UCSD

GENERAL CATALOG

1976/1977

University of California, San Diego • June, 1976

Correspondence Directory

UNIVERSITY OF CALIFORNIA, SAN DIEGO
La Jolla, California 92093

Admissions		
Undergraduate	Registrar & Admissions	102 Matthews Campus
Graduate	(Address the appropriate Department of Instruction)	
School of Medicine	Admissions Office	1301 Basic Science Bldg.
Registration	Registrar & Admissions	102 Matthews Campus
Housing		
Undergraduate	Housing Administration	206 Matthews Campus
Married Students	Office of Housing Services	250 Matthews Campus
Graduate Apts.	Office of Housing Services	250 Matthews Campus
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Residence Status	Registrar & Admissions	102 Matthews Campus
Financial Aids (Loans & Grants for Undergraduates and Graduate Students)	Student Financial Services	214 Matthews Campus
Scholarships (for Undergraduates)	Student Financial Services	214 Matthews Campus
Fellowships	Office of Graduate Studies and Research	108 Matthews Campus
Teaching and Research Assistantships	(Address the appropriate Department of Instruction)	
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Student Activities	Student Center	Cluster Center
Foreign Students' Affairs	Office of International Education	Matthews Campus
Educational Opportunity Program (EOP)	Student Center	Cluster Center
Graduate Advancement Program	Office of Graduate Studies and Research	108 Matthews Campus
Graduate Women's Program	Office of Graduate Studies and Research	108 Matthews Campus
Provosts		
John Muir College	H&SS Building	Muir Campus
Revelle College	Revelle Provost Building	Revelle Campus
Third College	Building 412	Matthews Campus
Fourth College	Building 302	Matthews Campus
Dean of Graduate Studies	Office of Graduate Studies and Research	108 Matthews Campus
General Information	Public Information Office	211 Matthews Campus

UCSD

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VOLUME 9 NUMBER 4: JUNE, 1976

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Five issues a year: March, April, May, June, and August.

Front Cover: The handsome new Third College campus is highlighted by recent landscaping and an old eucalyptus tree, which frames the Chemistry Research Building on the right and the Classroom Building in the background.

Photo by Joel C. Don, Revelle College student

UNIVERSITY OF CALIFORNIA, SAN DIEGO

GENERAL CATALOG
1976 - 1977

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By Mail: $2.00

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HISTORY OF THE UNIVERSITY **INSIDE BACK COVER**

ACADEMIC CALENDAR

	FALL QUARTER 1976	WINTER QUARTER 1977	SPRING QUARTER 1977
UNDERGRADUATE STUDENTS: DEADLINE FOR APPLICATIONS FOR SCHOLARSHIPS	Jan. 15		
GRADUATE STUDENTS: APPLICATIONS FOR FELLOWSHIPS			
Deadline date for filing application materials	Jan. 15		
Notice of Awards	Apr. 1		
Acceptance of Awards	Apr. 15		
NOTE: Most departments adhere to the above schedule for assistantships also, but many will accept later applications.			
UNDERGRADUATE STUDENTS: ADMISSION			
Opening date for filing application materials	Nov. 1	July 1	Oct. 1
GRADUATE STUDENTS: ADMISSION			
Foreign students; Deadline for filing application materials	June 1	Sept. 1	Dec. 1
Domestic students: Deadline for filing application materials	Aug. 1	Nov. 1	Feb. 1
NOTE: Applicants should check with their prospective departments to determine deadline dates since some have established earlier deadline dates and accept applications for Fall Admission only.			
ALL CONTINUING UNDERGRADUATE AND GRADUATE STUDENTS: REGISTRATION DEADLINES			
Filing enrollment cards			
Without penalty	May 21	Nov. 19	Mar. 4
With penalty	Sept. 28	Jan 11	Apr. 5
Payment of Fees			
Without penalty	Sept. 28	Jan. 11	Apr. 5
With penalty/petition	Oct. 8	Jan. 21	Apr. 15
ALL NEW UNDERGRADUATE AND GRADUATE STUDENTS: REGISTRATION DEADLINES			
Payment of Fees			
Without penalty	Sept. 28	Jan. 11	Apr. 5
With penalty/petition	Oct. 8	Jan. 21	Apr. 15
Filing enrollment cards (including preferred program card)			
Without penalty	Sept. 28	Jan. 11	Apr. 5
With penalty/petition	Oct. 8	Jan. 11	Apr. 15
GRADUATE STUDENTS: APPLICATION FOR INTERCAMPUS EXCHANGE PROGRAM	Sept. 6	Dec. 27	Mar. 21
QUARTER BEGINS	Sept. 20	Jan. 10	Apr. 4
INSTRUCTION BEGINS	Sept. 27	Jan. 10	Apr. 4
GRADUATE STUDENTS: FILING APPROVED LEAVE OF ABSENCE	Oct. 8	Jan. 21	Apr. 15
UNDERGRADUATE STUDENTS: DEADLINE FOR CHANGE OF PROGRAM			
Adding Courses	Oct. 8	Jan. 21	Apr. 15
Dropping Courses without Late Fee	Oct. 8	Jan. 21	Apr. 15
Changing to or from P/NP	Oct. 8	Jan. 21	Apr. 15
Dropping courses without penalty of "F" grade	Nov. 5	Feb. 18	May 13

1976-77

	FALL QUARTER 1976	WINTER QUARTER 1977	SPRING QUARTER 1977
GRADUATE STUDENTS: DEADLINES FOR CHANGE OF PROGRAM			
Adding or dropping courses without penalty/petition	Oct. 8	Jan. 21	Apr. 15
GRADUATE STUDENTS: MASTER'S DEGREE			
Filing for advancement to candidacy	Oct. 8	Jan. 21	Apr. 15
Filing approved thesis	Dec. 10	Mar. 25	June 17
GRADUATE STUDENTS: DOCTOR OF PHILOSOPHY DEGREE			
Filing for advancement to candidacy	Oct. 8	Jan. 21	Apr. 15
Filing draft dissertation with doctoral committee	Nov. 12	Feb. 25	May 20
Filing approved dissertation and related materials	Dec. 10	Mar. 25	June 17
GRADUATE RECORD EXAMINATION (GRE) TEST DATES	Oct. 16 Dec. 11	Jan. 8 Feb. 26	Apr. 23 June 11
GRADUATE SCHOOL FOREIGN LANGUAGE TEST (GSFLT)	Oct. 9	Feb. 5	Apr. 9 June 25
THANKSGIVING VACATION (ACADEMIC & ADMINISTRATIVE HOLIDAYS)	Nov. 25-26		
GRADUATE STUDENTS: REMOVING INCOMPLETE GRADES (E) ASSIGNED IN PREVIOUS QUARTERS	Dec. 4	Mar. 19	June 11
UNDERGRADUATE STUDENTS: REMOVING INCOMPLETE GRADES (I) ASSIGNED IN PREVIOUS QUARTERS	Dec. 4	Mar. 19	June 11
INSTRUCTION ENDS	Dec. 4	Mar. 19	June 11
FREE DAY	Dec. 6	Mar. 21	June 13
FINAL EXAMINATIONS	Dec. 7-11	Mar. 22-26	June 14-18
QUARTER ENDS	Dec. 11	Mar. 26	June 18
GRADUATE STUDENTS COMPLETION OF REQUIREMENTS			
Final date for completion of all requirements for degrees to be awarded at end of quarter	Dec. 10	Mar. 25	June 17
Final date for completion of all requirements for degrees to participate in commencement			June 17
CHRISTMAS HOLIDAYS (ADMINISTRATIVE HOLIDAYS)	Dec. 24 Dec. 31		
ACADEMIC AND ADMINISTRATIVE HOLIDAY		Feb. 21	
ADMINISTRATIVE HOLIDAY		Mar. 28	
MEMORIAL DAY (ACADEMIC AND ADMINISTRATIVE HOLIDAY)			May 30
GRADES MAILED TO ALL STUDENTS (APPROXIMATE)	Jan. 17	Apr. 15	July 8

EXPLORERS WELCOME

Your experience at UC San Diego will be largely what you choose to make of it.

