divisions, including 13 from the Intercollege Division of Statistics.

Graduate Study. The Graduate Group in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. The M.S. is designed to give students a strong foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Facility in computer programming is essential for some of the course work. The supervised statistical consulting required of all M.S. students has proven to be a valuable educational experience. The Ph.D. program combines advanced course work in statistics and probability with the opportunity for in-depth concurrent study in an applied field. The Biostatistics Affinity Group, a subgroup of the Graduate Group in Statistics, has been formed to oversee the recently approved emphasis in biostatistics in the Ph.D. program. For detailed information, see the Graduate Announcement, or contact the Chairperson of the Group.

Preparation. For admission to the Ph.D. program, coursework requirements for the master's degree, and at least one semester/two quarters of advanced calculus must be completed.

Graduate Adviser, W.O. Johnson.
Surgical and Radiological Sciences

(School of Veterinary Medicine)

Chairperson: Jan Komiebeded, D.V.M., Assistant Clinical Professor

Gregg Kortz, D.V.M., Lecturer
Susan A. Kraegel, D.V.M., Lecturer
Michael L. Magne, D.V.M., M.S., Assistant Clinical Professor
Kyle G. Mathews, D.V.M., M.S., Lecturer
John S. Mattison, D.V.M., Associate Clinical Professor
George M. Peavy, D.V.M., Assistant Clinical Professor
Elisabeth Richardson, D.V.M., Lecturer
Randall H. Scaglioni, D.V.M., Associate Clinical Professor
Sam Silverman, D.V.M., Ph.D., Clinical Professor
James Toler, D.V.M., Ph.D., Associate Clinical Professor
Melinda K. Van Vechten, D.V.M., Assistant Clinical Professor
Erik K. Wiener, D.V.M., Assistant Clinical Professor
Leigh West-Hyde, D.V.M., Associate Clinical Professor

Courses in Surgical and Radiological Sciences (VSR)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

230L. Principles of Anesthesia and Surgery (2) II. Stoffel Lecture—2 hours. Prerequisite: graduate or postdoctoral student or consent of instructor. Integration of principles and techniques of anesthesia and surgery for laboratory animals. Course is not restricted to student numbers. Offered in alternate years.

230L. Principles of Anesthesia and Surgery (2) II. Stoffel Lecture—4 hours. Prerequisite: course 230 concurrently. Laboratory to complement course 230. Limited enrollment. Offered in alternate years. (SU grading only.)

265A. Principles and Practice of Veterinary Radiation Oncology - A (1.5) II. Thon Lecture—1 hour; laboratory—3 hours total. Prerequisite: open only to graduate students and residents. Topic will include series of lectures on physical methods of radiation therapy, bioeffects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465A.) (SU grading only.)

265B. Principles and Practice of Veterinary Radiation Oncology - B (1.5) III. Thon Lecture—1 hour. Prerequisite: course 265A. Principles and practice of veterinary radiation therapy. The topics will include a series of lectures on physical methods of radiation therapy, bioeffects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 465B.) (SU grading only.)

290. Structure and Function of the Mammalian Respiratory System (4) II. Jones Lecture—3 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B, Mathematics 16A, 16B and 16C, Physics 5A and 5B. Advanced study of respiratory physiology and morphology with emphasis on principles of alveolus, ventilation and perfusion, gas distribution, exchange, transport, and delivery at rest, during exercise, and at high altitude. Offered in alternate years.

290. Clinical Neurology/Neuropathology Conference (1) I, II, III. Cardinet, Higgins, Bailey Seminar—1.5 hours. Prerequisite: third- or fourth-year standing in the School of Veterinary Medicine, Veterinary Medicine Teaching Hospital, or UCVMC resident or graduate student in appropriate discipline. Discussion and review of neural and muscular pathology of selected cases from the Veterinary Medicine Teaching Hospital. (SU grading only.)

Professional Courses

406. Special Procedures Rounds (2) I, II, III. The Staff Lecture—6 hours. Prerequisites: a DVM degree and consent of instructor. Offered for graduate degree credit. Review of selected radiology cases from previous day. Specific radiographic changes and differential diagnosis are discussed, with participants leading the discussions. Special procedures such as angiography; nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (SU grading only.)

409. Clinical Case Discussions (1.5) I, II, III. The Staff Lecture—6 hours. Prerequisite: a DVM degree and consent of instructor. Offered for graduate degree credit. Review of selected radiology cases from previous day. Specific radiographic changes and differential diagnosis are discussed, with participants leading the discussions. Special procedures such as angiography; nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (SU grading only.)

410. Current Topics in Radiological Sciences (1.5) I, II, III, IV. The Staff Lecture—1.5 hours. Prerequisite: DVM degree or consent of instructor. Fundamentals of radiological sciences for radiology residents. Topics will include series of in-depth lectures covering the broad spectrum of veterinary radiological sciences and related alternate imaging modalities. Clinically oriented but also including relevant research material. (SU grading only.)

411. Small Animal Surgery (1.25 per week) I, II, III. The Staff (Vasseur in charge) Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of small animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)

412. Large Animal Surgery (1.25 per week) I, II, III. The Staff (Pascoe in charge) Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of large animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (SU grading only.)
Lecture—20 hours total. Prerequisite: second-, third-, or fourth-year veterinary students; residents in specialty training; or graduate students. Overview of current knowledge and practical techniques used in small animal dentistry. (SU grading only.)

415. Veterinary Anesthesia (1 1/2 per week) I, II, III. The Staff (Stefey in charge)
Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for anesthetist of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (SU grading only.)

416. Lameness in Dogs (1 1/2) III. Vasseur
Lecture—33 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Discussion of lameness examination will be followed by detailed descriptions of the disorders that cause lameness in dogs and cats and means to diagnosis and treat them effectively. An important goal will be to distinguish those disorders that can be managed by the general practitioner from those that require referral to a specialist.

417. Lameness in Dogs (0 5/3) III. Vasseur
Laboratory—3 three-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Hands-on experience in surgical manipulation and exposure of joints. (SU grading only.)

420. Small Animal Neuroanatomy (1 1/2 per week) I, II, III. Bailey
Lecture—4 hours; laboratory—16 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for management of patients including history taking, neurological examination, and neurosurgical procedures during the shift supervised by the senior neuroradiologist. May be repeated for credit. (SU grading only.)

422. Veterinary Ophthalmology (3 1/3–3 1/2 per week) I, II, III. Bellhorn
Laboratory—25–50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of animals in the ophthalmic and other clinical services including history taking, ophthalmologic examination, special diagnostic techniques, and post-surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (SU grading only.)

424. Small Animal Ophthalmology (2) III. Byun
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnosis and treatment of commonly encountered eye diseases of small animals and nonhuman primates. (SU grading only.)

431. Small Animal Orthopedic Surgery (2 7/8) II.
Vasseur
Lecture—27 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Management of common fractures, luxations, and dislocations in dogs is presented.

451. Small Animal Orthopedic Surgery (0 5/3) II.
Vasseur
Laboratory—3 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Hands-on experience in application of external coaptation devices and in the use of different types of fixation for fractures. (SU grading only.)

462. Radiographic and Ultrasonographic Diagnosis: Small Animal (1 1/3) III. Hirst
Lecture—16 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Students will be supplied with small animal radiographic and ultrasonographic case studies. Weekly discussion will be held to discuss assigned cases in small groups with instructors. Limited enrollment.

463. Soft Tissue Surgical Diseases (2 3/4) II.
Gregory
Lecture—2 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Pathophysiology and surgical treatment of selected soft tissue diseases.

465. Principles and Practice of Veterinary Radiation Oncology: A (1 1/2) II.
Theon
Lecture—1 hour; laboratory—3 hours total. Prerequisite: open only to graduate students and residents. Principles and practice of veterinary radiation therapy. Topics will include a series of lectures on physical methods of radiation therapy, biologic effects of therapeutic radiation, and the applications in veterinary patients. Offered in alternate years. (Same course as 265A) (SU grading only.)

466. Principles and Practice of Veterinary Radiation Oncology: B (1 1/4) III. Theon
Lecture—1 hour. Prerequisites: course 465A. Principles and practice of veterinary radiation therapy. The topics will include a series of lectures on physical methods of radiation therapy, biologic effects of therapeutic radiation, and applications in veterinary patients. Offered in alternate years. (Same course as 265B.) (SU grading only.)

466. Mixed-Large Animal Anesthesia (1 1/2) II.
Hidebrand
Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Applied clinical anesthesiology for mixed patients. Topics include: anesthetic techniques and considerations for anesthetizing a variety of species including horses, cattle, sheep, swine, poultry, and non-human primates. (SU grading only.)

467. Small Animal Anesthesiology (1 1/2) III. Meagher, O'Brien
Lecture—30 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Approved for graduate degree credit. Presentation of material is designed to be used in clinical settings. Topics include: anesthetic drugs and techniques. (SU grading only.)

468. Equine Lameness and Radiology (4) III. Meagher, O'Brien
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiologic diagnosis of cases that cause lameness in horses. Imaging protocols will be practiced and discussed. Anatomy and pathology of various areas of the musculoskeletal system will be reviewed. (SU grading only.)

469. Equine Surgery (2) III. Pascoe
Lecture—20 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Designed to allow the student to gain additional training and experience with surgical procedures in the horse.

469. Equine Surgery Laboratory (1) III. Pascoe
Laboratory—10 three-hour sessions. Prerequisite: course 469 concurrently. Specific surgical procedures of the horse will be performed by students. Participants in the course may be assigned in groups of three rotations. Limited enrollment.

472. Large Animal Grand Rounds (1/2) III. The Staff (Pascoe in charge)
Discussion—1 hour. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital or consent of instructor. House Officers take an active part in the presentation and discussion of cases from the large animal and ambulatory clinics. (SU grading only.)

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Textile Science
See Fiber and Polymer Science

Textiles
(A Graduate Group)
S. Haig Zeronien, Ph.D., D.S.C., Chairperson of the Group
Group Office, 129 Eversom Hall (916-752-6650)
Faculty: The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. Students in the program can emphasize either the physical or behavioral science aspects of textiles. Research areas include: structure, modification, and properties of fibers and related polymers as well as fibrous assemblies; and societal and technological factors related to adoption and consumption of textiles and apparel. Extensive specialized textiles research facilities are available. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Adviser. S. H. Zeronien (Textiles and Clothing).

Textiles and Clothing
(College of Agricultural and Environmental Sciences)
Margaret H. Rucker, Ph.D., Chairperson of the Division
Division Office, 129 Eversom Hall (916-752-6650)
Faculty: You-Lu Hsieh, Ph.D., Associate Professor; Susan B. Kaiser, Ph.D., Professor; Emory Merlezea, Ph.D., Adjunct Professor; Howard L. Needles, Ph.D., Professor; Ning Pan, Ph.D., Assistant Professor; Margaret H. Rucker, Ph.D., Professor; S. Haig Zeronien, Ph.D., D.S.C., Professor
Emeriti Faculty: Mary Ann Morris, Ph.D., Professor Emeritus
The Major Program

The textiles and clothing major emphasizes the connections among (a) the physical characteristics of textile products, (b) human perceptions of and behavior toward these products, and (c) global economic trends affecting the textile/apparel marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production, distribution, and consumer use of textiles and apparel. (See also Fiber and Polymer Science.)

The Program. The textiles and clothing major offers two options: multidisciplinary and marketing/economics. The Multidisciplinary option provides students with a broad knowledge base in both the social and physical sciences. This base includes production, end-use applications and care of textiles and apparel, physical and chemical properties of textiles, and social, psychological and economic aspects of textiles and clothing. The Marketing/Economics option emphasizes social science and business course work, while also providing students with an awareness of the physical characteristics of textile products.

Interdisciplinary Career Alternatives. Textiles and clothing majors can pursue internships and careers in apparel production and merchandising, retail management, international marketing, textile testing and conservation, and textiles journalism. The majority of textiles and clothing graduates accept entry-level management positions within the textile and apparel industry or in related fields, (e.g., merchandising and marketing, production, research and development, technical service, and management). Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selections of restricted elective coursework.

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

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>English Composition</td>
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<td>College Requirement</td>
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<td>Rhetoric 1</td>
<td>0-4</td>
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<tr>
<td>Preparatory Subject</td>
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<tr>
<td>Computer science (Agricultural Systems and Environment 21, Computer Science Engineering 10)</td>
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<tr>
<td>Economics 1A (1A-1B)</td>
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<tr>
<td>History of art or cultural anthropology (Anthropology 2, Art 10H)</td>
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<tr>
<td>Physics (Physics 10 or Physics 1A)</td>
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<tr>
<td>Psychology (Psychology 1)</td>
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<td>Sociology (Sociology 1A)</td>
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<td>Statistics (Statistics 13)</td>
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<td>Textiles and Clothing (Textiles and Clothing 6, 8)</td>
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<tr>
<td>Option-Specific Preparatory Subject Matter</td>
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<td>Marketing/Economics Option</td>
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<tr>
<td>Accounting (Management 11A-11B)</td>
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<td>Chemistry (Chemistry 10)</td>
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<td>Mathematics (Mathematics 16A-16B)</td>
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<td>OR</td>
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<td>Multidisciplinary Option</td>
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<td>Chemistry (Chemistry 2A, 2B, 8A)</td>
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<tr>
<td>Biology (Biology 1A-1B)</td>
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<tr>
<td>Breadth/General Education</td>
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### Courses in Textiles and Clothing (TXC)

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing. See also courses in Fiber and Polymer Science.

#### Lower Division Courses

5. Introduction to Textiles (4). Needles Lecture—3 hours; laboratory—4 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized.


92. Internship in Textiles and Clothing (1-12). I, II, III. The Staff (Rucker in charge) Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (PNC grading only.)

99. Directed Group Study (1-5). I, II, III. The Staff (Rucker in charge) Prerequisite: consent of instructor. (PNC grading only.)

99. Special Study for Lower Division Students (1-5). I, II, III. The Staff (Rucker in charge) (PNC grading only.)

#### Upper Division Courses


162L. Textile Fabrics Laboratory (1). III. Pan Laboratory—3 hours. Prerequisite: course 162 may be taken concurrently. Laboratory methods and procedures employed in the study of properties of textile fabrics as related to serviceability, comfort, and appearance.

163. Textile Coloration and Finishing (3). Needles Lecture—3 hours. Prerequisite: course 6, Fiber and Polymer Science 110, or Chemistry 6B. Basic principles of textile dyeing, printing, and finishing; color theory, structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles.

163L. Textile Coloration and Finishing Laboratory (1). III. Needles Laboratory—3 hours. Prerequisite: course 163 may be taken concurrently. Demonstrates various aspects of dying, printing, and finishing of textile substrates including the effect of fiber and finish type, and physical and chemical variables on dying and finishing processes and on the properties of the resultant textile.

164. Principles of Apparel Production (3). III. Hsieh Lecture—3 hours. Prerequisite: course 6 or 8. Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering.


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*Course not offered this academic year.*
171. Clothing Materials Science (4) I. Heisk. Pan
Lecture—3 hours; laboratory/discussion—3 hours.
Prerequisite: course 6, 8, and senior standing. The
properties, characterization, and performance evalua-
tion of clothing materials and structures for specific
functional applications. Principles and methods
related to wetting and transport properties, fabric
hand and aesthetic properties, clothing comfort,
and material and assembly technology.

173. Principles of Fashion Marketing (4) I. Rucker
Lecture—3 hours; laboratory—3 hours. Prerequisite:
course 8, Economics 1A, Agricultural Economics
113, or 136, and 132. Study of basic elements of
fashion marketing including philosophy and
objectives, organization merchandising, pricing,
promotion, and personal selling. Offered in alternate
years.

174. Introduction to World Trade in Textiles and
Clothing (2) I. Rucker
Lecture—2 hours. Prerequisite: course 8. Structure of
the global fiber/textile/apparel complex and its dis-
tribution patterns with an overview of political, eco-
omic, and technological factors that are changing
these industries and their markets. Offered in alternate
years.

177. Clothing and Social Perception (3) I. Kaiser
Lecture—3 hours; laboratory 107; Sociology 2;
Psychology 1. Social and cognitive processes
related to the meanings people assign to clothing
when perceiving one another. Particular attention
is given to the following appearance-related stereo-
types: age, sex, physical attractiveness, status, eth-
nicity, influences of clothing and appearance on social
interactions.

180A-180B. Research in Textiles and Clothing
(2-2 1/2, I, II. The Staff (Rucker in charge)
Laboratory—6 hours. Prerequisite: senior standing
with textile-related major, and consent of instruc-
tor. Senior thesis on independent problems. Research
begun in course 180A will be continued and com-
pleted in course 180B. (Deferred grading only, pend-
ing completion of sequence.)

192. Internship in Textiles and Clothing (1-12) I, II,
III. The Staff (Rucker in charge)
Internship—3-36 hours. Prerequisite: consent of
instructor. Work experience off campus in a textiles
or clothing-related area. Supervision by a member of
the Textiles and Clothing faculty. (P/NP grading only.)

197T. Tutoring in Textiles and Clothing (1-5) I, II,
III. The Staff (Rucker in charge)
Discussion—laboratory—5-15 hours. Prerequisite:
upper division textiles-related major and consent of
instructor. Tutoring of students in Textiles and Clap-
ping courses. Assistance with discussion groups and
lab sections under supervision of instructor. May be
repeated for credit if tutoring another textiles
course. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates
(1-5) I, II, III. The Staff (Rucker in charge)
(P/NP grading only.)

Graduate Courses

230. Behavioral Science Concepts in Textiles (3)
I. Kaiser
Lecture—3 hours. Prerequisite: course 107, upper
division or graduate course in statistics (e.g., Agri-
cultural Systems and Environment 120) and one in
a behavioral science (e.g., Psychology 145). Examina-
tion of theories and research concerning relationships
between clothing and human behavior with empha-
sis on research techniques, including methods of
measuring clothing variables. Offered in alternate
years.

250A-F. Special Topics in Polymer and Fiber Sci-
ence (3) I. Zeronian
Lecture—3 hours. Prerequisite: Polymer and Fiber
Science 100 or consent of instructor. Selected topics
of current interest in polymer and fiber science. Top-
ical areas vary each time the course is offered. Same
course as Materials Science and Engineering 250A-F.

Seminar (1-12) I, II. The Staff
Seminar—1 hour. Critical review of selected topics of
current interest in textiles. (S/U grading only.)

Research Conference (1-4) I, II, III. The Staff
(Rucker in charge)
Discussion—1 hour. Prerequisite: graduate standing;
consent of instructor. Individual faculty members
meet with 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.)

Recent Advances in Textiles (3) I. The Staff
(Zeronian in charge)
Lecture—3 hours. Prerequisite: two upper division
courses in Textiles and Clothing or consent of instruc-
tor. Critical reading and evaluation on selected top-
ics of current interest in textiles. Multidisciplinary
aspects of the topics selected will be stressed. May
be repeated for credit.

Group Study (1-5) I, II, III. The Staff (Rucker
in charge)
Research (1-12) I, II, III. The Staff (Rucker in
charge) (S/U grading only)

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UC Davis Washington Center

Prof. Bruce W. Jenkins, Director
UC Davis Washington Center, 2301 M Street, NW,
5th Floor, Washington, D.C. 20003 (202-296-8211)

Information: UC Davis Washington Center
Internship and Career Center
2nd Floor, South Hall, 916-752-7260

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

Undergraduate Academic Internship Program

The UC Davis Washington Center undergraduate
program is open to students from all majors in the
College of Letters, Agriculture, and Environmental
Sciences, and Engineering who have successfully
taken 64 units towards graduation. Students with
12-16 units of academic credit, continue to be
registered as full-time students, and fulfill university
residency requirements. A GPA of approximately 2.0
is recommended for admission. Applicants also are
evaluated based on a written statement, letters of recom-
modation, and personal interviews.

The undergraduate program runs fall and spring
quarters, on a 12-13 week, "extended quarter" basis. It
has two principal components:

- Internships/Research Projects (5-8 units): Students
  work three to four days per week as interns in federal
  agencies, interest groups, media, museums or
  in other organizations related to policy, politics, science
  and culture and gained to the interests and objectives
  of individual students. Working with the internship
  experience, each student will develop an independent
  research project, under the supervision of a member of
  the faculty.

- Policy-Process Seminar (4 units): Each student
  must enroll in at least one seminar. Most of these
  courses focus on a particular area of policy (e.g., foreign
  policy, science policy, economic policy, agricultural
  policy) and the key

issues, the politics, the principal institutions, and
the dynamics of the process within that policy
area. Some are of more general interest, de-
signed to draw on some of the unique historical,
scientific, cultural and artistic resources of
Washington. In addition to regular instruction,
seminars are likely to include guest speakers,
obserations of congressional committees and
federal agencies, and other relevant Washington
experiences.

Courses are taught by UC Davis faculty in residence,
faculty from the UCLA and UC Santa Barbara Wash-
ington programs, or visiting faculty from the Wash-
ington area.

Financial aid eligibility is maintained and the aid
package can be adjusted to reflect the additional costs of the Program. Some additional financial
awards also are offered directly by the Washington
Center, including the University of California Presi-
dent's Washington Scholarship Program.

Students live in university-arranged housing, conve-
nient to public transportation. Arrangements also are
made to cover health services and other aspects of
student life. The program also includes many educa-
tional, cultural and social activities in the Wash-
ington area.

Students also may participate in a Summer Program.
The Summer Program is non-credit. It includes inter-
ships and many of the same educational, cultural,
historical and social activities as the fall and spring
quarters. The program fee is $2,200. Some financial
assistance is provided but more limited than for the
academic year programs.

The Washington Center also has two positions for
graduate students as Graduate Fellows (Combination
of a predoctoral research fellowship and a teaching
assistantship). More information is available from the
Washington Center or Graduate Studies.

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Urology

See Medicine, School of

Vegetable Crops

College of Agricultural and Environmental Sciences
Kent J. Bradford, Ph.D., Chairperson of the
Department
Department Office, 146 Asmundson Hall (916-752-
0516)

Faculty

M. Joseph Ahene, Ph.D., Lecturer
Alan B. Bennett, Ph.D., Professor
Arnold J. Bloom, Ph.D., Professor
Kent J. Bradford, Ph.D., Professor
Mark A. Canwell, Ph.D., Lecturer
Louise E. Jackson, Ph.D., Associate Professor
Richard A. Jones, Ph.D., Professor
Richard W. Michelmore, Ph.D., Professor
Donald J. Nye, Ph.D., Professor
Makalo F. Quirins, Ph.D., Professor
Vincent Rubatzky, Ph.D., Lecturer
Dina St. Clair, Ph.D., Assistant Professor
Donald A. Salvest, Jr., Ph.D., Professor
Carol Shahan, Ph.D., Associate Professor
Ronald E. Voss, Ph.D., Lecturer
Shang C. Yang, Ph.D., Professor
John L. Yoder, Ph.D., Associate Professor
Emeriti Faculty

James F. Harrington, Ph.D., Professor Emeritus
James M. Lyons, Ph.D., Professor Emeritus
Leonard L. Morris, Ph.D., Professor Emeritus

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*Course not offered this academic year.*
Harlan K. Pratt, Ph.D., Professor Emeritus
Lawrence R. Rapoport, Ph.D., Professor Emeritus
Charles M. Rick, Ph.D., Professor Emeritus
Paul G. Smith, Ph.D., Professor Emeritus
Arthur R. Spurr, Ph.D., Professor Emeritus
Herman Timm, Lecturer Emeritus
James E. Welch, Ph.D., Lecturer Emeritus
Masatosh Yamaguchi, Ph.D., Professor Emeritus

Graduate Study. A program of study is offered leading to the M.S. degree in Vegetable Crops. Information can be obtained from the Graduate Adviser. See also the Graduate Studies section in this catalog.


Related Courses. Vegetable Crops faculty also teach the following courses that contribute to majors and graduate programs in Agricultural Systems and Environment, Biological Sciences, Genetics, and Plant Biology:


Concordance

The following courses in Vegetable Crops have been transferred to other subject areas:

Course Number Equivalent new course and number
101 Agricultural Systems and Environment 100 (Principles of Vegetable Crops Production)
105 Plant Science 114 (Biology, Evolution and Systematics in Vegetables)
106 Agricultural Systems and Environment 118 (Seed Production and Quality)
121 Plant Science 191 (Undergraduate Research: Proposal)
191L Plant Science 191L (Undergraduate Research: Experiment)
194H Plant Science 194H (Senior Honors Thesis)
195 Agricultural Systems and Environment 195 (Field Study of Vegetable Industry)

Courses in Vegetable Crops (VCR)

Questions pertaining to the following courses should be directed to the Instructor or to the Vegetable Crops Office, 148 Armstrong Hall.

Lower Division Course 92. Internship in Vegetable Crops (1-6) I, II, III. The Staff (Department Chairperson in charge) Internship—3–36 hours. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92–192 series. (P/NP grading only.)

Upper Division Courses 106. Topics in Plant Science Research (1) I, II. The Staff Discussion—1 hour. Prerequisite: undergraduate standing in the plant or biological sciences. Discussion and critique of current research by faculty, graduate students, and undergraduate students. May be repeated for a maximum of 3 units. (P/NP grading only.)

192. Internship in Vegetable Crops (1-12) I, II, III. The Staff (Chairperson in charge) Internship—3–36 hours. Prerequisite: consent of instructor. Work experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92–192 series. (P/NP grading only.)

1977. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge) Laboratory/discussion—3–9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision, students may grade laboratory manuals, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) 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. Management of Vegetable Production Systems (3) I. J. Johnson Lecture/discussion—3 hours. Prerequisite: course 101 or consent of instructor. Overview of management practices utilized in vegetable production systems, emphasizing the balance between resource inputs and crop productivity. Topics include nutrient management, water and energy, pest control strategies, and analysis of contemporary systems for fresh market and processing production.

202. Postharvest Physiology of Vegetables (4) I. Satyve and Yang Lecture—2 hours, laboratory—6 hours. Prerequisite: Botany 112 or Plant Science 112. Comparative Physiology of Harvested Vegetables: emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Laboreator procedures and research exercises. Offered in alternate years.

220. Biotechnology and Genetics of Crop Improvement (3) I. Michelmore Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113, Genetics 102A, 102B recommended. Emphasizes the integration of modern molecular biology and classical plant breeding including: transposable elements, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms, male sterility, gametophyte selection, disease and stress resistance.

220L. Biotechnology and Genetics of Crop Improvement Laboratory (1) I. Michelmore Laboratory—3 hours. Prerequisite: course 220 concurrently. Several class projects in plant genetics and biotechnology: tomato genetics, zinc deficiency, Agrobacterium mediated plant transformation, self-incompatibility in Brassica species, mapping disease resistance genes.

221. Genetics and Cytogenetics of Vegetable Crops (3) I. Quiros Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytogenetics of the principal vegetable crops on a crop by crop basis. Current advances in the cytogenetic technology, sources of germplasm and applications to practical breeding problems.

221L. Genetics and Cytogenetics of Vegetable Crops Laboratory (2) I. Quiros Laboratory—6 hours. Prerequisite: course 221 (may be taken concurrently). Genetic and cytogenetic techniques applicable to vegetables. Includes chromosome squash preparation techniques, pachytene analysis, segregation and linkage analysis of quantitative traits in interspecific hybrids, centromere mapping, and aneuploid segregations.

225. Transposable Elements in Higher Plants (3) I. Yoder Lecture—1 1/2 hours; discussion—1 1/2 hours. Prerequisite: graduate standing or consent of instructor. Examines both the classical and molecular genetic information about plant transposable elements. Topics include the discovery, molecular structure, evolutionary significance and practical uses of these fascinating genetic entities. Offered in alternate years.

228. Plant Molecular Biology Laboratory (5) I. Bennett, Harada (Botany) Lecture—2 hours; laboratory—10 hours. Prerequisite: Molecular and Cellular Biology 120L, a course in molecular genetics, and consent of instructors. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene therapy. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Plant Biology 228.)

*230. Selected Methods in Vegetable Research (3) I. Bennett Lecture—1 hour; laboratory—6 hours. Prerequisite: one course from Plant Science 102, Botany 111, 112, Biochemistry 101A/101B or 101L. Survey of the theory and practice of certain laboratory methods and techniques used in vegetable/plant research, with emphasis on determination of plant constituents, physiological functions, and cell/tissue culture. Offered in alternate years.

230. Seminar (1-6) I, II, III. The Staff Discussion—1 hour. (S/U grading only.)

291. Special Topics in Vegetable Crops (2) I. The Staff (Chairperson in charge) Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. In-depth coverage of selected topics in vegetable crops and related disciplines. Topics and speakers determined by instructor in charge. Assignments include brief evaluation of a lecture, and paper or report or grant proposal. May be repeated for credit. (S/U grading only.)

298. Group Study (1-6) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor.

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

Professional Course

300. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge) Tutoring—3–9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience. Who are not teaching assistants. Students under supervision may give lectures, prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (S/U grading only.)

Veterinary Medicine, School of

Frederick A. Murphy, D.V.M., Ph.D., Dean of the School
George H. Cardinell III, D.V.M., Ph.D., Associate Dean—Academic Programs
Bennie I. Osburn, D.V.M., Ph.D., Associate Dean—Research
Robert J. Hansen, Ph.D., Associate Dean—Student Programs
Charles A. Hjerm, D.V.M., Associate Dean—Clinical Programs; Director, Veterinary Medical Teaching Hospital
Donald J. Klingborg, D.V.M., Assistant Dean—Public Programs; Director, Veterinary Extension
Thomas B. Farver, Ph.D., Director, Master's of Preventive Veterinary Medicine Program
School Office, 1018 Haring Hall (916-752-1360)

Courses in Veterinary Medicine (VMD)

Lower Division Course 92. Internship in Veterinary Science (1-12) I, II, III, summer. Cardinell Discussion/laboratory—1–4 hours; clinical experience—3–36 hours. Prerequisite: approval of project by faculty sponsor prior to period of internship. Students in this program will be under the supervision of faculty in the School of Veterinary Medicine whose
experience is appropriate for the proposed project. (PNNP grading only.)

Upper Division Courses

170. Ethics of Animal Use (3). III. Brooks, Dunndon, Price
Lecture—2 hours. Prerequisite: one basic course in composition or speech. Applied ethical methodology, respectful of divergent views, for the personal and professional ethics toward animals. Examination of ethical problems, legal aspects, history, problem areas and potential consensus policy to protect animal and related human values. General Education credit. Civilization and Culture or Contemporary Communities.

192. Internship in Veterinary Science (1-12). I, II, III, IV. Carden
Discussion-laboratory and clinic—3-56 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in Veterinary Medicine. (PNNP grading only.)

Professional Courses

400. Informatics (1.0). Carden
Discussion—2 hours; laboratory—8 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Acquisition of elementary skills and proficiency in the use of microcomputers will be achieved through the "real time" use of microcomputers in the Science laboratories of instruction. (SU grading only.)

401A-401B. Microscopic and Gross Veterinary Anatomy (7.5-2.9). II. Hyde
Lecture—40 sessions/14 sessions (401A/401B); laboratory—35 sessions/15 sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Normal interrelationships of structure and function through an integrated presentation of molecular, cellular, tissue, organ, and whole animal structure; principles of developmental biology and organogenesis, and comparative structure of animals and their organ systems.

402A. Systemic Physiology: Cardiovascular System (1.5). I. Jones
Lecture—14 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic principles of normal physiological function of heart, blood vessels, and cardiovascular system. Principles are essential for understanding disorders of cardiovascular system.