If you are genuinely interested in stretching your mind, and in acquiring knowledge that will serve you well for the rest of your life, the University of California, San Diego could be the right choice for you.

If you still don't know where you are headed, or what you want to do with your life, UC San Diego might be able to help you find your way.

But if you are considering UC San Diego solely because someone else wants you to come here, or as a place to hibernate, we suggest you forget us. Because at UC San Diego, all of us are really serious about education.

Not that we aren't equally serious about enjoying ourselves in the process of learning — college years can be — and should be — years of adventure and happiness. These are the years for exploring, for unfolding, for living with other explorers, who like yourself, are searching for answers to certain very fundamental questions.

UC San Diego can be a very good place to make this search, and that's why most of our students come here. Very few undergraduate students truly know where they are going or what they want to do a decade from now.

"When I came here, I had definite goals for my life and career. But this place really helps to open yourself up to new things, and my goals are being redefined and reevaluated. It's a very healthy process for the student to go through these changes."
Sophomore, Fourth

If you feel confused about the future bear in mind that

- a third or more of all high school students graduating this year will eventually find occupations in fields that haven't been invented yet;
- the average American worker changes occupation five times during a working career.

UC San Diego welcomes explorers.

UC SAN DIEGO IS SPECIAL

So what makes UC San Diego unique? For one thing, this is an exciting place. It's intellectually stimulating to study at the same university where men and women are making headlines in the arts, sciences, humanities, medicine, and oceanography. It's an inspiring experience to share a campus with a Nobel prize-winner who foresees the day when people may sail to distant planets by riding their spacecraft on the solar wind.

"I often ask myself why I came here. I still don't really have to have a good reason – I like it here and that's enough!"
Senior, Fourth

One reason for choosing UC San Diego, then, is its faculty.

A second feature which makes UC San Diego a "special" place is its "small-college" structure. This structure is designed to work for your benefit.

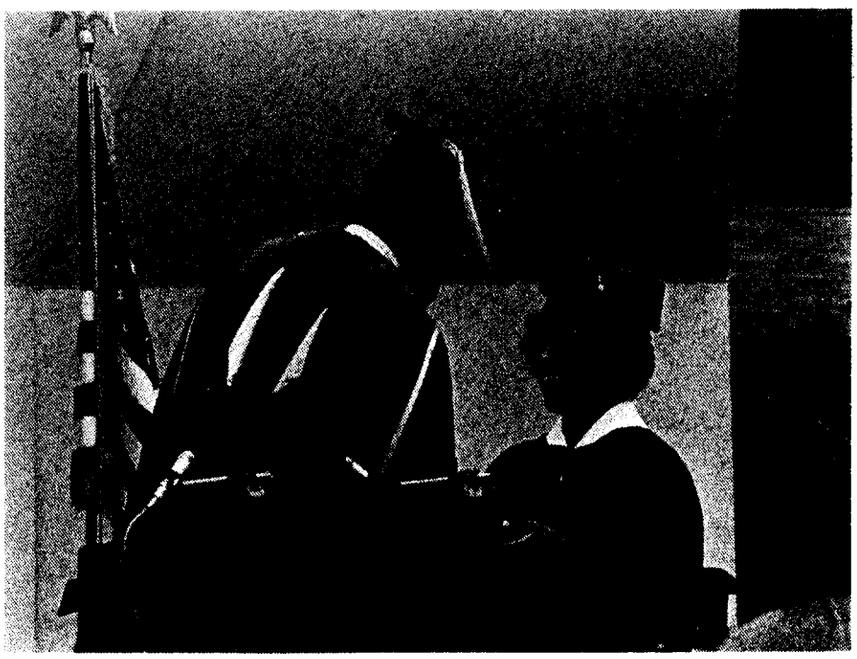
State-wide, the University of California has eight general campuses. Of these, two are built around the small-college concept made famous by Oxford University in England. One of them is UC San Diego, the other is UC Santa Cruz.

"I like the idea of having four small colleges instead of one big university where nobody knows who you are and no one is really interested in what you are doing or how you feel."
Freshman, Fourth

In adopting the small-college structure, the planners of the San Diego campus decided to capitalize on the virtues of "smallness" while retaining the advantages of "bigness." To become a respected university, they reasoned, a university must have a large faculty and staff, and it must be "big" enough to afford well-equipped teaching facilities, laboratories, and research libraries.

With these advantages of "bigness" the planners decided to merge the benefits of "smallness." Instead of one sprawling campus, they would create several more compact campuses. They would thus establish an environment in which the students might retain their individualities and feel a sense of belonging. The planners were aware that many students prefer such an informal setting to the crowded world of the big-city campus.

These were the qualities which the planners of UC San Diego had in mind when they organized the "small-college" system. The four colleges are, in alphabetical order, Fourth College, which admitted its first students in the fall of 1974, John Muir College, which began operation in 1967, Revelle College, the first of the four colleges, which opened in 1964, and Third College, which opened its doors in 1971.



"They seem to care about Third World people here. There are programs here that direct themselves to the interests of the Third World. There are a lot of good people here who really give a damn about us."
Sophomore, Third

RECREATION AT UC SAN DIEGO

UC San Diego's undergraduate colleges sit astride a 1200-acre site high on the bluffs overlooking the Pacific Ocean at La Jolla. This seaside community has long been famed as a vacation and retirement colony. It has some of the finest beaches and coves, restaurants, and art galleries, as well as other recreational and cultural attractions in the nation.

Naturally then, much of the social life at UC San Diego centers around the waterfront, with surfing and scuba-diving among the favorite diversions of students here.

Inland, student life ranges from the small-town atmosphere of Del Mar southward to the open-air markets of Tijuana and the primitive wilderness of the Baja California Peninsula in Mexico.

The City of San Diego, some 12 miles from the campus, offers a variety of recreational opportunities including Old Town (where California was born), Sea World in Mission Bay, the world-famed San Diego Zoo, and the Sports Arena and San Diego Stadium, sites of a year-round calendar of major league sporting events and concerts.

"There are a lot of trees here. There's a lot of concrete, but I think that this makes for a beautiful dichotomy. I like the trees the best."
Junior, Revelle

For theater-lovers there's Balboa Park's Old Globe, home of the National Shakespeare Festival every summer. Next door to the Old Globe, the Cassius Carter Center Stage Theater presents a season of plays, while downtown the Civic Theater also schedules a full season of cultural events including opera, ballet, and the San Diego Symphony.

On-campus entertainment includes a series of Friday and Saturday night films at very low prices throughout the year. The Drama Department presents plays throughout the school year in the UCSD Theatre. Concerts ranging from rock to jazz to classical, free dances in the cafeterias and gym, street dances, noon concerts and appearances by prominent jazz groups are also scheduled regularly.