402B. Systemic Physiology: Gastrointestinal System (1.5). II. Clay
Lecture—11 hours; laboratory—2 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Basic principles of normal physiological function of the vertebrate gastrointestinal system. Principles are essential for understanding disorders of the gastrointestinal system.

402C. Systemic Physiology: Respiratory System (1.5). I. Jones
Lecture—12 hours; laboratory—6 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides basic understanding of functional and physiological function of the vertebrate respiratory system.

402D. Physiology of the Urinary System (1.7). III. Brussy
Lecture—13 sessions; laboratory—4 sessions. Prerequisite: first year standing in the School of Veterinary Medicine. This course provides an understanding of the various function of the kidney and the urinary system: body fluids and acid-base physiology and mammalian renal physiology. (PNNP grading only.)

403A-403B. Physiological Chemistry (4.5-2.0). II. Hansen
Lecture—36 sessions/15 sessions (403A/403B); discussion—4 sessions/2 sessions; laboratory—6 sessions/3 sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Emphasizes biochemical concepts under biological and physiological processes. Prerequisites: second year standing in the School of Veterinary Medicine. (PNNP grading only.)

404A. Small Animal Radiology (1.9). II. Nyland
Lecture—15 hours; laboratory—4 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to interpretation of alternate imaging procedures and therapeutic radiology of small animals. (PNNP grading pending completion of sequence.)

405. Veterinary Parasitology (3.6). III. Conrad, Boyle
Lecture—28 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Provides an understanding of the important biological and clinical aspects of parasitic disease and the diseases they cause in animals.

406. Principles of Behavior (0.7). I. Hart
Lecture—7 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Overview of animal behavior with relevance to veterinary medicine.

407A. Principles of Operative Surgery (0.6). III. Breznek
Lecture—7 hours; laboratory—1 three-hour session. Prerequisite: second year standing in the School of Veterinary Medicine. Introduction to surgical techniques, including such topics as sepsis, antisepsis, instrumentation, hemostasis, wound healing, and others.

407B. Principles and Techniques of Surgery (2). Pascoe
Lecture—9 hours; laboratory—9 three-hour sessions; discussion—3 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Continuation of course 407A. Provides an understanding of surgical techniques and principles. Special emphasis is placed on the principles of learning and execution of surgical techniques.

407C. Surgery of the Urinary System (1.0). III. Bedard
Lecture—10 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine or consent of instructor. Study of anatomy and principles of surgery of the kidneys and urinary system. Special emphasis is placed on the principles of learning and execution of surgical techniques.

408. Nutrition and Nutritional Diseases in Animals (2.9). II. Morey
Lecture—27 hours; laboratory—2 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Principles of nutrition and their application to the solution of nutritional disorders of animal species.

409. Epidemiology (1.7). II. Bledsoe
Lecture—11 hours; discussion—6 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

410. Principles of Veterinary Pharmacology and Toxicology (2.4). I. Joy
Lecture—22 hours; laboratory—2 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides a basic understanding of the problems of drug treatment and the application of pharmacology and toxicology to veterinary medicine.

411B. Veterinary Pharmacology (1.5). I. Girdle
Lecture—17 hours; laboratory—1 three-hour session. Prerequisite: second year standing in the School of Veterinary Medicine. Provides a basic understanding of the principles of the solution of nutritional disorders of animal species.

414B. Veterinary Pharmacology (1.5). I. Girdle
Lecture—17 hours; laboratory—1 three-hour session. Prerequisite: second year standing in the School of Veterinary Medicine. Provides a basic understanding of the principles of the solution of nutritional disorders of animal species.

414C. Veterinary Toxicology (2.1). III. Segall
Lecture—21 hours. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of toxicity, mechanisms of drug elimination, and toxicokinetics. Course also covers the biochemical and toxicological effects of drugs and substances of biological importance in animals.

419. Virology (2.7). Zhu, Zerva
Lecture—19 hours; laboratory—8 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

420. Immunology (3.0). I. Gershwin
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

421. Principles of Neuroscience (2.7). I. Ganz
Lecture—12 hours; laboratory—2 sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

422. Veterinary Ophthalmology (1.4). I. Beilhorn
Lecture—12 sessions; laboratory—2 sessions. Prerequisite: third year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

423. Introduction to the Nervous System (3.5). III. I. Beilhorn
Lecture—24 hours; laboratory—6 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

425. Introduction to the Nervous System (3.5). III. I. Beilhorn
Lecture—24 hours; laboratory—6 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

435. Principles of Neuroradiologic Anatomy (3.5). III. I. Beilhorn
Lecture—24 hours; laboratory—6 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

430. Principles of Radiology and Radiographic Anatomy (3.5). I. Beilhorn
Lecture—25 sessions; laboratory—6 sessions; discussion—2 sessions (total for series). Prerequisite: first year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

431. Endocrinology and Metabolism (2.0). III. Cury
Lecture—20 hours. Prerequisite: first year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

432. Veterinary Oncology (1.4). I. Madewell
Lecture—12 hours; laboratory—2 sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Provides an understanding of the principles of the solution of nutritional disorders of animal species.

*Course not offered this academic year.
**43SA-43SB. Clinical Hematology and Biochem- istry (3.5).** Lecture—26 sessions/16 sessions (43SA/43SB); laboratory—14 sessions/5 sessions; discussion—4 sessions (43SB only). Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Knowledge and understanding of normal form and function of the hemolympathic, excretory cytologic, and clinical biochemical systems pertinent to the health and diseases of domestic animals. Preparation for advanced course work in medical diagnosis and therapeutics with specific species focus and orientation.

**451. Veterinary Bacteriology and Mycology (4.9).** Lecture—54 hours; laboratory—15 three-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Introduction to the bacterial and fungal agents of disease. Emphasis on the virulence factors of various specific microorganisms will be discussed with respect to overall significance to animal disease; structural and functional aspects including morphology, cellular components and pathogenic mechanisms of interest.

**452. General Pathology (3.1).** Wilson. Lecture—18 hours; laboratory—13 three-hour sessions. Prerequisite: second year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Principles of veterinary medical pathology covering the major diseases of domestic animals with special emphasis on the fundamental mechanisms responsible for creating a disease situation. Illustrations of how the application of general pathological principles is used to detect the presence of disease and associations with disease and injury. Pattern of response to injury and on balance between damage and repair. 470A-470B. Hospital Practices (1.2-1.2-1.2) I, II, III. The Staff (Hijere in charge) Laboratory—6 hours. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical training in veterinary medicine. Assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital. (SU grading only, pending completion of three-term sequence.)

**471. General Practice Clinics (2.5-15).** I-II-III. Hijere 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. Students assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital with emphasis on those services related to veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (SU grading only, pending completion of three-term sequence.)

**472. Urban Animal Practices (2.5-15).** I-II-III. Hijere 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. Students assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital with emphasis on those services related to urban veterinary practice. May be repeated for credit. Students enrolled in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (SU grading only, pending completion of three-term sequence.)

**473. Large Animal Practice Clinics (2.5-15).** I-II-III. Hijere 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. Students assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital with emphasis on those services related to large animal veterinary practice. May be repeated for credit. Students enrolled in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (SU grading only, pending completion of three-term sequence.)

**474. Equine Practice Clinics (2.5-15).** I-II-III. Hijere 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. Students assignments in the medical and surgical services and clinical diagnostic laboratories of the Veterinary Medical Teaching Hospital with emphasis on those services related to equine veterinary practice. May be repeated for credit. Students enrolled in combined DVM/MPVM program enroll for the Summer Sessions I-II sequence. (SU grading only, pending completion of three-term sequence.)

**490A. Hospital Practices: Small Animal Clinic (2) I, II, III. Ling Laboratory—10 six-hour sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to the procedures, protocol, techniques, and knowledge integral to working in the Small Animal Clinic of the VMTH. (SU grading only, pending completion of sequence.)

**490B. Hospital Practices: Small Animal Clinic (2) I, II, III. Ling Laboratory—10 six-hour sessions. Prerequisite: second-year standing in the School of Veterinary Medicine and course 490A. Continuation of 490A. (SU grading only, pending completion of sequence.)

**490C. Hospital Practices: Small Animal Clinic (2) I, II, III. Ling Laboratory—10 six-hour sessions. Prerequisite: third-year standing in the School of Veterinary Medicine.
Viticulture and Enology

College of Agricultural and Environmental Sciences

Linda F. Bisson, Ph.D., Chairperson
Department Office, 1023 Wickersham Hall
(916) 398-0280

Faculty
Douglas C. Adams, Ph.D., Associate Professor
Linda F. Bisson, Ph.D., Professor
Roger B. Bouthon, Ph.D., Professor (Viticulture and Enology, Chemical Engineering)
Susan E. Ebeler, Ph.D., Assistant Professor
Mark A. Matthews, Ph.D., Associate Professor
Carole P. Meredith, Ph.D., Associate Professor
Ann C. Noble, Ph.D., Professor
Andrew Walker, Ph.D., Assistant Professor
Lawrence L. Waterhouse, Ph.D., Assistant Professor
Larry E. Williams, Ph.D., Professor

Emeriti Faculty
Maynard A. Amerine, Ph.D., Professor Emeritus
James A. Cook, Ph.D., Professor Emeritus
Richard E. Kepner, Ph.D., Professor Emeritus
W. Mark Klewer, Ph.D., Professor Emeritus
Barbara Kunkle, Ph.D., Professor Emeritus
Lloyd A. Lider, Ph.D., Professor Emeritus
Harold P. Olive, Ph.D., Professor Emeritus
Corinuth S. Cough, D.Sc., Professor Emeritus
Verna L. Singleton, Ph.D., Professor Emeritus

Academic Senate Distinguished Teaching Award
Robert J. Weaver, Ph.D., Professor Emeritus
A. Digmore Webb, Ph.D., Professor Emeritus

The Program of Study. Viticulture is a specialization under the Agricultural Science major; and enology is a specialization under the Plant Science and the Agricultural Systems and Environmental majors.

Graduate Study. Various graduate programs offer opportunities to advance to advanced degrees in the fields of viticulture and enology. For the M.S. or Ph.D. degree see Agricultural and Environmental Chemistry, Chemical Engineering, Ecology, Food Science, Genetics, Horticulture, Microbiology, Plant Biology, Plant Pathology, and Soil Science.

Courses in Viticulture and Enology (VEN)

Lower Division Courses
1. Introduction to Viticulture (2) I. Williams Lecture-2 hours. Fundamentals of biology of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, reproduction, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division viticulture.

2. Introduction to Wine Making (3) I. Noble, II. Meredith, III. Adams Lecture-3 hours; term paper. This broad overview of wine introduces students to the general objectives and applications of the wine industry. Topics include winemaking, quality control, and marketing. Prerequisites: three units of college-level biology and one unit of college-level mathematics.

3. Special Study for Undergraduates (1-6) I., II., III. The Staff (Chairperson in charge) (P/NP grading only)

Upper Division Courses
10A. Viticultural Practices (2) I. Walker Discussion-laboratory-4 hours. Prerequisite: course 2. Provides the information required to identify the major wine, raisin, and table cultivars grown in California and elsewhere. Also provides experience in vineyard sampling techniques and vine disease identification.

10B. Viticultural Practices (2) I. Walker Discussion-laboratory-4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of vineyard production, including pruning, training, irrigation, and vineyard management. Prerequisite: course 2.

10C. Viticultural Practices (2) II. Walker Discussion-laboratory-4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation, and water management, and the methods of pest control for improvement of grape quality.

110. Grapevine Growth and Physiology (3) III. Matthews Lecture-3 hours. Prerequisite: course 2. The physiological aspects of grapevines are covered in this course. Topics include growth and development, the role of the root system, water relations, and the nutritional requirements of grapes. Prerequisites: course 2.

111. World Viticulture (3) III. Meredith Lecture-3 hours. Prerequisite: upper division standing. Study of the diversity of viticulture, both geographic and historical. Study of the history of grape growing and its spread throughout the world. Special emphasis will be placed on major wine-producing countries and their production practices. Prerequisites: course 2.

115. Raisin and Table Grape Production (2) II. Williams Lecture-2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other production areas of the world. Special emphasis will be placed on major production areas and their production practices. Prerequisites: course 2.

116. Wine Grape Production (3) II. Matthews Lecture-3 hours. Prerequisite: course 2. Focus on the production practices associated with wine grape cultivation, including training practices, pruning, and use of chemicals. Prerequisites: course 2.

118. Grapevine Pests, Diseases and Disorders (3) III. Williams Lecture-3 hours. Prerequisite: course 2. The various pests and diseases of grapes are covered in this course. Prerequisites: course 2.

123. Analysis of Musts and Wines (3) I. Waterhouse Lecture-2 hours; laboratory-3 hours. Prerequisite: Chemistry 2A, 2B, 2C, 2A, and 2B. Open to undergraduate students in Enfermentation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles of grape juice and wine analysis, and the reasons for use of each analysis. Analyses of a practical and useful nature are chosen for the laboratory exercises demonstrating various chemical, physical, and biochemical methods.

124. Wine Production (4). Bissone Lecture-2 hours; laboratory-3 hours; independent study-3 hours. Prerequisite: course 2 and Biological Sciences 102. Course 123 may be taken concurrently. Open to undergraduate students in Fermentation Science, Microbiology, Biochemistry, and Plant Science. Prerequisites: course 2 and Biological Sciences 102.

125. Wine Types and Sensory Evaluation (3) II. Noble Lecture-2 hours; laboratory-3 hours. Prerequisite: course 124. Principles of equilibria and rates of various physical and chemical reactions in wines; treatment of unstable compounds in wine. Prerequisites: course 124. Recommended: course 125.

126. Wine Processing (4) II. Bouthon Lecture-2 hours; laboratory-3 hours; discussion-1 hour. Prerequisite: course 124. Principles of equilibria and rates of various physical and chemical reactions in wines; treatment of unstable compounds in wine. Prerequisites: course 124. Recommended: course 125.

128. Wine Microbiology (4) III. Bisson Lecture-2 hours; laboratory-6 hours. Prerequisite: courses 123, 124, 125, 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, filtration, and purification of wines. (Prerequisites: course 127.)

130. Management, Marketing, and Economics of the California Wine Industry (3) III. The Staff Lecture-3 hours; laboratory-3 hours; fieldwork-6 hours. Prerequisite: course 124. Introduction to management, marketing, and economics of wine in the United States with particular emphasis on California. Reviews market segmentation and explores alternative strategies for grape production, wine production, brand development, distribution, and social policy formation. (Deferred grading only.)

133. Wine Processing Equipment (1) II. Bouthon Lecture-1 hour; field trip. Prerequisite: courses 124, 126. Food Science and Technology 110A, 110B recommended. A course for undergraduate students which provides a systematic description of unit operations and processing equipment used in modern commercial winemaking. Emphasis is given to the principles and techniques of operation and to the performance of this equipment with grapes, juices, and wines.

140. Distilled Beverage Technology (3) III. Bouthon Lecture-3 hours. Prerequisite: Chemistry 68B, Food Science and Technology 110A. Distillation principles and practices: production technology of brandy, whiskey, rum, vodka, gin, and other distilled beverages. Characteristics of final products, fermentation, distillation, and aging. Offered in alternate years.

186. Fermentation Science (3) III. Ogrodzicki (Food Science and Technology) Lecture-3 hours. Prerequisite: Microbiology 102. Basic principles of fermentation science and biotechnology with emphasis on industrial fermentation processes that generate useful products, including fermentation and beverages. Prerequisites: course 124. Offered in alternate years.

190. Winemaking Seminar (1) I. III. The Staff Seminar-1 hour; discussion-1 hour; research paper. Prerequisite: course 3. Weekly seminar presented by outside speakers on a specific winemaking topic chosen for the quarter. Discussion follows with the speaker hosted by the faculty member in charge. May be repeated twice for credit.

192. Internship (1-12) I., II., III. The Staff (Chairperson in charge) Internship-3-6 hours. Prerequisite: completion of 8 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be supervised and approved by a member of the department and must be arranged by the student. (P/NP grading only.)

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

*Course not offered this academic year.
219. Plant Phonics (3) I, II. Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, or the equivalent consent of instructor. Flavonoids and other natural phenolic substances of plants; their chemistry, natural occurrence, biochemistry, relation to animal diets, and relation to properties of foods and other products.

235. Winery Design and Economics (5) II. Boulton. Lecture—4 hours; discussion—1 hour. Prerequisite: course 124, 135, Food Science and Technology 110A recommended. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting, project scheduling, capital costs and ten-year cash flow analysis for the winery. Grading based on design project.

270. Critical Evaluation of Scientific Literature (1) I, II, III. Bloom. Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological sciences. Students choose, present, and lead discussion of recent research articles in a special topic area chosen by instructor, intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (SU grading only.)

290. Seminar (1) I, II, III. Adams. Seminar—2 hours. Prerequisite: consent of instructor. (SU grading only).

290C. Advanced Research Conference (1) I, II, III. Research Faculty. Discussion—2 hours. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. (SU grading only.)

291. Advances in Viticulture (1) I. Matthews. Seminar—1 hour. Prerequisite: consent of instructor. Experts in various fields of viticulture will lead discussions on recent advances in their fields of expertise. Emphasis and topics will vary from year to year and may be repeated for credit. (SU grading only.)

292. Advances in Enology (1) III. Waterhouse. Discussion—2 hours, seven to ten weeks. Prerequisites: courses 123, 124, 125, 126. Discussions of previously assigned reading material, usually in the form of two to three reprints. Discussions led by faculty to acquaint students with their current research interests. May be repeated for credit. (SU grading only.)

297T. Tutoring in Viticulture and Enology (1-5) I, II, III. The Staff (Chairperson in charge). Prerequisite: graduate standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact is primarily in laboratory or discussion sections, and under direction of a faculty member. (SU grading only.)

War-Peace Studies
(College of Letters and Science)
The interdisciplinary minor in War-Peace Studies examines the causes and dynamics of intra- and international wars and efforts to prevent and settle such conflicts. Students in the minor are encouraged to participate in the educational activities of the Davis Program of the UC Institute on Global Conflict and Cooperation (IOCC). The minor is sponsored by the International Relations Program.

Minor Program Requirements:

**War-Peace Studies**

<table>
<thead>
<tr>
<th>Courses</th>
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<tr>
<td>Anthropology 122B, 131</td>
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<tr>
<td>Comparative Literature 157</td>
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<td>Philosophy 115, 118</td>
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<tr>
<td>Physics/ Applied Science 137</td>
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<tr>
<td>Political Science 121, 122, 123, 124, 123, 176</td>
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<tr>
<td>Sociology 119, 157</td>
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**Minimum Credits Required:** 20

**Approaches**

One or two courses from the following:

- Anthropology 122B, 131
- Comparative Literature 157
- Philosophy 115, 118
- Physics/Applied Science 137
- Political Science 121, 122, 123, 124, 123, 176
- Sociology 119, 157

The minor is sponsored by the International Relations Program.

**Water Science (A Graduate Group)**

Students admitted into the Water Science Graduate Group before June 30, 1993 will be allowed to complete their degree in this subject.

New students should see the Hydrologic Science Graduate Group section in this catalog.

**Information.** K. Tanji (Land, Air and Water Resources), 127 Vehmeyer Hall (916-752-6540).

**Wildlife and Fisheries Biology**

(College of Agricultural and Environmental Sciences)

Joseph J. Cach Jr., Ph.D., Chairperson of the Department

Department Office, 1088 Academic Surge (916-752-6586)

**Faculty**

- Daniel W. Anderson, Ph.D., Professor
- Louis W. Botsford, Ph.D., Professor
- Tim Caro, Ph.D., Associate Professor
- Joseph J. Cach Jr., Ph.D., Professor
- Ronald E. Cole, B.S., Lecturer
- Chris Dewees, Ph.D., Lecturer
- Nadine K. Jacobsen, Ph.D., Associate Professor
- Dale F. Lotz, Ph.D., Professor
- Rex E. Manah, B.S., Lecturer
- Peter B. Moyle, Ph.D., Professor
- Nick Van Vuren, Ph.D., Assistant Professor

**Emeriti Faculty**

- Walter E. Howard, Ph.D., Professor Emeritus
- Robert G. Schwab, Ph.D., Professor Emeritus

**The Major Program**

The wildlife and fisheries biology major deals with the relationships between the needs of people and the requirements of wildlife. Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies for future generations.

The Program. Because of the diversity of problems in the field, emphasis in the major is placed on broad training in biological and physical sciences, with specialization in one of seven areas. The major is designed primarily for students interested in eventually becoming professionals in wildlife and fisheries biology, but the breadth of course requirements, when combined with suitable electives, also make it suitable as a preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as The Wildlife Society, American Fisheries Society, or the Ecological Society of America or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty advisor.

Career Alternatives. Positions now held by graduates in this major include wildlife, fisheries, animal control, and resource biologists and managers with local, state and federal agencies. Some graduates are biologists or consultants with private industries such as commercial fishing businesses, electrical utilities, sportsman's clubs, aquaculture operations, and environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions.

**Water Science**

See Hydrologic Science
B.S. Major Requirements:

UNITS

Written/Ora l Expression ........................................... 4-8

English 1 .................................................................... 4

Rhetoric and Communication ................................. 4

Preparatory Subjects .................................................. 47-53

Biological Science (Biological Sciences 1A, 1B, 1C) ....... 15

Chemistry (Chemistry 2A, 2B, and 2A) ...................... 13

Computer science (Agricultural Systems and Environment 21) ........................................ 4

Mathematics (Mathematics 16A, 16B) ...................... 6

Physics (Physics 1A, 1B or 2A, 2B, 2C) ...................... 6-12

Statistics (Statistics 100, 102 or Agricultural Systems and Environment 120) ............... 4

Breadth/General Education ....................................... 6-24

Satisfaction of General Education requirement ...

Depth Subject Matter ................................................ 49-61

Ecology (Environmental Studies 100 or Evolution and Ecology 101) ......................... 4

Evolution (Evolution and Ecology 100) ...................... 4

Genetics (Biological Sciences 101) ......................... 4

Physiology (Neurobiology, Physiology, and Behavior 101) ........................................... 8

Vertebrate anatomy (Anatomy 100 or Evolution and Ecology 170) ................................. 3-4

Organismal core: Choose three lecture courses and two (laboratory) courses. [Wildlife and Fisheries Biology 110 (110L), 111 (111L), 120 (120L), or Evolution and Ecology 134 (134L)] .......................... 12-13

Disciplinary core (Wildlife and Fisheries Biology 122, 124 (124L), and either 121 or 130) .... 11-12

Statistics: Choose one course (two recommended) from Statistics 104, 106, 108 or 140 .... 2-4

Research methods (Wildlife and Fisheries Biology 100 or 102 and 102L) ...................... 3-7

Restricted Electives .................................................... 9-24

Choose one from the seven Areas of Specialization shown below.

Unrestricted Electives ............................................... 10-65

Total Units for the Degree (minimum) .................... 190

Areas of Specialization

1. Behavioral ecology: Choose one course from each group:
   a. Neurobiology, Physiology and Behavior 102 or Psychology 194
   b. Entomology 104, Environmental Studies 101 or Anthropology 154A-154B
   c. Environmental Studies 128, Statistics 110, Wildlife and Fisheries Biology 151 or Range Science 13S

2. Conservation biology: Complete Wildlife and Fisheries Biology 154 and Evolution and Ecology 102. Choose one course from each group:
   a. Botany 144, Entomology 147, Geography 173, Evolution and Ecology 117, 138, 144 or 147
   b. Economics 123, Environmental Studies 161, 166 or Geography 161

3. Ecotoxicology and disease ecology: Complete Wildlife and Fisheries Biology 163, Chemistry 8B, Biological Sciences 102, 103. Choose two courses from a and one from b, or one from a and two from b:
   a. Environmental Toxicology 101, 112A (112B recommended), 132, 136 or Water Science 41
   b. Clinical Pathology 101, Medical Microbiology 115 or 116

4. Fisheries biology: Complete Wildlife and Fisheries Biology 102, 120, 120L, 121, Chemistry 8B, Biological Sciences 102, 102L, 103, and:
   a. One course from Entomology 116 or Evolution and Ecology 112-112L
   b. Two courses from Environmental Studies 116 (or 150C), 151 or Water Science 123
   c. Physiological ecology: Complete Wildlife and Fisheries Biology 121 and 130, Chemistry 8B, Biological Sciences 102, 103. Choose two courses from Biological Sciences 121, Environmental Studies 129-129L, or Neurobiology, Physiology and Behavior 140
   d. Vertebrate pest ecology: Complete Wildlife and Fisheries Biology 151, Agronomy 100, Chemistry 8B, Biological Sciences 102, 103, and choose one course from Botany 120, 121, Entomology 110 or 115
   e. Wildlife biology: Complete Wildlife and Fisheries Biology 100, 110-110L, 111-111L, 130, 151 and:
      a. Choose two courses from Plant Biology 102 (or 106), 117, Range Science 133, 134
      b. Choose one course from Wildlife and Fisheries Biology 131, 136 or Range Science 135

Major Advisor: Students transferring to Davis from another institution or new students declaring the major in Wildlife and Fish must consult the Major Advisor so that their program can be evaluated and a faculty advisor assigned. See receptionist in 1108 Academic Surge Building or telephone 752-6658

Graduate Study: See the Graduate Studies section in this catalog.

Courses in Wildlife and Fisheries Biology (WFB)

Lower Division Courses

10. Wildlife Ecology and Conservation (4) Lott, Moye

Lecture—3 hours; discussion—1 hour. Introduction to the ecology and conservation of vertebrates. Complexity and severity of world problems in conserving biological diversity. General Education credit: Nature and Environment

92. Internship (1-6) I, II, III. The Staff (Department Chairperson in charge)

Internship—3-16 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only)

Upper Division Courses

100. Field Methods in Wildlife Biology (3) III. The Staff (Chairperson in charge)

Lecture—10 hours total, laboratory—40 hours total (7 days). Prerequisites: courses 110, 110L, 111L, 111L, and Evolution and Ecology 101, or the equivalent courses, and consent of instructor. Methods for research in ecology and conservation of wild birds and mammals. Emphasis on the study of demography, intraspecific and interspecific interactions, activity budgets, home range, diets, and on report writing. Held between winter and spring quarters. Limited enrollment

102. Field Studies in Fish Biology (1) III. Moye, Czech

Lecture/discussion—1 hour. Prerequisite: upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Emphasis on theory of quantitative fish capture methods and design of individual research projects. Field ecology, physiology or population biology of fishes. Offered in alternate years

102L. Field Studies in Fish Biology: Laboratory (6) III. Moye, Czech

Fieldwork—15 hrs; laboratory—12 hours; discussion/laboratory—3 hours. Prerequisite: course 102, upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Field investigations of fish biology are emphasized including quantitative capture methods and individual research projects on ecology, behavior, physiology or population biology of fishes at the field site in relation to their habitats in alternate years. (Deferred grading pending completion of projects)

110. Biology and Conservation of Wild Mammals (3) III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Course in ecology recommended. Biology and conservation of wild mammals. Natural history, taxonomy, geographical-ecological distribution: anatomical-physiological adaptations of mammals to their environment; and research management techniques are emphasized

110L. Laboratory in Biology and Conservation of Wild Mammals (2) III. The Staff (Chairperson in charge)

Laboratory—6 hours. Prerequisite: course 110 may be taken concurrently and consent of instructor. Laboratory exercises in the morphology, systematics, species identification, anatomy, and adaptations of wild mammals to different habitats. Limited enrollment

111. Biology and Conservation of Wild Birds (3) I. Anderson

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, and Evolution and Ecology 101. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis is on adaptations to environment, species interactions, management, and conservation.

111L. Laboratory in Biology and Conservation of Wild Birds (2) I. Anderson

Laboratory—6 hours. Prerequisite: course 111 may be taken concurrently; consent of instructor. Laboratory exercises in bird species identification, anatomy, morphology, age and sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Limited enrollment

120. Biology and Conservation of Fishes (3) I. Moye

Lecture—3 hours. Prerequisite: Biological Sciences 1B. Introduction to evolution, ecology, and conservation of marine and freshwater fishes. Limited enrollment

120L. Laboratory in Biology and Conservation of Fishes (1) I. Moye

Laboratory—3 hours. Prerequisite: course 120 (may be taken concurrently). Morphology, taxonomy, conservation, and identification of marine and freshwater fishes with emphasis on California species. Limited enrollment

121. Physiology of Fishes (4) II. Czech

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division courses in physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes

122. Population Dynamics and Estimation (4) III. Botaford

Lecture/discussion—2 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B. Statistics 13 or the equivalent. An upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-in-ratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment), case histories

123. Freshwater Invertebrate Ecology (4) III.

Ermitt

Lecture/discussion—2 hours; laboratory—3 hours; fieldwork—3 hours; one all-day Saturday field trip required. Prerequisite: Biological Sciences 1A and 1B or the equivalent. Ecology and classification of freshwater invertebrates with emphasis on life history, habitat, diversity, and behavior. Invertebrate monitoring to assess environmental impacts and classification based on morphology as a tool for understanding ecology and biology of aquatic organisms


130. Physiological Ecology of Wildlife (4) II. Jacobsen
Lecture—4 hours. Prerequisite: course 110, 111, or 120; Neurobiology, Physiology and Behavior 101 and Evolution and Ecology 101. Animal functions, adaptations, and ecological energetics of wildlife. Nutrition, metabolism, and productivity are emphasized as a pattern of relationships for understanding the distribution and abundance of wild ecotomes and endemomes in time and space.

131. Biology and Management of Cervidves (3) III. Jacobsen
Lecture—2 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology and Behavior 101 and Evolution and Ecology 101, or the equivalent; course 110 recommended. Population ecology, behavior, population dynamics, and management of wildlife and upland game birds. Offered in alternate years.

136. Ecology of Waterfowl and Game Birds (3) I, II.
The Staff (Chairperson in charge) Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: courses 111 and 111L or the equivalent. Dynamics of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in alternate years.

140. Ecology and Evolution of Vertebrate Social Organization (4) II, IV.
The Staff (Chairperson in charge) Prerequisite: Biological Sciences 18 or upper division ecology course (Evolution and Ecology 101 or the equivalent). Spacing competition, cooperation, and grouping of wild vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal consideration is given to humans and other primates. Offered in alternate years.

141. Behavioral Ecology (3) II, Caro
Lecture—3 hours. Prerequisite: Evolution and Ecology 101. Basic theories underlying the functional and evolutionary significance of behavior, and the role of ecological constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. Offered in alternate years.

151. Wildlife Ecology (3). Van Vuren
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, and 1C, or the equivalent. Population ecology of wild vertebrates, particularly habitat selection, demography, competition, predation, population growth, and regulation set in the context of human-caused degradation of environments in North America.

153. Wildlife Ecology/taxonomy (4) I. Anderson
Lecture—3 hours; laboratory—1 hour. Prerequisite: introductory courses in organic chemistry, ecology, physiology, or course of instructor; Environmental Toxicology 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecology, examples/case histories, philosophical/managerial considerations. Offered in alternate years.

154. Conservation Biology (3) III. Caro
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Studies 100. Introduction to conservation biology. Background to the biological issues and controversies surrounding loss of species and habitats.

190. Seminar in Wildlife and Fisheries Biology (1) I, II, III. The Staff (Chairperson in charge)
Seminar—1 hour. Prerequisite: upper division standing in biological sciences or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated twice for credit. (P/NP grading only.)