Informal meeting places such as Revelle's Coffee House and Muir's Five-and-Dime are visited by students throughout the day and evening. The Student Center provides many meeting rooms and recreational facilities for students. The new Mandeville Center, a $5.3 million fine arts building, which opened in March, 1975, houses offices, classrooms and work spaces for the Departments of Music and Visual Arts, as well as an 850-seat auditorium. The three-level structure, north and east of the gymnasium, provides a center for a greatly expanded program of art exhibits, concerts, and other cultural events.

MOUNTAINS, DESERTS, AND BEACHES

Many Southern Californians live out-of-doors. The San Diego metropolitan area — which includes UC San Diego — has the most benign climate in the United States, year-around.

Fishing opportunities are plentiful offshore in kelp beds west of La Jolla, and surrounding the Coronado Islands in the Mexican waters. Bass and trout fishing are found in nearby lakes and streams. An hour's drive to the east, the Laguna Mountains provide pleasure at all seasons for campers and hikers. Beyond the Lagunas lies the vast Borrego Desert with its breathtaking display of wildflowers in the spring.

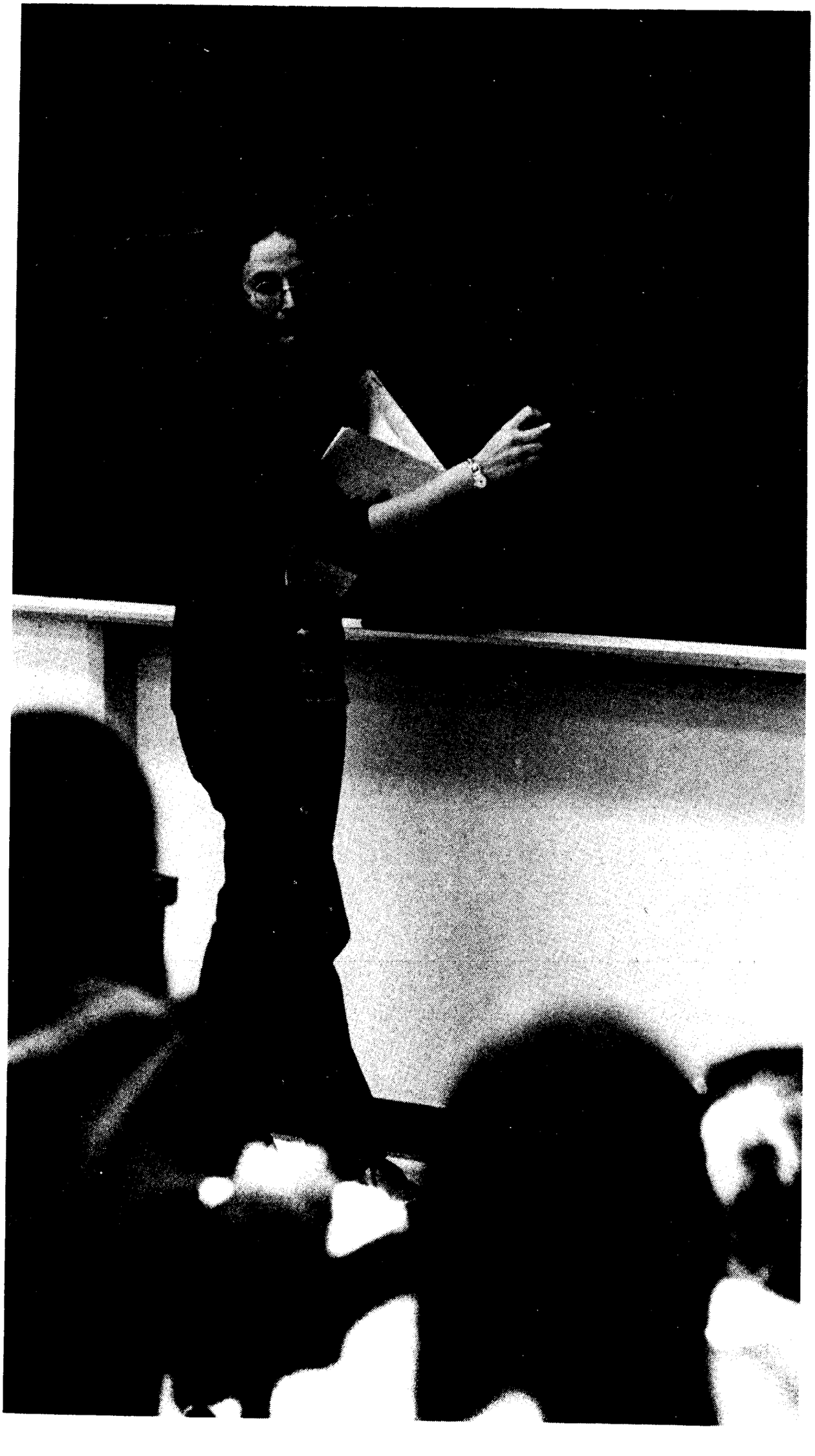
For 900 miles southward from the U.S.-Mexican border stretches the peninsula of Baja California, a mecca for lovers of unspoiled beaches and untouched mountains and deserts. The peninsula, site of the grueling Baja cross-country road races each year, is still largely unexplored wilderness, despite the recent opening of a trans-peninsular highway.

"MOST SPORTS-MINDED CAMPUS"

UC San Diego athletic director Howard Hunt calls this campus "the most sports-minded in America." And Mr. Hunt has the statistics to prove it. UC San Diego fields more intercollegiate athletic teams — twenty-seven — than any other college or university in the nation. This total is all the more remarkable in light of the fact that UC San Diego has no big-time football team and that the student body voted four-to-one against allowing any athletic scholarships.

The University's amateur sports program has produced some championship teams. In one recent year, for example, UC San Diego's Tritons were national volleyball champions and the team included two all-Americans.

In addition to this, special emphasis is placed on women's sports teams.



SELECTING YOUR MAJOR

Your major course of study at UC San Diego will be determined by a number of things, including your interests, skills, abilities and needs.

Should you need help in selecting a major, there are many people standing by to aid you. Among them are the academic advisers in the provosts' offices, faculty members (who can help you to select a curriculum that is right for you), and a staff of specialists in Counseling and Psychological Services (who can help you appraise your needs).

With or without such help, you will probably select a major by your second year at UC San Diego, and perhaps will change it as your education progresses.

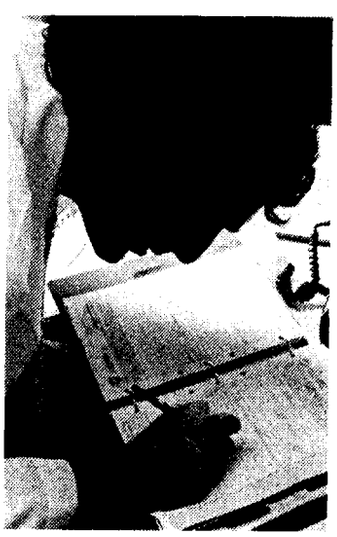
"A lot of effort is required here, and you really have to motivate yourself, which can be hard at times. UCSD offers a real challenge to your personal initiative."
Senior, Muir

PLANNING YOUR CAREER

The choice of a major can be part of your career planning. But your choice will not necessarily lock you in for life to any specific type of work. A major in biology, for example, can provide certain laboratory skills, or pre-professional training for a health field, or lead to jobs quite unrelated to biology.

A firm commitment to a particular field is not expected. However, by graduation, in your own best interests, you should know where you want to begin, and have a direction in mind.

There are career-planning services to help you in this process. Counseling, occupational literature, employer information and data on employment trends are all available. These services, together with your own experience, probably will lead you to a satisfying initial choice.