190C. Research Group Conference (1) I, II, III. The Staff
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fisheries biology. May be repeated for credit. (P/NP grading only.)

191. Museum Science (2) II, Cole
Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing in Biological Sciences or consent of instructor. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. Offered in alternate years. (P/NP grading only.)

192. Internship (1-12) I, II, III, summer. The Staff (Chairperson in charge) Internship—3-36 hours. Prerequisite: completion of 64 units and consent of instructor. Work experience off campus in a summer or academic semester. Offered by the department. Internships supervised by a member of the faculty. (P/NP grading only.)

195. Field and Laboratory Research (3) I, II, III. The Staff (Chairperson in charge) Laboratory—5 hours; discussion—1 hour. Prerequisite: course 110L, 111L, or 120L; 121 or 130; Evolution and Ecology 101 or the equivalent; consent of instructor. Critique and practice of research methods applied to research in experimental and/or field-oriented aspects of wildlife and fishery science. Offered in alternate years. (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.)

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

199. Special Study for Advanced Undergraduates (1-3) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

Graduate Courses

201. Field Research in Wildlife Biology (6) Extra-sessional summer. The Staff (Chairperson in charge) Lecture—1 hour; laboratory—40 hours; individual research projects and oral and written reports. Prerequisite: courses 140, 110, or 111-111L; Evolution and Ecology 101, Statistics 102, or the equivalent; consent of instructor. Field research in wildlife biology: formulation of testable hypotheses, experimental design, execution of the study, data analysis, and preparation of suitable written and oral reports. Limited enrollment. Permission given to graduate students in wildlife areas of study. (SU grading only.)

222. Advanced Population Dynamics (3) II. Botsetfod Lecture—3 hours; discussion—1 hour. Prerequisite: advanced standing; course 110-120; population dynamics (course, 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management, and exemplary case histories. Emphasis on development and use of realistic population models in ecological research.

252. Principles of Vertebrate Control (3). The Staff (Chairperson in charge) Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Principles and concepts concerning the ecological, behavioral, economic, philosophical, and historical basis of managing wild vertebrates that have become pests. (SU grading only.)

290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge) Seminar—3-13 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of wildlife biology. Special topic selected for a quarter will vary depending on interests of instructor and students. (SU grading only.)

290C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge) Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. (SU grading only.)

291. Seminar in Aquatic Ecology (2) II. Moyle Seminar—2 hours. Prerequisite: graduate standing in biology. Presentation and analysis of assigned topics in aquatic ecology emphasizing fish, fisheries, and aquatic conservation. Offered in alternate years. (SU grading only.)

292. Physiology of Fishes Seminar (1). Coeh Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology; consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated twice for credit. (SU grading only.)

293. Seminar in Wildlife Disease Ecology (2) III. Thies (Medical Microbiology) in charge, Jacobsen Seminar—2 hours. Prerequisite: graduate standing or advanced undergraduate in biology. Presentation and analysis of assigned research papers on disease ecology of wild vertebrates related to considerations of habitat quality, population regulation, wildlife management, and/or implications for human or domestic animal health. (SU grading only.)

294. Seminar in Behavioral Ecology of Predators and Prey (3) II, Caro Seminar—2 hours; term paper. Prerequisite: graduate standing in biology. Presentation and analysis of research papers on social foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator-prey interactions. May be repeated twice for credit. Offered in alternate years.

295. Seminar in Wildlife Ecology (3) II. Anderson Seminar—2 hours; term paper required. Prerequisite: graduate standing in biology. Presentation and analysis of assigned research papers on transport, exposure, and effects of environmental contaminants on wildlife-associated ecosystem components, especially at individual/population levels. Specific subjects vary each offering. Offered in alternate years. (SU grading only.)

297. Supervised Teaching in Wildlife and Fisheries (1-3) I, II. The Staff (Chairperson in charge) Tutorial—4-9 hours. Prerequisite: meet qualifications for teaching assistant; graduate standing; consent of instructor. Tutoring and teaching students in undergraduate courses in Wildlife and Fisheries Biology. Weekly conferences with instructor; evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated for a total of 6 units when a different course is tutored. (SU grading only.)

298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge) Lectures and/or discussions—1-5 hours.

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

Women's Studies

(290) Women's Studies

Linda Morris, Ph.D. Program Director
Program Office, 271 Kerr Hall (916-752-4686)

Committee on Charge
Rosa Linda Fregoso, Ph.D. (Chicano Studies, Women's Studies)
Wendy Ho, Ph.D. (Asian American Studies, Women's Studies)
Carole Joffe, Ph.D. (Sociology, Women's Studies)
William E. Keo, D.F.A. (Creative Writing)
Kari Loke, Ph.D. (English, Comparative Literature)
Lati Mari, Ph.D. (Women's Studies)
Linda A. Morris, Ph.D., ex officio (English)
Judith Newton, Ph.D. (Women's Studies)

*Course not offered this academic year.*
Women's Studies

Carol Tomlinson-Keasey, Ph.D., Professor
(Psychology)
Patricia Turner, Ph.D., Associate Professor (African American Studies, American Studies)
Martha West, J.D., Professor (Law)
Diane Wolf, Ph.D., Associate Professor (Sociology)

The Major Program

Women's Studies is an interdisciplinary major founded on the premise that gender is a historically variable construction that centrally shapes the historical experience and everyday lives of women as well as men. Women's Studies also assumes that gender, race, class, and sexual and national identities are constructed in relation to each other. The intersections of these categories of experience as well as the history of debate over what these categories mean is an important strand of the Women's Studies curriculum. Women's Studies at UCSD is particularly rich in faculty dealing comparative, cross-cultural work on women and gender. Among the faculty offering courses for the major are scholars working on women and gender in Africa, the Caribbean, the Americas, China, Europe, Japan, India, various countries of the Middle East, Southeast Asia, and the United States.

The Program: Students majoring in this field may take courses in African American and African Studies, American studies, anthropology, comparative literature, art history, English, history, linguistics, Chicana/o Studies, political science, psychology, sociology, Asian American studies, Native American studies, French, German, Italian, Spanish, textiles and clothing, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an advisor.

Career Alternatives. Women's Studies prepares undergraduates for a variety of careers. The B.A. degree in Women's Studies, for example, provides excellent grounding for undergraduate courses in comparative literature, public administration, and social services. Students wishing to pursue doctoral work will also find that interdisciplinary training in Women's Studies equips them with theoretical and methodological strengths in most disciplines and applied research fields. Increasingly, too, specialists in Women's Studies are being used as consultants in industry, higher education, insurance companies and personnel firms. State and federal government agencies require people who have special training in understanding gender relations. Finally, educational institution need specialists to develop and administer women's studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter .................................................. 20
Two courses from Women's Studies 20, 50, 70 ........................................ 8

Three courses selected from the following. .12
African American and African Studies

10, 15, American Studies 1E, 1F, Anthropology 2, Art History 15, Asian American Studies 1, 2,
Chicana/o Studies 10, 20, Classics 15, Comparative Literature 12, English 308, 309, 40A or 46B, 46C or 46D, 46H, History 72A, 72B, Native American Studies 1, 10,
Psychology 1, Sociology 1, 2, 3, Women's Studies 80.

Depth Subject Matter ......................................................... 44
Choose one of two tracks: (1) Disciplinary or (2) Thematic. Each track consists of three parts (A, B, C).

(A) Core courses in Women's Studies .......................... 16

Disciplinary track and Thematic track
Women's Studies 103, 104, 190 and one additional upper division Women's Studies course.

(B) Cross-Cultural Requirement ......................... 16

Disciplinary track and Thematic track
Choose four courses (at least one from each category). Courses used to meet this requirement may not duplicate those used to meet the requirement for Part C, Major Emphasis. The rat that follows represents a partial list of options; other courses may be included with the consent of the Women's Studies Adviser.

Ethnic Studies: Women of Color in the United States


Cultures Outside the United States


Historical Material Prior to 1900


(C) Gender-based Courses .................................................. 12

Disciplinary track:
Choose three courses from one of the following focus groups:

Anthropology focus
Anthropology 130, 131, 134, 139, 148B, 158.

History focus
History 102H, 102G, 148A, 148B.

Literature and Language focus

Sociology and Psychology focus

OR

Thematic track:
Choose three courses that form a thematic cluster (for example, Gender and Race in the United States; The Cultural Representations of Gender; Gender and Public Policy; Gender and Global Issues; Gender and Autobiography; The Body, Theory and Representation). Other clusters may be developed in consultation with a Women's Studies adviser.

Total units for the major ........................................... 64

Major Adviser. See Class Schedule and Room Directory.

Minor Program Requirements:

UNITS

Women's Studies ......................................................... 24

A. Core courses ......................................................... 4

Women's Studies 70, 80

B. Ethnic studies/Women of color in the U.S. (choose one). .4


C. Culture outside the U.S. ................................................. 4

Additional Electives from approved list of upper division cross-listed and Women's Studies courses.

Note: With prior consultation with an advisor, other upper division courses may be accepted toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

Graduate Study. The Women's Studies Program offers a Designated Emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of twelve other affiliated departments. Please see catalog listing "Feminist Theory and Research."

Courses in Women's Studies (WMS)

Lower Division Courses

20. Cultural Representations of Gender (4). II. Newton, Brogan. Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Interdisciplinary investigation of how specific cultures represent gender difference. Examines a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions.

50. Introduction to Women's Studies (4). I, II, III. Newton, Robnett, Flego. Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Interdisciplinary introduction which will consider biographical, sociological and psychological perspectives on the study of sex roles. General Education credit: Contemporary Societies.

70. Theory and History of Sexualities (4). III. Newton. Lecture/discussion—4 hours. Key issues in the cultural construction, organization, and reproduction of sexualities such as the intersection of sexual identity with gender, race, ethnicity, and class, and the relation between movements for sexual liberation and the regulation of the body.

80. Special Topics in Women's Studies (4). II. Robnett. Lecture/discussion—4 hours. In-depth examination of a women's studies topic related to the research interest of the instructor. May be repeated for credit when topics differ. Limited enrollment.

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

99. Special Study for Undergraduates (1-5). I, II, III. The Staff (Director in charge). Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Upper Division Courses

102. Colonialism, Nationalism, and Women (4). III. Mani. Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Explores key dimensions of women's relationship to colonialism and nationalism in one or more societies.

103. Introduction to Feminist Theory (4). I. Ho. Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Introduction to the emergence of feminist theory and key concepts in feminist theorizing. Examination of past and present debates over sexuality, race, ethnicity, politics, and the social construction of women's experience.

104. Feminist Approaches to Inquiry (4). II. Newton. Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Feminist applications and transformations of traditional disciplinary practices; current issues and methodologies in feminist interdisciplinary work.

187. Gender and Social Policy (4). III. Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and a course in Women's Studies. The role of gender in the creation of social policy, especially with respect to issues brought into the policy arena by contemporary feminism. Offered in alternate years.

190. Senior Seminar (4). I. Mani. Seminar—4 hours. Prerequisite: Women's Studies senior status. Capstone course for senior Women's Studies majors, which focuses on current issues in feminism as they impact on theory, public policy, and practice.

192. Internship in Women's Studies (1-12). I, II, III. The Staff. Internship—3-36 hours; written report. Prerequisite: completion of a minimum of 84 units and consent of advisor; enrollment dependent on availability of internships; enrollment dependent on availability of positions. Supervised internship and study in positions and institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.)

195. Thematic Seminar in Women's Studies (4). I, II, III. The Staff. Seminar—4 hours. Prerequisites: two courses specified for women's studies major. Group study of a topic, issue, or area in feminist theory and research involving intensive reading and writing. May be repeated for credit when topics differ. Enrollment limited.

197. Tutoring in Women's Studies (1-4). I, II, III. The Staff (Director in charge). Tutoring—3-12 hours. Prerequisite: upper division standing; completion of course to be tutored with a grade of A or better. Activities depend on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, leading discussion groups. (P/NP grading only.)

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

199. Special Study for Advanced Undergraduates (1-5). I, II, III. The Staff (Director in charge). Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Graduate Courses


200B. Problems in Feminist Research (4). III. Schiesari. Seminar—4 hours. Prerequisite: course 200A with a grade of B or better. Application of feminist theoretical perspectives and the interdisciplinary investigation of a problem or question chosen by the instructor. May be repeated for credit when subject area differs.

201. Special Topics in Feminist Theory and Research (4). III. Erickson, Jaffe. Lecture/discussion—4 hours. Explores in depth a topic in feminist theory and research related to the research interests of the instructor. May be repeated for credit in different subject areas. Limited enrollment.

299. Special Study for Graduate Students (1-12). I, II, III. The Staff (SU grading only.)

Zoology

See Biological Sciences: Section of Evolution and Ecology

*Course not offered this academic year.
Concordance Lists for Sections in the Division of Biological Sciences

On July 1, 1993, the faculty and teaching programs of the six departments in the Division of Biological Sciences at UC Davis were reorganized into five new sections: Evolution and Ecology (EVE); Microbiology (MIC); Molecular and Cellular Biology (MCB); Neurobiology, Physiology and Behavior (NPB); and Plant Biology (PLB). On the following pages are lists of courses offered by the former departments, followed by their new names, numbers, and titles in the new sections, and lists of courses offered by the five new sections, followed by their former names, numbers, and titles. Duplicate credit cannot be earned for a course under the new numbering system if credit has been earned for the course it replaced; however, some exceptions are allowed. If you have questions about duplication of credit or about receiving credit for repeating courses, please consult the Undergraduate Academic Programs Office, Division of Biological Sciences, 66 Briggs Hall (516-752-0410).