"Involvement here is the key. Students who come here expecting to enjoy UCSD without becoming involved are only fooling themselves. Once you become involved, this place comes alive."
Sophomore, Muir

WHAT WE DON'T HAVE

As you will see from the list of majors shown in this catalog, UC San Diego offers a variety of programs in the humanities, fine arts, social sciences, and natural sciences. We must admit, however, that there are some programs not offered here. Further, although every academic program has met all the rigorous standards set by Systemwide faculty and administrators, there are certain emphases in some majors which may not be what you are looking for. In some cases, our not offering a particular program or activity reflects a deliberately chosen philosophy; in others, the lack is temporary, to be liquidated as we grow; and in still others it is due to a reluctance to duplicate offerings at other UC campuses or in other segments of higher education.

SO — when you come to UC San Diego, don't expect to find:

An intercollegiate football team;

Athletic scholarships;

Physical Education as a major or minor;

Business courses (although we do offer a management science major, through the Economics Department);

Oceanography as an undergraduate major (although we can prepare you for graduate work in that field);

Nursing (although we can give you the first two years leading to qualifying for the Schools of Nursing at UCLA and UC San Francisco, as well as other institutions);

Dentistry (although our various B.A. programs in the sciences make excellent pre-dental programs);

Industrial Arts;

Secondary Teaching Credentials (although at UC San Diego you can complete the first four years of the five required by the State of California);

Journalism (although many of our majors will qualify you to work as a journalist);

Geography;

Early Childhood Education;

Some departmental emphases of which you should be aware:

Our biology programs are strongly oriented toward the cellular and molecular levels of life. While we offer courses in organismal and field biology, there are no majors with this sort of emphasis.

Our Department of Visual Arts offers excellent programs in fine arts studio work and in art history — but you won't find illustration or fashion design or similar commercially applicable programs.

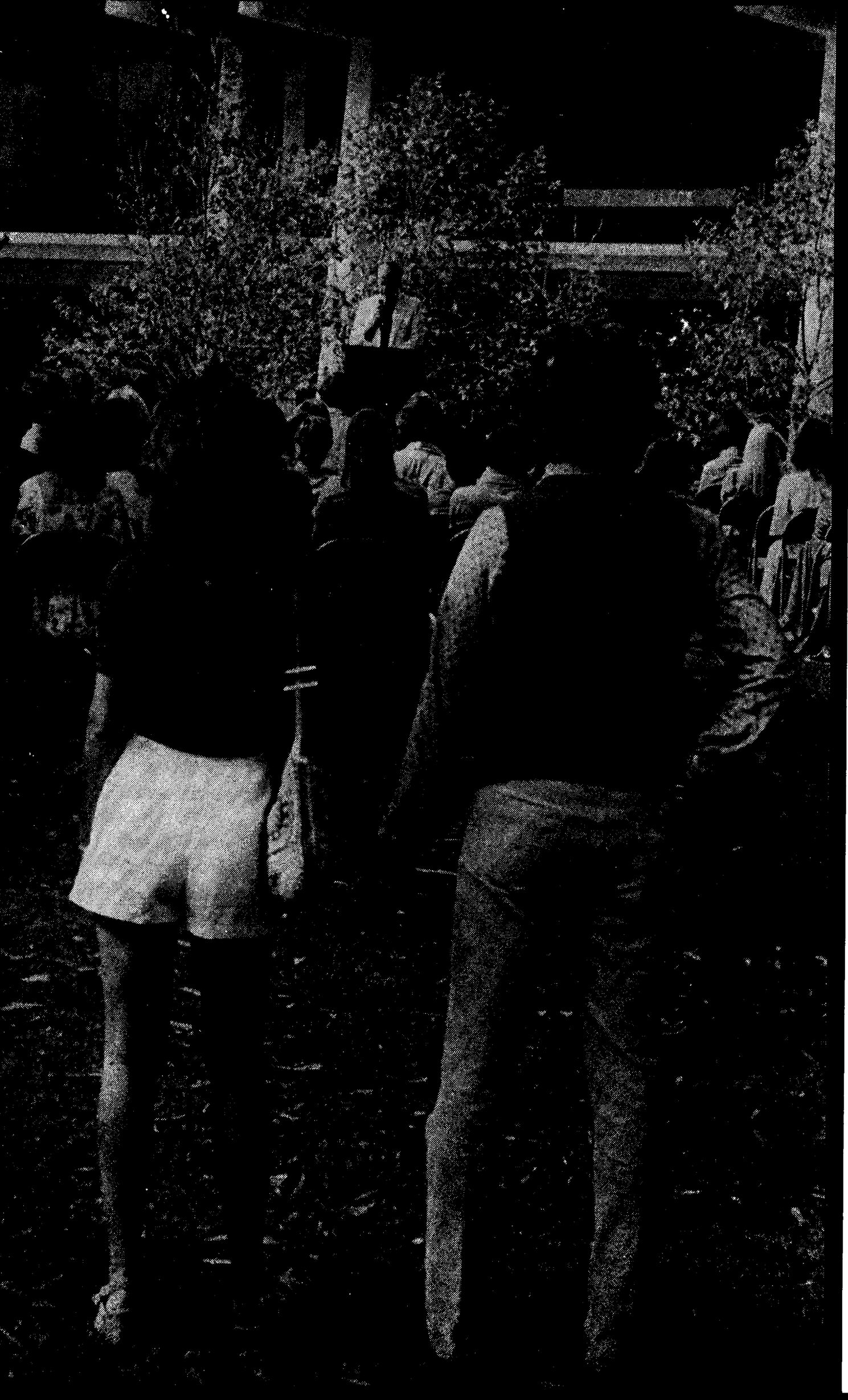
Our Department of Psychology offers an emphasis in experimental psychology, with choices as to the types of experimental approaches available. We also offer a general psychology major, but nothing in the fields of humanistic psychology or clinical psychology.

Our Teacher Education Program leads to the partial credential in elementary teaching; graduates of this program are qualified for teaching jobs, with the understanding that the full credential is to be obtained within seven years, which will involve taking courses at some other college or university after the completion of the TEP here.

NEED MORE INFORMATION? CHECK THE FOLLOWING:

- ☐ How do I apply for admission? Page 53. (see also "Note," below.)
- ☐ How much does it cost? See "Fees and Expenses." Page 68.
- ☐ How does UC San Diego grade? Page 105.
- ☐ What about scholastic requirements? Page 75.
- ☐ How do I go about choosing a college at UC San Diego? Page 19.
- ☐ What kinds of services and facilities are available at UC San Diego for students? Page 119.
- ☐ How many students and faculty were there at UC San Diego in 1976? Page 371.
- ☐ Where do I write for more information? See inside front cover.

NOTE: An admissions packet for students interested in entering UC San Diego is available at any California high school or junior college counselor's office. Out-of-state students may obtain a packet by writing to the Admission Office on any University of California campus.



Choosing a College at UC San Diego

As a member of the nine-campus family of the University of California, UC San Diego is a full-fledged university in every sense of the term. Graduate and undergraduate programs are offered in a wide range of disciplines, leading to the Bachelor's, Master's, M.D. and Ph.D. degrees. UC San Diego's Scripps Institution of Oceanography is world-renowned in its field, and the University's relatively new School of Medicine already has won national distinction for the quality of its scholarship. UC San Diego's undergraduate programs also have been singled out for special honors in national surveys, despite the comparative youth of UC San Diego as a general campus.

So UC San Diego is, first and foremost, a university. There is one feature, however, which sets this campus apart from most large universities in California and elsewhere: the "small-college" concept, patterned after the model so successfully pioneered, centuries ago, by Oxford and Cambridge.

Early in UC San Diego's history, the University's planners agreed that some students learn more, and with greater personal satisfaction, when their academic and social loyalties are concentrated upon a relatively small group of instructors and fellow students. At the same time, the planners recognized that there are many advantages to "bigness" in a university. So the benefits of "bigness" were combined with the assets of "smallness" in planning the small-college environment at UC San Diego.

The concept was launched at UC San Diego with the opening of Revelle College in 1964. Three more colleges—John Muir, Third, and Fourth—have since been inaugurated. Each college has its own distinctive academic flavor. Thus you may choose from a rich variety of educational philosophies and environments in selecting the program best suited to your own personality and needs.

Each college has its own residence halls, recreational facilities, and student services, creating an atmosphere of intimacy not generally achieved on a large campus. But the colleges and graduate schools combine to constitute a large University at UC San Diego, with such advantages as a major library (UC San Diego's, still growing, already has passed the one-million-volume mark); an ultra-modern computer center; a center for performing and visual arts; a rich, year-round program of cultural attractions and entertainments, and a complete array of physical education and recreational facilities.

Separate colleges may be found on many American university campuses, but these are designed usually to serve specific disciplines—a college of engineering, a college of agriculture, a college of business administration, and the like. At UC San Diego, however, every subject is offered in

every college, and your choice of a college will depend not on the subjects you wish to study, but rather on the nature of the environment in which you wish to study those subjects.

So the question you must answer for yourself, as you read the pages which follow, is not 'Which college is best for pre-med, or literature, or . . .? "The real question, which you alone can answer, is "Which college offers the environment in which I, as an individual, will do my best work?"

In addition to your major course of study—which will be essentially the same, no matter which college you choose—you will be required to satisfy a number of breadth (general education) requirements. Such requirements are a feature of every educational institution, and at UC San Diego they are among the most obvious differences among the four colleges. Each has its own distinctive pattern of breadth requirements, designed to meet the desires and needs of different kinds of personalitites.

In sum, when you apply for admission to UC San Diego, you will be asked to specify the college of your choice. Bear in mind all of the above considerations as you read the following brief descriptions of the four colleges: Revelle, Muir, Third, and Fourth.

Much of the success you will enjoy at UC San Diego—and much of the pleasure and personal satisfaction you will derive—will hinge upon the care with which you make this important choice.

Revelle College

Revelle College, the first college on the UC San Diego campus, was named in honor of Dr. Roger Revelle, former University-wide Dean of Research, and for many years Director of UC San Diego's Scripps Institution of Oceanography.

Formerly called the School of Science and Engineering and later First College, Revelle College was established in 1958. After being temporarily housed on the Scripps campus, Revelle moved into its first complete buildings during the 1963-64 academic year. In 1960 Revelle began a graduate program in the physical sciences. From that beginning, it rapidly developed its humanities and social science programs, and today the teaching program reflects a broad spectrum of learning.

The Educational Philosophy With the establishment of Revelle College, the faculty was given a rare opportunity to shape an undergraduate curriculum that would, insofar as any educational program can, prepare its students for the modern world. From the outset of planning the curriculum, the faculty asked: What sort of knowledge must students have if they are to be liberally educated? In what areas? To what depth? How specialized must that education be in the undergraduate years?

The educational philosophy of Revelle College was developed in response to such fundamental questions. Its undergraduate program is based on the assumption that students who are granted the Bachelor of Arts degree will have attained:

1. an acceptable level of general education in mathematics, foreign language, the physical, biological, and social sciences, the fine arts and the humanities;
2. preprofessional competence in one academic discipline;
3. an understanding of an academic area outside their major field.

To this end, a lower-division curriculum has been established which should enable students to acquire an understanding of the fundamental problems, methods, and powers of the humanities and the arts, the social and behavioral sciences, mathematics, and the natural sciences.

The lower-division curriculum assumes that undergraduates should not concentrate heavily in a special field until they have had a chance to learn something about the various fields that are open to them. Their general education must, then, be thorough enough for them to see the possibilities of those fields. Early in their careers, they should know three languages: their own, a foreign language, and the universal language of mathematics. They will study a foreign language as a spoken, vital means of communication; studying that language, they will come to know something of the general nature of language itself. And they will study mathematics as part of general education and as preparation for a required sequence of courses in the physical and biological sciences. They will learn more about their own culture in a two year program of study in the Humanitiies and Fine Arts, which requires the regular writing of essays. Finally, they will, as sophomores, study the social and behavioral sciences. They will also have some elective time in which they can take courses in disciplines that they would like to explore further. Once they have completed this program, they will be ready for the relatively more specialized work of the upper division.

During the students' upper-division years (junior and senior), their main efforts will be devoted to intensive work in their major fields at a level of competence that will enable them to continue their study in the graduate division.

The students' *general* education will not, however, stop at the end of the sophomore year; in addition to their majors, all upper-division students will do a substantial fraction of course work in an area or areas of learning distinctly different in content and method from that of the major. (Generally, the following will be considered "areas of learning" in the above sense: mathematics and natural sciences; the social sciences; humanities.)

Revelle College stresses the broad character of its curriculum. Every student, for example, is required to achieve a certain competence in calculus. The emphasis on calculus and physical science is in some respects a deviation from educational theory of the last hundred years. The older "general education" theory demanded that scientists achieve a reasonable competence in the social sciences and humanities. The rising importance of science justifies the application of the theory to non-scientists as well.

Four years of college can at best yield only a limited knowledge; the major task is to train students so that they can adapt quickly and effectively to the rapidly changing world.

General Education Requirements Revelle College students are required to demonstrate an acceptable level of basic knowlege in the humanities, fine arts, social sciences, language, mathematics, and the physical and biological sciences before entering a major academic field for specialization during the junior and senior years. They will reach the required level through a set of courses that comprise approximately 80 per cent of their work in the lower division.

Students are encouraged to meet the requirements of the lower division and the major requirements of the upper divison as rapidly as possible. The entire program, including the general education requirements of the upper division, is designed to be completed in four years. Variations within the program will occur, of course, depending on the student's interest, prior training, and ability to make use of individual study. Those who demonstrate superior achievement and competence in an academic area may take advanced courses and individual-study programs.

Lower Division In order to fulfill the minimum lower-division requirements in the principal fields of knowledge, the student takes a recommended set of courses, the prerequisites for which have been met by the general admission standards of the University.

The lower-division general education requirements are as follows:

1. satisfaction of the general University Subject A requirement;
2. three courses in mathematics (three quarters of calculus);
3. three courses in social science;
4. five courses in the natural sciences (two courses in physics, two courses in chemistry and one course in biology);
5. verbal and reading proficiency in a modern foreign language, or demonstrated reading ability in a classical language;
6. six courses in humanities;
7. one course in fine arts.

Subject A Satisfaction of the University requirement in Subject A. (See "Undergraduate Admissions, Policies, and Procedures and "Humanities").

Mathematics Mathematics has for centuries held an important place in education, in the sciences, and in the humanities. As an integral part of their liberal education, students will be brought into contact with a significant area of mathematics. Furthermore, they will gain the facility to apply mathematics in their studies of the physical, biological and behavioral sciences.