Former Departments

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<thead>
<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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<td>Biological Sciences 102</td>
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<tr>
<td>101B General Biochemistry</td>
<td>Biological Sciences 103</td>
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<tr>
<td>101L General Biochemistry Lab</td>
<td>Molecular &amp; Cellular Biol 120L</td>
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<tr>
<td>102L Advanced Undergraduate Lab</td>
<td>Biochemistry Laboratory</td>
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<tr>
<td>110L General Biochemistry Lab</td>
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<tr>
<td>111L General Biochemistry Lab</td>
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<tr>
<td>121 Plant Biochemistry</td>
<td>Molecular &amp; Cellular Biol 126</td>
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<tr>
<td>123 An Introduction to Enzymology</td>
<td>Food Science &amp; Technology 123</td>
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<tr>
<td>123L Enzymology Laboratory</td>
<td>Food Science &amp; Technology 123L</td>
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<tr>
<td>131 Behavior and Analysis of Enzyme Systems</td>
<td>Molecular &amp; Cellular Biol 123</td>
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<td>143 Structure-Function Relations of Proteins</td>
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<td>151 Molecular Biology of Eukaryotic Cells</td>
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<td>190 Undergraduate Seminar in Biochemistry</td>
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<td>198 Directed Group Study</td>
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<td>200 Current Techniques in Biochemistry</td>
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<td>201D Cellular Biochemistry</td>
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<td>204 Gene Expression</td>
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<td>212 Chemical Modifications of Proteins</td>
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<td>215 Kinetics of Biological Systems</td>
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<td>250 Biochemical Literature</td>
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<td>270 Advanced Research Conference</td>
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<td>298 Group Study</td>
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<td>299 Research</td>
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<td>390 The Teaching of Biochemistry</td>
<td>Molecular &amp; Cellular Biol 390</td>
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Concordance List for Biological Sciences (BIS)

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<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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<tr>
<td>121 Physiological Adaptation of Marine Organisms</td>
<td>NeuroPhysio&amp;Biology 141</td>
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<tr>
<td>XX, 1XX, 2XX All other undergraduate and graduate courses</td>
<td>Biological Sciences XX, 1XX, 2XX</td>
</tr>
</tbody>
</table>

See course listing for new upper division common curriculum (Biological Sciences 101, 102, 103, 104).
### Concordance List for Botany (BOT)

<table>
<thead>
<tr>
<th>Former Number and Course Title</th>
<th>Equivalent New Course, If Any</th>
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<tr>
<td>XX Lower division courses in Botany</td>
<td>Plant Biology XX</td>
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<tr>
<td>100 Evolutionary Biology of Plants</td>
<td>Evolution and Ecology 100</td>
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<td>101 Survey of Plant Communities of California</td>
<td>Evolution and Ecology 121</td>
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<td>117 Plant Ecology</td>
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<td>130 Survey of Cell Biology</td>
<td>Biological Sciences 104</td>
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<td>140 Paleobotany</td>
<td>Evolution and Ecology 140</td>
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<td>144 Plant Geography</td>
<td>Evolution and Ecology 144</td>
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<tr>
<td>1XX All other upper division Botany courses</td>
<td>Plant Biology 1XX</td>
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<td>202 Plant Ecpophysiology</td>
<td>Plant Biology (GradGp) 210</td>
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<tr>
<td>243 Palynology</td>
<td>Evolution and Ecology 243</td>
</tr>
<tr>
<td>2XX All other graduate Botany courses</td>
<td>Plant Biology (GradGp) 2XX</td>
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<td>390 The Teaching of Botany</td>
<td>Plant Biology 390</td>
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### Concordance List for Genetics (GEN)

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<tr>
<td>10 Heredity and Evolution</td>
<td>Molecular &amp; Cellular Biol 10</td>
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<td>99 Special Study for Undergraduates</td>
<td>Molecular &amp; Cellular Biol 99</td>
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<tr>
<td>100 Principles of Genetics</td>
<td>Biological Sciences 101</td>
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<tr>
<td>100L Principles of Genetics Laboratory</td>
<td>Molecular &amp; Cellular Biol 160L</td>
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<td>102A Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 161</td>
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<tr>
<td>102B Molecular Genetics</td>
<td>Molecular &amp; Cellular Biol 170L</td>
</tr>
<tr>
<td>103 Organic Evolution</td>
<td>Evolution and Ecology 100</td>
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<tr>
<td>104 Developmental Genetics</td>
<td>Molecular &amp; Cellular Biol 163</td>
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<tr>
<td>105 Population Genetics</td>
<td>Evolution and Ecology 102</td>
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<td>106 Evolutionary Quantitative Genetics</td>
<td>Molecular &amp; Cellular Biol 162</td>
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<td>107 Human Genetics</td>
<td>Molecular &amp; Cellular Biol 166</td>
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<td>144 Advanced Developmental Genetics</td>
<td>Molecular &amp; Cellular Biol 190C</td>
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<td>190C Introduction to Genetics Research</td>
<td>Undergraduate Seminar in Molecular Genetics</td>
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<td>Molecular &amp; Cellular Biol 178</td>
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<td>Molecular &amp; Cellular Biol 192</td>
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<td>193 Research Seminar in Current Topics</td>
<td>Molecular &amp; Cellular Biol 193</td>
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<td>197T Tutoring in Genetics</td>
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<td>198 Group Study</td>
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<td>199 Special Study for Advanced Undergraduates</td>
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<tr>
<td>202 Plasmids, Recombinant DNA, and Genetic Engineering</td>
<td>Molecular &amp; Cellular Biol 262</td>
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<td>203 Advanced Evolution</td>
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<td>209 Molecular Evolution</td>
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<td>300 Methods in Teaching Genetics</td>
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### Concordance List for Microbiology (MIC)

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<td>Elementary Physiology</td>
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<td>10 Elementary Physiology</td>
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<td>100A Cellular Physiology</td>
<td>NeuroPhysiol&amp;Behavior 103</td>
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<td>NeuroPhysiol&amp;Behavior 104L</td>
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<td>100L Cellular Physiology Laboratoy</td>
<td>former NPB 100L Cellular Physiology/Neurobiol Lab</td>
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<tr>
<td>106A Experiments in Physiology: Design and Execution</td>
<td>NeuroPhysiol&amp;Behavior 106</td>
</tr>
<tr>
<td>106B Experiments in Physiology: Design and Execution</td>
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<td>110 Systemic Physiology</td>
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<tr>
<td>120A Comparative Physiology: Neurointegrative Mechanisms</td>
<td>NeuroPhysiol&amp;Behavior 125</td>
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<td>120B Comparative Physiology: Circulation</td>
<td>NeuroPhysiol&amp;Behavior 127</td>
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<td>120D Comparative Physiology: Endocrinology</td>
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<td>120E Comparative Physiology: Respiration</td>
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<td>120F Comparative Physiology of Sensory Systems</td>
<td>NeuroPhysiol&amp;Behavior 126</td>
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<td>147 Avi ation Physiology</td>
<td>NeuroPhysiol&amp;Behavior 140</td>
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<td>148 Principles of Environmental Physiology</td>
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<td>2XX Graduate courses in Physiology</td>
<td>Undergraduate courses in Neurobiology, Physiology and Behavior</td>
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<td>3XX Professional courses in Physiology</td>
<td>Graduate courses in the Physiology Graduate Group</td>
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### Concordance List for Zoology (ZOO)

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<td>Evolution and Ecology 92</td>
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<td>2 Internship</td>
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<td>99 Special Study for Lower Division Students</td>
<td>Evolution and Ecology 99</td>
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<tr>
<td>100 Embryology</td>
<td>Molecular &amp; Cellular Biol 150</td>
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<td>100L Laboratory in Vertebrate Embryology</td>
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<td>101 Advanced Developmental Biology</td>
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<td>102 Senior Colloquium in Developmental Biology</td>
<td>Advanced Developmental Biology</td>
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<tr>
<td>105 Phylogenetic Analysis of Vertebrate Structure</td>
<td>Molecular &amp; Cellular Biol 159</td>
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<tr>
<td>112 Invertebrate Zoology</td>
<td>Molecular &amp; Cellular Biol 142</td>
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<tr>
<td>112L Laboratory for Invertebrate Zoology</td>
<td>Advanced Cell Biology: Contractile and Motile Systems</td>
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<tr>
<td>121A Cell Biology</td>
<td>Evolution and Ecology 101</td>
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<tr>
<td>121B Cell Biology</td>
<td>Evolution and Ecology 104</td>
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<td>121C Advanced Cell Biology</td>
<td>Molecular &amp; Cellular Biol 141</td>
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<td>121L Cell Biology Laboratory</td>
<td>Molecular &amp; Cellular Biol 142</td>
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<td>122 Histology</td>
<td>Molecular &amp; Cellular Biol 141L</td>
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<td>125 Animal Ecology</td>
<td>Molecular &amp; Cellular Biol 146</td>
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<td>130 Survey of Cell Biology</td>
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<td>133 Patterns in Vertebrate Biology</td>
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<td>134 Herpetology</td>
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<td>135 Mammalogy</td>
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<td>137 Ornithology</td>
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<td>138 Ecology of Tropical Latitudes</td>
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<td>149 Evolution of Ecological Systems</td>
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<td>155 Behavior of Animals</td>
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<td>189 Introduction to Biological Research</td>
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<td>190 Undergraduate Seminar in Zoology</td>
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<td>199 Special Study for Advanced Undergraduates</td>
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<td>200 Current Techniques in Cell Biology</td>
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<td>202 Biomechanics</td>
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<td>203 Global and Regional Modeling</td>
<td>Population Biology (Grad) 212</td>
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<td>204 Cellular Basis of Morphogenesis</td>
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<td>205 Pattern Formation</td>
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<td>206 Mechanisms of Organogenesis</td>
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<td>222 Modeling in Invertebrate Evolution</td>
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<td>225 Biology of Fertilization</td>
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<td>226 Cell and Molecular Biology of Cancer</td>
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<td>236 Muscle Physiology</td>
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<td>270 Research Conference in Evolutionary Biology</td>
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<td>283 Neurobiological Literature</td>
<td>Population Biology (Grad) 270</td>
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<td>Neurobiological Literature 283</td>
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### New Sections

#### Conkordance List for Biological Sciences (BIS)

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<td>Genetics 100 Principles of Genetics</td>
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<tr>
<td>102   Structure and Function of Biomolecules</td>
<td>Biochm &amp; Biophys 101A General Biochemistry</td>
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<td>103   Bioenergetics and Metabolism</td>
<td>Biochm &amp; Biophys 101B General Biochemistry</td>
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<td>104   Regulation of Cell Function</td>
<td>Botany/Zoolgy 136 Survey of Cell Biology</td>
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<td>Physiology 100A Cellular Physiology</td>
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<td>Zoology 121A Cell Biology</td>
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<td>100   Introduction to Evolution</td>
<td>Botany 100 Evolutional Biology of Plants</td>
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<td>Zoology 146 Animal Phylogeny and Evolution</td>
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<td>101   Introduction to Ecology</td>
<td>Zoology 125 Animal Ecology</td>
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<td>102   Advanced Evolution</td>
<td>Genetics 105 Population Genetics</td>
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<td>Genetics 106 Evolutional Quantitative Genetics</td>
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<td>105   Phylogenetic Analysis of Vertebrate Structure</td>
<td>Zoology 105 Phylogenetic Analysis of Vertebrate Structure</td>
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<td>112   Invertebrate Zoology</td>
<td>Zoology 112 Invertebrate Zoology</td>
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<td>112L  Laboratory for Invertebrate Zoology</td>
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<td>117   Plant Ecology (Same course as Plant Biology 117)</td>
<td>Botany 117 Plant Ecology</td>
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<td>121   Survey of Plant Communities in California</td>
<td>Plant Biology 121 Survey of Plant Communities in Calif</td>
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<td>133   Patterns in Vertebrate Biology</td>
<td>Zoology 133 Patterns in Vertebrate Biology</td>
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<td>134   Herpetology</td>
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<td>137   Ornithology</td>
<td>Zoology 137 Ornithology</td>
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<td>137L  Ornithology Laboratory</td>
<td>Zoology 137L Ornithology Laboratory</td>
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<td>138   Ecology of Tropical Latitudes</td>
<td>Zoology 138 Ecology of Tropical Latitudes</td>
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<td>140   Paleobotany</td>
<td>Botany 140 Paleobotany</td>
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<td>141   Principles of Systematic Zoology</td>
<td>Zoology 141 Principles of Systematic Zoology</td>
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<td>144   Plant Geography</td>
<td>Botany 144 Plant Geography</td>
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<td>147   Zoogeography</td>
<td>Zoology 147 Zoogeography</td>
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<td>149   Evolution of Ecological Systems</td>
<td>Zoology 149 Evolution of Ecological Systems</td>
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<td>170   Comparative Biomechanics</td>
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<td>Zoology 170L Comparative Biomechanics Laboratory</td>
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<td>189   Introduction to Research</td>
<td>Zoology 189 Introduction to Biological Research</td>
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<td>190   Undergraduate Seminar</td>
<td>Zoology 190 Undergraduate Seminar in Zoology</td>
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<td>192   Internship</td>
<td>Zoology 192 Internship</td>
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<td>Zoology 194HABC Research Honors</td>
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<td>197T  Tutoring</td>
<td>Zoology 197T Tutoring</td>
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<td>198   Directed Group Study</td>
<td>Zoology 198 Directed Group Study</td>
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<td>Zoology 199 Special Study for Advanced Undergraduates</td>
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<td>221   Behavioral Ecology</td>
<td>Zoology 221 Behavioral Ecology</td>
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<tr>
<td>240   Paleobotany and Angiosperm Evolution</td>
<td>Botany 240 Paleobotany and Angiosperm Evolution</td>
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<td>243   Palynology</td>
<td>Botany 243 Palynology</td>
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<tr>
<td>267   Seminar in Animal Behavior</td>
<td>Zoology 267 Seminar in Animal Behavior</td>
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<td>290   Current Topics</td>
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<td>290C  Research Conference</td>
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<td>298   Group Study</td>
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<td>299   Research</td>
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## Concordance List for Molecular and Cellular Biology (MCB)

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<td>99</td>
<td>Special Study</td>
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<td>120L</td>
<td>Biochemistry Laboratory</td>
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<td>121</td>
<td>Molecular Biology of Eukaryotic Cells</td>
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<td>122</td>
<td>Structure and Function of Proteins</td>
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<tr>
<td>123</td>
<td>Behavior and Analysis of Enzyme &amp; Receptor Systems</td>
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<tr>
<td>124</td>
<td>Plant Biochemistry</td>
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<td>138</td>
<td>Undergraduate Seminar in Biochemistry</td>
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<td>140L</td>
<td>Cell Biology Laboratory</td>
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<td>141</td>
<td>Cellular Regulation of Gene Expression</td>
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<tr>
<td>142</td>
<td>Advanced Cell Biology: Contractile and Motile Systems</td>
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<tr>
<td>146</td>
<td>Histology</td>
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<tr>
<td>148</td>
<td>Undergraduate Seminar in Cell Biology</td>
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<td>150</td>
<td>Embryology</td>
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<td>150L</td>
<td>Laboratory in Vertebrate Embryology</td>
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<td>151</td>
<td>Advanced Developmental Biology</td>
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<td>158</td>
<td>Undergraduate Seminar in Developmental Biology</td>
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<td>159</td>
<td>Senior Colloquium in Developmental Biology</td>
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<td>161</td>
<td>Molecular Genetics</td>
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<td>162</td>
<td>Human Genetics</td>
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<td>166</td>
<td>Advanced Developmental Genetics</td>
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<td>170L</td>
<td>Advanced Molecular Genetics Laboratory</td>
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<td>178</td>
<td>Undergraduate Seminar in Molecular Genetics</td>
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<td>190C</td>
<td>Undergraduate Research Conference</td>
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<td>191</td>
<td>Introduction to Research</td>
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<td>192</td>
<td>Internship</td>
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<td>193</td>
<td>Advanced Research</td>
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<td>194H</td>
<td>Research Honors</td>
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<td>197T</td>
<td>Tutoring</td>
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<td>198</td>
<td>Directed Group Study</td>
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<td>Directed Group Study</td>
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<td>199</td>
<td>Special Study for Advanced Undergraduates</td>
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<tr>
<td>200A</td>
<td>Current Techniques in Cell Biology</td>
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<tr>
<td>200B</td>
<td>Current Techniques in Biochemistry</td>
</tr>
<tr>
<td>200C</td>
<td>Current Techniques in Biophysics (same course as Biophysics 200)</td>
</tr>
<tr>
<td>220L</td>
<td>Advanced Biochemistry Laboratory Rotations</td>
</tr>
<tr>
<td>221A</td>
<td>Physical and Chemical Biochemistry</td>
</tr>
<tr>
<td>221B</td>
<td>Integration of Metabolism and Regulatory Phena</td>
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<td>221C</td>
<td>Molecular Biology</td>
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<tr>
<td>221D</td>
<td>Cellular Biochemistry</td>
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<td>231</td>
<td>Membrane Biochemistry</td>
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<td>232</td>
<td>Chemical Modifications of Proteins</td>
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<td>241</td>
<td>Membrane Biology</td>
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<td>242</td>
<td>Muscle Biophysics</td>
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<td>246</td>
<td>Seminar in Cell Biology</td>
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<td>249</td>
<td>Literature in Cell Biology</td>
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<td>250</td>
<td>Special Topics in Cell Biology</td>
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<td>251</td>
<td>Biology of Fertilization</td>
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<td>252</td>
<td>Cellular Basis of Morphogenesis</td>
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## Concordance List for Molecular and Cellular Biology (MCB) continued