There are two beginning-year course sequences which meet the Revelle College mathematics requirement. Both sequences include integral and differential calculus and linear algebra. Freshmen enrollment in these sequences is dependent upon the student's high school and college preparation in mathematics as well as future plans. Students are urged to keep their math skills at a high level by taking math during their junior and senior years in high school. Students who have completed college courses in calculus or who present Advanced Placement Credit in mathematics may not receive credit for mathematics courses which duplicate their advanced standing work. (See "Courses, Curricula, and Programs of Instruction: Mathematics".)

Social Sciences Three lower division courses in the social sciences are required for the bachelor's degree. Lower divison work in anthroplogy, economics, linguistics, politcal science, psychology and sociology will be accepted toward satisfaction of the social science requirement.

Students wishing to submit courses in other departments (such as Communications and Urban and Rural Studies) in satisfaction of this requirement should consult the Office of the Revelle Provost prior to taking such classes.

Natural Sciences The natural science sequences present the fundamental concepts of modern physical science and biology. For the student who may major in one of these disciplines, the courses provide a background and preparation for further study; for those students who will continue their studies outside the sciences, they offer an opportunity to gain a certain understanding and appreciation of current developments in these fields.

Two sequences are offered. Students enroll in one sequence or the other depending upon their prior preparation in mathematics. Five courses in one sequence will satisy the natural sciences requirement. (See "Courses, Curricula, and Programs of Instruction: Nautral Sciences".)

Language Requirements are in terms of levels of proficiency that must be attained by the student, rather than in terms of a certain course or number of courses that must be passed. Proficiency may be attained in any modern foreign or classical language. Programs are currently offered in French, Spanish, Russian, German, Chinese, Italian, Hebrew, Greek and

Latin. Students who have preparation in other modern languages should see the Office of the Provost, Revelle. The language requirement may be satisfied by any of the following:

1. demonstration of oral proficiency and a satisfactory score in a standard language examination,

-OR-

2. a passing grade in Literature 10 in a modern foreign language or its equivalent course in a classical language,

-OR-

3. successful completion of language sequence 4, 5 and 6.

The normal preparation for lower-division language proficiency will be language courses in the student's freshman year. With normal high school preparation in language most students will require about a year of course work to prepare for the examination, but some students will take less time and some more, because of differences in ability, industry, and previous language work in high school, on other campuses, or in informal extracurricular activities (e.g., foreign movies, language clubs, language tables) involving the language.

To assist students in attaining the required language proficiencies in a *modern* language, three special kinds of aid are offered:

1. self-instructional materials and equipment, which students can use to advance their proficiency at their own optimum speed;

2. a program of small tutorial classes, conducted by native speakers of the language;

3. instruction by linguistic scientists about language and the learning of languages. This instruction is intended to broaden the scope of students' education as well as to assist them in their own language study.

Humanities. The purposes of the general educational requirement in humanities are two-fold: (a) to confront students with significant humanistic issues in the contest of a rigorous course which can serve as an introduction to the academic disciplines of history, literature, and philosophy; (b) to provide training and practice in rhetorical skills, especially persuasive written expression.

Students may meet this requirement by satisfactorily completing the following program:

1. three courses, in sequence, of an interdisciplinary humanities program offered by the departments of History, Literature and Philosophy, which focus on some of the great documents of civilizations; these courses are taken in the freshman year. In addition, laboratories in writing and rhetoric are taken in conjunction

with the sequence. Writing laboratory sections are organized to give students experience in several rhetorical strategies as well as to give students training and practice in the preparation and critique of expository essays relevant to the materials studied concurrently in the Humanities portion of the course. Completing these sequences satisfies the Subject A requirement for students who have not otherwise satisfied it. Additional attention is given to those students who enter Revelle College with a Subject A deficiency.

2. a three course sequence in an interdisciplinary humanities program or an approved departmental sequence; this sequence is normally taken in the sophomore year.

For course descriptions, see "Courses, Curricula and Programs of Instruction: Humanities", and the appropriate departmental listings.

Fine Arts One course is required and is usually taken in the freshman or sophomore year. Students may choose a course from drama, music, or visual arts. (See "Courses, Curricula, and Programs of Instruction".)

Freshman Year

FALL	WINTER	SPRING
Humanities/ Composition	Humanities/ Composition	Humanities/ Composition
Language	Language	Language
Mathematics 1A or 2A	Mathematics 1B or 2B	Mathematics 1C or 2C
Fine Arts* or Elective	or Natural Science 1B	Natural Science 2B
Natural Science 1A	or 2A	or Elective

Sophomore Year

FALL	WINTER	SPRING
Humanities	Humanities	Humanities
Natural Science 1C or 2C	Nat. Sci. 1D or 2D	Nat. Sci. 1E or 2E
Social Science	Social Science	Social Science
Elective/Language	Elective/Language	Elective/Language

*Students may enroll in a course in drama, music or visual arts to meet the fine arts requirement in any of the six quarters in which they have room to schedule a class that interests them.

Upper Division

The Major All undergraduate majors offered at UC San Diego are available to Revelle College students. The major program requires a minimum of 12 to 15 upper-division courses, depending on the

department in which the major is taken. (See "Courses, Curricula, and Programs of Instruction".)

As changes in major requirements occur, students are expected to satisfy the new requirements insofar as possible. Hardship cases should be discussed with the departmental adviser, and petitions for adjustment submitted to the provost when necessary.

Restricted Electives In addition to the major requirements, departments may require a student to pass a number of courses in his or her general area of learning. The requirement is intended to give breadth as well as depth to the student's major. The major program and related elective choices may total up to 18 courses in the upper division.

Non-Contiguous Courses In addition to the major and any restricted electives, Revelle College students are required to complete six non-contiguous courses in an area of studies *other than* that of the major. For the purposes of this requirement, the humanities, the social sciences, and the natural sciences (including mathematics) will be considered three different areas. The requirement may be met in one of the following ways:

I. *The Non-Contiguous Minor*
Students have available two options with respect to the non-contiguous minor;

a) *Departmental Minor* — All six non-contiguous courses for the minor are taken in one department, and they are chosen with the advice and approval of a minor adviser in that department;

b) *Project Minor* — A project minor centers on a problem or period chosen by the student. The project is often interdepartmental and interdisciplinary. The program must have the approval of a minor adviser in the "center-of-gravity" department, who will also be available to assist the student in planning the program for the minor. (Students unable to locate an appropriate faculty adviser should ask the Office of the Revelle Provost for assistance.)

II. *Six Electives Unrelated to the Major*
Under this option, a student is free to elect any six courses for which the student is qualified, subject only to the constraints that at least three courses be at the junior-senior level and that all six courses are non-contiguous to the student's major.

No more than three lower-division courses may be included in a minor program.

Each department will designate a minor adviser. Minor programs are subject to approval by the provost.

The Graduation Requirements In order to graduate from Revelle College, a student must:

1. satisfy the University of California requirement in American History and Institutions. (See "Undergraduate Admissions, Policies, and Procedures: American History and Institutions".);
2. satisfy the lower-division general education requirements (including Subject A);
3. complete a major consisting of at least 12 upper-division courses;
4. complete 6 non-contiguous courses (no more than 3 may be lower division);
5. pass at least 46 courses (184 quarter units);
6. attain a C average (2.0) or better in all work attempted in the University of California (exclusive of University Extension). Departments may require a C average in all upper-division courses and/or a grade of C in specific courses used on the major;
7. meet senior residence requirement. (See "Undergraduate Admissions, Policies, and Procedures: Senior Residence".)

Upon satisfaction of the graduation requirements, Revelle College will recommend that the student be awarded the degree Bachelor of Arts.

Honors in Revelle College Provost's Honors will be awarded each quarter to students who complete the previous quarter's programs with distinction according to criteria established by the Executive Committee of the College.