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<thead>
<tr>
<th>New Number and Course Title</th>
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<tbody>
<tr>
<td>253 Pattern Formation</td>
<td>Zoology 205 Pattern Formation</td>
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<tr>
<td>254 Mechanisms of Organogenesis</td>
<td>Zoology 206 Mechanisms of Organogenesis</td>
</tr>
<tr>
<td>255 Molecular Mechanisms in Animal Development</td>
<td>Zoology 208 Molecular Mechanisms in Animal Development</td>
</tr>
<tr>
<td>256 Cell and Molecular Biology of Cancer</td>
<td>Zoology 228 Cell and Molecular Biology of Cancer</td>
</tr>
<tr>
<td>258 Seminar in Development</td>
<td>Zoology 292 Seminar in Development</td>
</tr>
<tr>
<td>259 Literature in Developmental Biology</td>
<td>Zoology 269 Research Conference in Developmental Biology</td>
</tr>
<tr>
<td>262 Recombinant DNA and Genetic Engineering</td>
<td>Genetics 202 Plasmids, Recombinant DNA, and Genetic Engineering</td>
</tr>
<tr>
<td>290C Research Conference</td>
<td>Biochem &amp; Biophys 25C</td>
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<tr>
<td>291 Current Progress in Molecular and Cellular Biology</td>
<td>Biochem &amp; Biophys 291 Current Progress in Biochemistry</td>
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<tr>
<td>295 Literature in Molecular and Cellular Biology</td>
<td>Biochem &amp; Biophys 270 Advanced Research Conference</td>
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<tr>
<td>296 Research Seminar</td>
<td>Biochem &amp; Biophys 298 Group Study</td>
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<td>298 Group Study</td>
<td>Genetics 298 Group Study</td>
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<tr>
<td>299 Research</td>
<td>Genetics 299 Research</td>
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<tr>
<td>390 Methods of Teaching</td>
<td>Biochem &amp; Biophys 390</td>
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<td></td>
<td>Genetics 300 The Teaching of Biochemistry</td>
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## Concordance List for Microbiology (MIC)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX, 1XX, Undergraduate and graduate courses in Microbiology</td>
<td>Microbiology XX, 1XX, 2XX No change to existing courses or numbers</td>
</tr>
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## Concordance List for Neurobiology, Physiology and Behavior (NPB)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
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<tbody>
<tr>
<td>10 Elementary Physiology</td>
<td>Physiology 10 Elementary Physiology</td>
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<tr>
<td>101 former NPB 110 Systemic Physiology</td>
<td>Physiology 110 Systemic Physiology</td>
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<td>101L former NPB 110L Systemic Physiology Laboratory</td>
<td>Physiology 110L Systemic Physiology Laboratory</td>
</tr>
<tr>
<td>102 former NPB 155 Animal Behavior</td>
<td>Zoology 155 Behavior of Animals</td>
</tr>
<tr>
<td>103 former NPB 100B Cellular Physiology/Neurobiology</td>
<td>Physiology 100B Cellular Physiology</td>
</tr>
<tr>
<td>104L former NPB 100L Cellular Physiology/Neurobiology Lab</td>
<td>Physiology 100LL Cellular Physiology Laboratory</td>
</tr>
<tr>
<td>106 Experiments in Physiology: Design and Execution</td>
<td>Physiology 106A Experiments in Physiology: Design and Execution</td>
</tr>
<tr>
<td>111ABC Advanced Systemic Physiology Laboratory</td>
<td>Physiology 111ABC Advanced Systemic Physiology Laboratory</td>
</tr>
<tr>
<td>112 Neuroscience</td>
<td>Physiology 112 Neuroscience</td>
</tr>
<tr>
<td>113 Cardiovascular, Respiratory, and Renal Physiology</td>
<td>Physiology 113 Cardiovascular, Respiratory, and Renal Physiology</td>
</tr>
<tr>
<td>114 Gastrointestinal Physiology</td>
<td>Physiology 114 Gastrointestinal Physiology</td>
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<tr>
<td>117 Avian Physiology</td>
<td>Physiology 117 Avian Physiology</td>
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<tr>
<td>119 former NPB 142 Invertebrate Physiology</td>
<td>Zoology 142 Invertebrate Physiology</td>
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<tr>
<td>119L former NPB142L Invertebrate Physiology Laboratory</td>
<td>Zoology 142L Invertebrate Physiology Laboratory</td>
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<tr>
<td>121 Physiology of Reproduction</td>
<td>Physiology 121 Physiology of Reproduction</td>
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<tr>
<td>121L Physiology of Reproduction Laboratory</td>
<td>Physiology 121L Physiology of Reproduction Laboratory</td>
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<tr>
<td>126 former NPB 120F Compar. Physiol: Sensory Systems</td>
<td>Physiology 120F Comparative Physiology of Sensory Systems</td>
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<tr>
<td>127 former NPB 120B Compar. Physiol: Circulation</td>
<td>Physiology 120B Comparative Physiology: Circulation</td>
</tr>
<tr>
<td>128 former NPB 120D Compar. Physiol: Endocrinology</td>
<td>Physiology 120D Comparative Physiology: Endocrinology</td>
</tr>
<tr>
<td>129 former NPB 120E Compar. Physiol: Respiration</td>
<td>Physiology 120E Comparative Physiology: Respiration</td>
</tr>
<tr>
<td>130 Physiology of the Endocrine Glands</td>
<td>Physiology 130 Physiology of the Endocrine Glands</td>
</tr>
<tr>
<td>140 former NPB 148 Principles of Environmental Physiology</td>
<td>Physiology 148 Principles of Environmental Physiology</td>
</tr>
<tr>
<td>141 Physiological Adaptations of Marine Organisms</td>
<td>Biological Sciences 121 Physiological Adaptations of Marine Organisms</td>
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### Concordance List for Neurobiology, Physiology and Behavior (NPB) continued

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
</tr>
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<tbody>
<tr>
<td>150 Hormones and Behavior</td>
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<tr>
<td>160 former NPB 143 Advanced Cellular Neurosciology</td>
<td>Zoology 143 Neurobiology</td>
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<tr>
<td>160L former NPB 143L Advanced Cellular Neurosciology Lab</td>
<td>Zoology 143L Neurobiology Laboratory</td>
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<tr>
<td>161 Developmental Neurobiology</td>
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<tr>
<td>162 Neuroethology</td>
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<tr>
<td>190 Prosemin in Physiology</td>
<td>Physiology 190 Prosemin in Physiology</td>
</tr>
<tr>
<td>190C Introduction to Physiological Research</td>
<td>Physiology 190C Introduction to Physiological Research</td>
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<tr>
<td>192 Internship</td>
<td>Physiology 192 Internship</td>
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<tr>
<td>194HABC Physiology—Honors</td>
<td>Physiology 194HABC Physiology—Honors</td>
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<tr>
<td>196AB Voluntary Control of Physiological Processes</td>
<td>Physiology 196AB Voluntary Control of Physiological Processes</td>
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<tr>
<td>197T Tutoring in Physiology</td>
<td>Physiology 197T Tutoring in Physiology</td>
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<tr>
<td>198 Directed Group Study</td>
<td>Physiology 198 Directed Group Study</td>
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<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Physiology 199 Special Study for Advanced Undergraduates</td>
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</table>

### Concordance List for Plant Biology (PLB)

<table>
<thead>
<tr>
<th>New Number and Course Title</th>
<th>Equivalent Former Course, If Any</th>
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</thead>
<tbody>
<tr>
<td>10 Plants, People and the Biosphere</td>
<td>Botany 10 Plants, People and the Biosphere</td>
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<tr>
<td>92 Internship</td>
<td>Botany 92 Internship</td>
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<tr>
<td>96 Directed Group Study</td>
<td>Botany 96 Directed Group Study</td>
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<tr>
<td>99 Special Study for Undergraduates</td>
<td>Botany 99 Special Study for Undergraduates</td>
</tr>
<tr>
<td>101 See: Evolution and Ecology 121</td>
<td>Botany 101 former BOT 101 Survey of Plant Communities of Calif., California Floristics</td>
</tr>
<tr>
<td>102 California Floristics</td>
<td>Botany 102 California Floristics</td>
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<tr>
<td>105 Developmental Plant Anatomy</td>
<td>Botany 105 Developmental Plant Anatomy</td>
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<tr>
<td>108 Systematic Botany of Flowering Plants</td>
<td>Botany 108 Systematic Botany of Flowering Plants</td>
</tr>
<tr>
<td>111 Plant Physiology</td>
<td>Botany 111 Plant Physiology</td>
</tr>
<tr>
<td>111D Problems in Plant Physiology</td>
<td>Botany 111D Problems in Plant Physiology</td>
</tr>
<tr>
<td>111L Introductory Plant Physiology Laboratory</td>
<td>Botany 111L Introductory Plant Physiology Laboratory</td>
</tr>
<tr>
<td>112 Plant Growth and Development</td>
<td>Botany 112 Plant Growth and Development</td>
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<tr>
<td>112D Problems in Plant Growth and Development</td>
<td>Botany 112D Problems in Plant Growth and Development</td>
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<tr>
<td>116 Plant Development and Evolution</td>
<td>Botany 116 Plant Development and Evolution</td>
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<tr>
<td>117 Plant Ecology (same course as Evolution and Ecology 117)</td>
<td>Botany 117 Plant Ecology</td>
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<tr>
<td>118 Introduction to Physiology</td>
<td>Botany 118 Introduction to Physiology</td>
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<tr>
<td>119 Introduction to Mycology</td>
<td>Botany 119 Introduction to Mycology</td>
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<tr>
<td>120 Introduction to Weed Science</td>
<td>Botany 120 Introduction to Weed Science</td>
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<tr>
<td>121 Biology of Weeds</td>
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<td>122 Action of Herbicides</td>
<td>Botany 122 Action of Herbicides</td>
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<tr>
<td>125 Molecular Biology of Plant Development</td>
<td>Botany 125 Molecular Biology of Plant Development</td>
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<tr>
<td>135 Mineral Nutrition of Plants</td>
<td>Botany 135 Mineral Nutrition of Plants</td>
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<tr>
<td>150 Biology and Management of Freshwater Macrophytes</td>
<td>Botany 150 Biology and Management of Freshwater Macrophytes</td>
</tr>
<tr>
<td>155 Anatomical and Cytological Methods</td>
<td>Botany 155 Anatomical and Cytological Methods</td>
</tr>
<tr>
<td>159 Experiments in Plant Biology: Design and Execution</td>
<td>Botany 159 Experiments in Plant Biology: Design and Execution</td>
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<tr>
<td>190C Research Conference in Botany</td>
<td>Botany 190C Research Conference in Botany</td>
</tr>
<tr>
<td>192 Internship</td>
<td>Botany 192 Internship</td>
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<td>194H Special Study for Honors Students</td>
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<tr>
<td>197T Tutoring in Botany</td>
<td>Botany 197T Tutoring in Botany</td>
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<tr>
<td>198 Directed Group Study</td>
<td>Botany 198 Directed Group Study</td>
</tr>
<tr>
<td>199 Special Study for Advanced Undergraduates</td>
<td>Botany 199 Special Study for Advanced Undergraduates</td>
</tr>
</tbody>
</table>
RESIDENCE FOR TUITION INFORMATION

Tuition Fee for Nonresident Students
If you have not been living in California with intent to make it your permanent home for more than one year immediately before the residence determination date for each term in which you propose to attend the University, you must pay a nonresident tuition fee in addition to all other fees. The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

Law Governing Residence
The rules regarding residence for tuition purposes at the University of California are governed by the California Education Code and implemented by Standing Orders of the Regents of the University of California. Under these rules, adult citizens and certain classes of aliens can establish residence for tuition purposes. There are particular rules that apply to the residence classification of minors (see below).

Who is a Resident?
If you are an adult student (at least 18 years of age) you may establish residence for tuition purposes in California if: (1) you are a U.S. citizen; (2) you are a permanent resident or other immigrant; or (3) you are a nonimmigrant who is not precluded from establishing a domicile in the U.S. by the provisions of the U.S. Immigration and Naturalization Service rules. To establish residence you must be physically present in California for more than one year and you must have come here with the intent to make California your home as opposed to coming to this state to go to school. Physical presence within the state solely for educational purposes does not constitute establishment of California residence, regardless of the length of your stay. You must demonstrate your intention to make California your home by satisfying your residential ties with your former state of residence and establishing those ties with California. Evidence of intent must be dated one year before the term for which you seek resident classification. If these steps are delayed, the one-year duration period will be extended until you have demonstrated both presence and intent for one full year. Effective Fall 1993, if your parents are not residents of California or you were not previously enrolled as a UC student, you will be required to establish financial independence in order to be a resident for tuition purposes. Your residence cannot be derived from your spouse or your parents.

Requirement for Financial Independence
You will be considered "financially independent" if one or more of the following applies: (1) you are at least 24 years of age by December 31 of the calendar year for which you are requesting residence classification; (2) you are a veteran of the U.S. Armed Forces; (3) you are a ward of the court or both parents are deceased; (4) you have legal dependents other than a spouse; (5) you are married, or a graduate student or a professional student, and you were not claimed as an income tax deduction by your parents or any other individual for the tax year immediately preceding the term for which you are requesting resident classification; or (6) you are a single undergraduate student and you were not claimed as an income tax deduction by your parents or any other individual for the tax year immediately precedent the term for which you are requesting resident classification, and you can demonstrate self-sufficiency for those years and the current year. (Note: Financial independence will not be a factor in residence status for graduate student instructors, graduate student teaching assistants, research assistants, junior specialists, postgraduate researchers, graduate student researchers, and teaching associates who are employed 40% or more of full time for the term for which classification is sought.)

Establishing intent to Become a California Resident
Indications of your intent to make California your permanent residence can include the following: registering to vote and voting in California elections; designating California as your permanent address on all school and employment records, including military records if you are in the military service; obtaining a California driver’s license or, if you do not drive, a California Identification Card; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside California from the date you establish residence; and keeping records relating to professional practice in California. The absence of these indicia in other states during any period for which you claim residence may also serve as an indication of your intent. Documentary evidence is required and all relevant indications will be considered in determining your classification. Your return will be questioned if you return to your prior state of residence when the University is not in session.

General Rules Applying to Minors
If you are an unmarried minor (under age 18), the residence of the parent with whom you live is considered to be your residence. If you have a parent living, you cannot charge your residence by your own act, by the appointment of a legal guardian, or by the relinquishment of your parent’s right of control. If you lived with neither parent, your residence is that of the parent with whom you last lived. Unless you are a minor alien present in the U.S. under the terms of a nonimmigrant visa which precludes you from establishing domicile in the U.S., you may establish your own residence when both your parents are deceased and a legal guardian has not been appointed. If you derive California residence from a parent that parent must satisfy the one-year duration requirement.

Specific Rules Applying to Minors
1. Divorced/Separated Parents
You may be able to derive California resident status from a California resident parent if you move to California to live with that parent on or before your 18th birthday. If you begin residing with your California parent after your 18th birthday, you will be treated like any other adult student coming to California to establish residence.

2. Parent of a Minor Moves From California
You may be entitled to resident status if you are a minor U.S. citizen or eligible alien whose parent(s) was a resident of California who left that state within one year of the residence determination date if: 1) you remained in California after your parent(s) departed; 2) you enroll in a California public postsecondary institution within one year of your parent(s) departure; and 3) once enrolled, you maintain continuous attendance in that institution.

3. Self-Support
You may be entitled to resident status if you are a U.S. citizen or eligible alien and either a minor or age 18 and can prove the following: 1) you lived in California for the entire year immediately preceding the residence determination date; 2) you have been self-supporting for that year; and 3) you intend to make California your permanent home.

4. Two-Year Care and Control
You may be entitled to resident status if you are a U.S. citizen or eligible alien and you have lived continuously with an adult who is not your parent for at least two years prior to the residence determination date. The adult with whom you are living must have been responsible for your care and control for the entire two-year period and must have been residing in California during the one year immediately preceding the residence determination date.

Exemptions from Nonresident Tuition
1. Member of the Military
If you are a member of the U.S. military stationed in California on active duty, unless you are assigned for educational pur-
2. Spouse or Other Dependents of Military Personnel
You are exempt from payment of the nonresident tuition fee if you are a spouse or a natural or adopted child or stepchild who is a dependent of a member of the U.S. military stationed in California on active duty. The exemption is available until you have lived in California long enough to become a resident. You must petition for a waiver of the nonresident tuition fee each term you are eligible. If you are enrolled in an educational institution and the member of the military is transferred on military orders to a place outside California where he or she continues to serve in the armed forces, or the member of the military retires from active duty immediately after having served in California on active duty, you may retain this exemption under the conditions listed above.

3. Child or Spouse of Faculty Member
To the extent funds are available, if you are an unmarried dependent child under age 21 or the spouse of a member of the University faculty who is a member of the Academic Senate, you may be eligible for a waiver of the nonresident tuition fee. Confirmation of the faculty member’s membership on the Academic Senate must be secured each term this waiver is granted.

4. Child or Spouse of University Employee
You may be entitled to resident classification if you are the unmarried dependent child or the spouse of a full-time University employee whose assignment is outside of California (e.g., Los Alamos Scientific Laboratory). Your parent’s or spouse’s employment status with the University must be ascertainable each term.

5. Child of Deceased Public Law Enforcement or Fire Suppression Employee
You may be entitled to a waiver of the nonresident tuition fee if you are the child of a deceased public law enforcement or fire-suppression employee who was a California resident at the time of his or her death and who was killed in the course of fire suppression or law enforcement duties.

6. Dependent of a California Resident
A student who has not been a resident of California for more than one year and who is the dependent child of a California resident who has been a resident for more than one year immediately prior to the residence determination date may be entitled to resident classification until the student has resided in California for the minimum time necessary to become a resident so long as continuous attendance is maintained at an institution.

7. Native American Graduate of BIA School
A student who is a graduate of a California school operated by the Federal Bureau of Indian Affairs (BIA), i.e., Sherman Indian High School, and who enrolls at the University of California may be eligible for an exemption of the nonresident fee.

Temporary Absence
If you are a nonresident student who is in the process of establishing a residence for tuition purposes and you return to your former home during non-instructional periods, your presence in the state will be presumed to be solely educational purposes and only convincing evidence to the contrary will rebut this presumption. (A student who is in the state solely for educational purposes will NOT be classified as a resident for tuition purposes regardless of the length of his or her stay.) If you are a student who has been classified as a resident for tuition purposes and you leave the state temporarily, your absence could result in the loss of your California residence. The burden will be on you (or your parents if you are a minor) to verify that you did nothing inconsistent with your claim of a continuing California residence during your absence. Steps that you (or your parents) should take to retain a California residence include:

1. Continue to use a California permanent address on all records—educational, employment, military, etc.
2. Satisfy California resident income tax obligations. (Note: If you are claiming California residence, you are liable for payment of income taxes on your total income from the date you establish California residence. This includes income earned in another state or country.)
3. Retain your California voter’s registration and vote by absentee ballot.
4. Maintain a California driver’s license and vehicle registration. If it is necessary to change your driver’s license and/or vehicle registration while you are temporarily residing in another state, you must change them back to California within the time prescribed by law.

Classification to Resident Status
All changes of status must be initiated prior to the first day of class for the term which you intend to be reclassified.

Incorrect Classification
If you were incorrectly classified as a resident, you are subject to reclassification and payment of all nonresident tuition fees not paid. If you concealed information or furnished false information and were classified incorrectly as a result, you are also subject to University discipline. Resident students who become nonresidents must immediately notify the campus residence deputy.

Inquiries and Appeals
Inquiries regarding residence requirements, determination and/or recognized exceptions should be directed to the Residence Deputy or Assistant Residence Deputy, Office of the Registrar, 12 Mrak Hall, Davis, California 95616, (916) 752-0879. NO OTHER UNIVERSITY PERSONNEL ARE AUTHORIZED TO SUPPLY INFORMATION RELATIVE TO RESIDENCE REQUIREMENTS FOR TUITION PURPOSES. You are cautioned that this summary is not a complete explanation of the law regarding residence. Please note that changes may be made in the residence requirements between the publication of this statement and the relevant residence determination date. Any student, following a final decision on residence classification by the residence deputy, may appeal in writing to the legal analyst (Legal Analyst—Residence Matters, 300 Lakeside Dr., 7th Floor, Oakland, CA 94612-3565) within 45 days of notification of the residence deputy’s final decision.

UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS, AND PRIVACY

Nondiscrimination. The University of California, in accordance with applicable Federal and State law and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a Vietnam-era veteran or special disabled veteran. The University also prohibits sexual harassment. This nondiscrimination policy covers admission, access, and treatment in University programs and activities.

Inquiries regarding the University’s student-related nondiscrimination policies may be directed to the Student Judicial Affairs Director, Jeanne Wilson, 465 Memorial Union, 916-752-1128.

Sexual Harassment. Sexual harassment of students, staff, or faculty members is prohibited by law and University regulation (Policy 380-12). Sexual harassment is unacceptable and will not be condoned on the UCD campus. The campus community will take all necessary and appropriate steps to protect students, staff, and faculty from sexual harassment and all
forms of sexual intimidation and exploitation. The Sexual Harassment Education Program (752-2255) provides information and assists students in resolving complaints of sexual harassment informally. Formal grievance procedures for student complaints charging legally impermissible discrimination (Policy 260-05) are available in the Office of Student Judicial Affairs and may be used to bring complaints of sexual harassment or other discrimination. Students may receive informal counseling and formal assistance by contacting any of the following offices: Vice Chancellors, Deans of the Schools and Colleges, the Office of Student Judicial Affairs, or the Sexual Harassment Education Program. In addition, the ASUCD Student Grievance Center, Counseling Center, and the Women's Resources and Research Center are available to provide referral service.

Disclosures from Student Records. In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the Davis campus of the University have the right:

- To inspect and review their own records;
- To have the right to file complaints with the Department of Education for alleged violations of the rights accorded them by the Federal Act.

These rights are implemented on the Davis campus by UCD Policy and Procedure Manual, Section 320-21, "Disclosure of Information from Student Records."

Questions about these rights should be directed to Bev Wilson, Office of Student Judicial Affairs, telephone 916-752-1128. Copies of the Federal Act, the full text of the UC Policies and the UCD Policy and Procedure Manual, Section 320-21, may be consulted at the Reference Desk of the Shields Library.Copies of the UC policies may be obtained at the Office of Student Judicial Affairs.

Categories of personally identifiable information designated by the campus as public information are: name, address (local and/or permanent), telephone numbers, date and place of birth, major field of study, dates of attendance, number of courses enrolled in which enrolled, degrees and honors received, most recent previous educational institution attended, participation in officially recognized activities, including intercollegiate athletics and the name, weight, and height of the participants on intercollegiate University athletic teams, provided, however, that address and telephone numbers are not public information. Students, students who wish to withhold information from their records shall so inform the Office of Student Affairs. Students who wish to have their address and telephone number confidential, the information may be released as a matter of public record and will be included in the campus Student Directory.

Students who wish to withhold information from the category of public information must file a form with the Office of the Registrar. Students availing themselves of this right should understand that the consequences of such action may be.

For example, if all information is designated non-public information, the campus cannot release any information 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 student's written consent.

Similarly, the student's status as a student cannot be verified for potential employers without the student's written consent. Any degrees earned and the dates they were conferred may not be confirmed for any third party in connection with the appointment of that graduate to a new position or published in connection with an employer that individual subsequently receives. Students may reverse the decision to withhold their address and phone number at registration for a new quarter on the Student Address Form. The decision to withhold address and phone number or all information can be reversed at any time by filing a form with the Office of the Registrar.

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

ACCREDITATION

The University of California, Davis is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges, an institutional accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education. UC Davis is also accredited by the Association of American Law Schools, American Bar Association, American Dietetic Association, Association of American Medical Colleges, Accreditation Council for Graduate Medical Education, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, American Chemical Society, American Assembly of Collegiate Schools of Business, American Society of Landscape Architects, the Commission on Teacher Credentialing, and the Joint Commission on Accreditation of Hospitals. Students interested in reviewing the accreditation documents may do so by scheduling an appointment with the Office of the Provost, Mrak Hall.

THE BOARD OF REGENTS

Governance of the University is entrusted to a corporation called The Board of Regents. Of the individuals composing the board, 19 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. Jack W. Peltason is president and head of the Universitywide administration. Authority for the administration of each campus has been delegated to a chancellor.
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

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Governor of California and President of The Regents

Leo T. McCarthy
Lieutenant Governor of California

Willie L. Brown, Jr.
Speaker of the Assembly

State Superintendent of Public Instruction

Robert E. Murphy
President of the Alumni Associations of the University of California

Roy L. Shults
Vice President of the Alumni Associations of the University of California

Jack W. Peltason
President of the University

David Finn
Peter Preuss

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(Reverse term expires on March 1 of year indicated)

William T. Bagley (2002)
Roy T. Brophy (1998)
Clair W. Burgener (2000)
Glenn Campbell (1996)
Frank W. Clark, Jr. (2000)
Ward Connerly (2005)
John G. Davies (2004)
Tino del Junco, M.D. (1997)
Alice J. Gonzales (1998)
S. Sus Johnson (2002)
Meredith J. Khachigian (2001)
Leo S. Kolligian (1997)
Howard H. Leach (2001)
Dean A. Watkins (1996)

Student Regent
Terrence Wooten (UCR) (June 30, 1995)

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Arnold Binder
Daniel Simmons

Principal Officers of The Regents

James E. Holst
General Counsel and Vice President—Legal Affairs

Herbert M. Gordon
Treasurer

Patricia L. Trivette
Secretary

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President of the University

Walter E. Massey
Provost and Senior Vice President—Academic Affairs

V. Wayne Kennedy
Senior Vice President—Business and Finance

William B. Baker
Vice President—University and External Relations

Cornelius L. Hopper, M.D.
Vice President—Health Affairs

Kenneth R. Farrell
Vice President—Agriculture and Natural Resources

James E. Holst
General Counsel and Vice President—Legal Affairs

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Chancellor at Berkeley

Larry N. Vanderhoef
Chancellor at Davis

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Chancellor at Irvine

Charles E. Young
Chancellor at Los Angeles

Raymond L. Orbach
Chancellor at Riverside

Richard C. Atkinson
Chancellor at San Diego

Joseph B. Martin
Chancellor at Santa Barbara

Henry T. Yang
Chancellor at Santa Cruz

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Chancellor Emeritus
James H. Meyer, Ph.D.

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Interim Executive Vice Chancellor and Provost
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Vice Chancellor—Administration

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Vice Chancellor—University Relations

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Vice Chancellor—Research

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Acting Vice Provost—Academic Programs and Dean—Undergraduate Studies
Harvey Himelfarb, M.A.
Acting Vice Provost—Faculty Relations

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Sally P. Springer, Ph.D.

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Associate Vice Chancellor—Information Technology
Trevor L. Chandler, Ph.D.
Assistant Vice Chancellor—Campus Diversity
Tom Compton, J.D.
Acting Assistant Vice Chancellor—Student Affairs (Student Relations)

Anthony B. Pores, M.P.A.
Assistant Vice Chancellor—Finance, Accounting Officer

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Associate Vice Chancellor—University Relations

Yvonne L. Marsh, M.S.
Assistant Vice Chancellor—Student Affairs (Enrollment, Advising and Academic Support Services)
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Jon C. Wagner, Ph.D., Associate Dean—Division of Education

Division of Biological Sciences (Intercollege)
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Ronald J. Baskin, Ph.D., Associate Dean—Academic Affairs
Mark Sanders, Ph.D., Associate Dean—Undergraduate Education Programs

Graduate School of Management
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Richard P. Castanias, Ph.D., Associate Dean—Academic Affairs

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Rex R. Perschbacher, J.D., Associate Dean—Academic Affairs
Antonia Bernhard, J.D., Assistant Dean—Student Affairs

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Robert J. Hansen, Ph.D., Associate Dean—Student Services
Bennie I. Osburn, D.V.M., Ph.D., Associate Dean—Research and Graduate Education

Graduate Studies
Donald L. Curry, Ph.D., Acting Dean

University Extension
Charles A. Lacy, Ph.D., Interim Dean
PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE:

The percent of alumni whose full-time job is in the field of their choice is shown by field of study. Figures do not include the 13 percent of graduates who had not decided on a career field at the time of the survey.

<table>
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<td>76</td>
<td>82</td>
<td>84</td>
<td>94</td>
<td>61</td>
<td>100</td>
<td>66</td>
<td>77</td>
<td>91</td>
<td>56</td>
<td>71</td>
<td>80</td>
<td>90</td>
<td>69</td>
</tr>
</tbody>
</table>

*Source: A 1991 survey of 1989-90 graduates conducted by Student Affairs Research and Information, UC Davis.

Fields of Study are groups of related undergraduate majors; for example, "Animal Science" would include such majors at UC Davis as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.

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RETENTION DATA AND GRADUATION RATES AT UC DAVIS

Freshmen

(Retention and graduation rates through Spring 1993 for all undergraduates entering UC Davis from high school.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled 4 Quarters</th>
<th>*Percent Graduating in 12 Quarters</th>
<th>*Percent Graduating in 15 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>2,434</td>
<td>92%</td>
<td>31%</td>
<td>70%</td>
</tr>
<tr>
<td>1984</td>
<td>3,010</td>
<td>93%</td>
<td>28%</td>
<td>71%</td>
</tr>
<tr>
<td>1985</td>
<td>2,718</td>
<td>91%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>1986</td>
<td>2,475</td>
<td>93%</td>
<td>28%</td>
<td>71%</td>
</tr>
<tr>
<td>1987</td>
<td>3,336</td>
<td>93%</td>
<td>29%</td>
<td>70%</td>
</tr>
<tr>
<td>1988</td>
<td>3,417</td>
<td>93%</td>
<td>30%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Transfer Students

(Retention and graduation rates through Spring 1993 for all undergraduates transferring to UC Davis as juniors.)

<table>
<thead>
<tr>
<th>Fall Quarter of Initial Enrollment:</th>
<th>Number of Students</th>
<th>Percent Enrolled 4 Quarters</th>
<th>*Percent Graduating in 6 Quarters</th>
<th>*Percent Graduating in 9 Quarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>535</td>
<td>89%</td>
<td>39%</td>
<td>75%</td>
</tr>
<tr>
<td>1985</td>
<td>464</td>
<td>92%</td>
<td>40%</td>
<td>75%</td>
</tr>
<tr>
<td>1986</td>
<td>455</td>
<td>91%</td>
<td>36%</td>
<td>79%</td>
</tr>
<tr>
<td>1987</td>
<td>520</td>
<td>92%</td>
<td>31%</td>
<td>77%</td>
</tr>
<tr>
<td>1988</td>
<td>569</td>
<td>91%</td>
<td>31%</td>
<td>75%</td>
</tr>
<tr>
<td>1989</td>
<td>623</td>
<td>92%</td>
<td>31%</td>
<td>71%</td>
</tr>
<tr>
<td>1990</td>
<td>844</td>
<td>92%</td>
<td>34%</td>
<td>66%</td>
</tr>
</tbody>
</table>

*These are not necessarily quarters of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies. (There are three quarters in each academic year.)

*Source: Student Affairs Research and Information, UC Davis (January 1994).

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AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR'S, MASTER'S, AND DOCTORATE DEGREES:

<table>
<thead>
<tr>
<th>Field of Study:</th>
<th>Bachelor's</th>
<th>Master's</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>$2749</td>
<td>$3288</td>
<td>$4436</td>
</tr>
<tr>
<td>Humanities/Social Sciences</td>
<td>$1893</td>
<td>$2448</td>
<td>$2678</td>
</tr>
<tr>
<td>Health Sciences/Life Sciences</td>
<td>$2196</td>
<td>$2578</td>
<td>$2948</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>$2230</td>
<td>$2837</td>
<td>$3829</td>
</tr>
</tbody>
</table>

*Source: 1993 National Salary Survey data provided by the College Placement Council.
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