The Executive Committee of Revelle College will award College Honors with the bachelor's degree to students with a superior over-all grade-point average at graduation. The honors designations are Honors, High Honors, and Highest Honors. To be eligible for College Honors, a student must have completed at least 20 courses (80 quarter units) in the University of California and have the recommendation of the major department.

Honors earned will be recorded on each student's diploma.

Transfer Students Transfer students accepted by Revelle College will, in general, be held to the lower-division general education requirements and the lower-division prerequisites for a major. The general education requirements, however, will be interpreted in a manner which considers the student's total educational program. The provost, in consultation with appropriate departments, will evaluate the credentials of each transfer student on an individual basis. Some departments may require a transfer student with senior standing to satisfy a residence

requirement within the major department. Students should consult their major advisers about the minimum number of courses required for this purpose.

In order to transfer to Revelle College from another college or school within the University of California, a student will be required to have a C (2.0) average or better on all work attempted at any University of California campus. (See "Undergraduate Admissions, Policies and Procedures; Admisssion in Advanced Standing".)

The Faculty of Revelle College

NAME	TITLE	DEPARTMENT
Abelson, John N., Ph.D.	Associate Professor	Chemistry
Addison, Michael C., Ph.D.	Associate Professor	Drama
Allison, Henry E., Ph.D.	Professor	Philosophy
Arnold, James R., Ph.D.	Professor	Chemistry
Attiyeh, Richard E., Ph.D.	Professor	Economics
Bear, Donald V. T., Ph.D	Associate Professor	Economics
Behar, Jack, Ph.D.	Associate Professor	Literature
Bishop, Errett A., Ph.D.	Professor	Mathematics
Blume, Bernhard, Ph.D.	Professor Emeritus	Literature
Bond, Frederick T., Ph.D.	Associate Professor	Chemistry
Bradner, Hugh, Ph.D.	Professor	AMES
Brueckner, Keith A., Ph.D.	Professor	Physics
Burbidge, E. Margaret, Ph.D.	Professor	Physics
Burbidge, Geoffrey, R., Ph.D.	Professor	Physics
Butler, Warren L., Ph.D.	Professor	Biology
Casalduero, Joaquin, Ph.D.	Professor Emeritus	Literature
Catalan, Diego (M-P), Ph.D.	Professor	Literature
Cespedes, Guillermo, Ph.D.	Professor Emeritus	History
Chen, Joseph Cheng-Yih, Ph.D.	Professor	Physics
Chodorow, Stanley A., Ph.D.	Associate Professor	History
Clark, Leigh B., Ph.D.	Associate Professor	Chemistry
Conlisk, John, Ph.D.	Professor	Economics
Craig, Harmon, Ph.D.	Professor	SIO
Crowne, David K., Ph.D.	Associate Professor	Literature
Dijkstra, Abraham J., Ph.D.	Associate Professor	Literature
Doolittle, Russell F., Ph.D.	Professor	Chemistry
Doppelt, Gerald D., Ph.D.	Assistant Professor	Philosophy
Dunseath, Thomas K., Ph.D.	Associate Professor	Literature

Edelman, Robert S., M.A.	Assistant Professor	History
Elliott, Robert C., Ph.D.	Professor	Literature
Ellis, Albert T., Ph.D.	Professor	AMES
Emmerson, Richard, Ph.D.,	Assistant Professor	Economics
Fahey, Robert C., Ph.D.	Associate Professor	Chemistry
Fairchilds, Cissie C., Ph.D.	Assistant Professor	History
Feher, George, Ph.D.	Professor	Physics
Firtel, Richard A., Ph.D.	Assistant Professor	Biology
FitzGerald, Carl H., Ph.D.	Associate Professor	Mathematics
Frankel, Theodore T., Ph.D.	Professor	Mathematics
Frazier, Gerald A., Ph.D.	Assistant Professor	AMES
Fredkin, Donald R., Ph.D.	Associate Professor	Physics
Freedman, Michael H., Ph.D.,	Assistant Professor	Mathematics
Friedkin, Morris E., Ph.D.	Professor, Provost of Revelle College	Biology
Friedman, Hannah, Ph.D.	Assistant Professor	Biology
Fung, Yuan-cheng, Ph.D.	Professor	AMES
Gibson, Carl H., Ph.D.	Associate Professor	AMES/SIO
Goodkind, John M., Ph.D.	Professor	Physics
Goodman, Murray, Ph.D.	Professor	Chemistry
Gould, Robert J., Ph.D.	Associate Professor	Physics
Green, Melvin H., Ph.D.	Associate Professor	Biology
Grobstein, Clifford, Ph.D.	Professor	Biology
Halkin, Hubert, Ph.D.	Professor	Mathematics
Hamburger, Robert N., M.D.	Professor	Pediatrics
Harrison, Newton A., M.F.A.	Professor	Visual Arts
Hartline, Daniel K., Ph.D.	Assistant Professor	Biology
Hawkins, James W., Ph.D.	Associate Professor	SIO
Hayashi, Masaki, Ph.D.	Professor	Biology
Hegemier, Gilbert A., Ph.D.	Professor	AMES
Heller, Walter P., Ph.D.	Associate Professor	Economics
Hooper, John W., Ph.D.	Professor	Economics
Hughes, H. Stuart	Professor	History
Intaglietta, Marcos, Ph.D.	Associate Professor	AMES
Jackson, Gabriel, Ph.D.	Professor	History
Kaplan, Nathan O., Ph.D.	Professor	Chemistry
Kearns, David R.	Professor	Chemistry
Kohn, Walter, Ph.D.	Professor	Physics
Kraut, Joseph, Ph.D.	Professor	Chemistry
Kroll, Norman M., Ph.D.	Professor	Physics
Langacker, Ronald W., Ph.D.	Professor	Linguistics
Lee, Edward N., Ph.D.	Professor	Philosophy
Lettau, Reinhard, Ph.D.	Professor	Literature
Libby, Paul A., Ph.D.	Professor	AMES
Liebermann, Leonard N., Ph.D.	Professor	Physics

Lin, Shao-Chi, Ph.D.	Professor	AMES
Linck, Robert G., Ph.D.	Associate Professor	Chemistry
Livingston, Robert B., M.D.	Professor	Neurosciences
Lonidier, Fred, M.F.A.,	Assistant Professor	Visual Arts
Loomis, William F., Jr., Ph.D.	Professor	Physics
Lovberg, Ralph H., Ph.D.	Professor	Physics
Luft, David S., Ph.D.	Assistant Professor	History
Lyon, James K., Ph.D.	Professor	Literature
Ma, Shang-keng, Ph.D.	Associate Professor	Physics
Macdougall, J. Douglas, Ph.D.	Assistant Professor	SIO
Malmberg, John H., Ph.D.	Professor	Physics
Manaster, Alfred B., Ph.D.	Associate Professor	Mathematics
Mandler, Jean M., Ph.D.	Associate Professor	Psychology
Mann, Judith K., Ph.D.	Assistant Professor	Economics
Maple, M. Brian, Ph.D.	Acting Associate Professor	Physics
Marcuse, Herbert, Ph.D.	Honorar Professor	Philosophy
Mark, Thomas, Ph.D.	Assistant Professor	Philosophy
Marti, Kurt, Ph.D.	Associate Professor	Chemistry
Masek, George E., Ph.D.	Professor	Physics
Matthias, Bernd T., Ph.D.	Professor	Physics
Mayer, Joseph E., Ph.D.	Professor Emeritus	Chemistry
McIlwain, Carl E., Ph.D.	Professor	Physics
Miles, John W., Ph.D.	Professor	AMES
Miller, David R., Ph.D.	Associate Professor	AMES
Miller, Stanley L., Ph.D.	Professor	Chemistry
Montrose, Louis A., Ph.D.	Assistant Professor	Literature
Moore, Stanley W., Ph.D.	Professor Emeritus	Philosophy
Mosshammer, Alden A., Ph.D.	Assistant Professor	History
Newmark, Leonard D., Ph.D.	Professor	Linguistics
Nguyen-Huu, Xuong, Ph.D.	Associate Professor	Physics/Biology
Norman, Donald A., Ph.D.	Professor	Psychology
Olafson, Frederick A., Ph.D.	Professor	Philosophy
Olfe, Daniel B., Ph.D.	Professor	AMES
Omvedt, Gail, Ph.D.	Assistant Professor	Sociology
Orr, Daniel, Ph.D.	Professor	Economics
Penner, Stanford S., Ph.D.	Professor	AMES
Perrin, Charles L., Ph.D.	Associate Professor	Chemistry
Peterson, Laurence E., Ph.D.	Professor	Physics
Pfaelzer, Mary J., Ph.D.	Assistant Professor	Literature
Phillips, David P., Ph.D.	Acting Associate Professor	Sociology
Piccioni, Oreste, Ph.D.	Professor	Physics
Pippin, Robert B.	Assistant Professor	Philosophy

Ramanathan, R., Ph.D.	Associate Professor	Economics
Ramm, Wolfhard, Ph.D.	Assistant Professor	Economics
Rand, Sinai, Ph.D.	Associate Professor	AMES
Randel, Fred V., Ph.D.	Assistant Professor	Literature
Reissner, M. Erich, Ph.D.	Professor	AMES/ Mathematics
Revelle, Roger R., Ph.D.	Professor	Political Science
Rice, John A., Ph.D.	Assistant Professor	Mathematics
Roberson, Robert E., Ph.D.	Professor	AMES
Rohrl, Helmut, Ph.D.	Professor	Mathematics
Rumelhart, David E., Ph.D.	Associate Professor	Psychology
Russell, R. Robert, Ph.D.	Professor	Economics
Russo, J. Edward, Ph.D.	Assistant Professor	Psychology
Saltman, Paul D., Ph.D.	Professor	Biology
Scales, Ronald D., Ph.D.	Assistant Professor	Philosophy
Schane, Sanford A., Ph.D.	Professor	Linguistics
Scheffler, Immo E., Ph.D.	Assistant Professor	Biology
Schmalensee, Richard L., Ph.D.	Associate Professor	Economics
Schrauzer, Gerhard N., Ph.D.	Professor	Chemistry
Shapiro, Barbara, Ph.D.	Associate Professor	History
Shenk, Norman, Ph.D.	Associate Professor	Mathematics
Shuler, Kurt, E., Ph.D.	Professor	Chemistry
Singer, S. Jonathan, Ph.D.	Professor	Biology
Small, Lance W., Ph.D.	Professor	Mathematics
Smith, Donald R., Ph.D.	Associate Professor	Mathematics
Sommers, Joseph, Ph.D.	Professor	Literature
Sorenson, Harold W., Ph.D.	Associate Professor	AMES
Steier, Saul, Ph.D.,	Assistant Professor	Literature
Stein, Wayne A., Ph.D.	Professor	Physics
Steinmetz, Philip	Assistant Professor	Visual Arts
Stroll, Avrum, Ph.D.	Professor	Philosophy
Suess, Hans E., Ph.D.	Professor	Chemistry
Suhl, Harry, Ph.D.	Professor	Physics
Swanson, Robert A., Ph.D.	Professor	Physics
Terras, Audrey A., Ph.D.	Assistant Professor	Mathematics
Thompson, William B., Ph.D.	Professor	Physics
Traylor, Teddy G., Ph.D.	Professor	Chemistry
Tuzin, Donald F., M.A.	Assistant Professor	Anthropology
Urey, Harold C., Ph.D.	University Professor Emeritus	Chemistry
Van Atta, Charles, W., Ph.D.	Professor	AMES/SIO
Vendler, Zeno, Ph.D.	Professor	Philosophy
Vernon, Wayne, Ph.D.	Associate Professor	Physics
Vold, Robert L., Ph.D.	Associate Professor	Chemistry

Walk, Cynthia, Ph.D.	Assistant Professor	Literature
Weare, John H., Ph.D.	Associate Professor	Chemistry
Wheatley, John C., Ph.D.	Professor	Physics
Wheeler, John C., Ph.D.	Associate Professor	Chemistry
Wierschin, Martin W., Ph.D.	Professor	Literature
Williams, Forman A., Ph.D.	Professor	AMES
Williamson, Stanely G., Ph.D.	Professor	Mathematics
Wilson, Kent R., Ph.D.	Associate Professor	Chemistry
Wong, David Y., Ph.D.	Professor	Physics
Wright, Andrew, Ph.D.	Professor	Literature
Zimm, Bruno H., Ph.D.	Professor	Chemistry
Zweifach, Benjamin W., Ph.D.	Professor	AMES

* * *

Fleming, Raymond R., B.A.	Lecturer	Literature
Johnson, Kay, M.S.	Lecturer	Political Science
Strum, Shirley, M.A.	Acting Assistant Professor	Anthropology
Winters, Barbara, M.A.	Acting Assistant Professor	Philosophy

Muir College

In the fall of 1967, John Muir College, second of the colleges planned for UC San Diego, admitted its first students. The college was named for John Muir, the California naturalist, geologist, and writer. Born in Dunbar, Scotland, in 1838, Muir was educated in Scotland and at the University of Wisconsin. He explored the Sierra Nevada Mountains, Alaska, and the Arctic regions and worked for many years in the cause of conservation and the establishment of national parks and forests. His books are still widely read for their vivid and engaging descriptions of the land and the people of early California. Muir made his home in Martinez, California. He was awarded an honorary degree by the University of California in 1913. He died in 1914.

The Character of the College John Muir College seeks to be an institution of a special kind. First of all, it intends to be an academic community: its members are engaged in inquiry and the sharing of ideas. At the same time a majority of its members are young adults who need to define themselves in relation to the physical world and the society in which they live. Self discovery, when undertaken in the midst of academic pursuits and opportunities, can be unusually profound and meaningful, especially if learning is truly joined with living, if knowledge gained in the

classroom, the library and the laboratory can in some real way be applied to the experience of the Muir student and the problems of contemporary society.

These are grand intentions. Simply announcing them does not make them so. The connection between learning and living, for example, is not always easy to maintain. Work is needed and students are expected to share in it. They help to conceive and design new courses. They serve on the John Muir College Council and the Curriculum Review and Development Board; these are concerned with the general governance of the College and its academic program. They act as house advisers in the residence halls and as discussion leaders in the Contemporary Issues program. They help to formulate and administer the rules under which they live. They share in the decisions affecting allocations of resources. They are active members of the community.

Appropriately, therefore, the general-education requirements and the curriculum as a whole encourage active rather than passive learning. Active learning necessitates self-education and opportunities for independent study. The major programs provide many forms of this. Those students who choose not to pursue a major will be expected to complete projects that demand much independent investigation.

The Graduation Requirements To receive a bachelor's degree from John Muir College a student must:

1. meet the general University requirement in Subject A. (See "Undergraduate Admissions, Policies and Procedures");
2. meet the Muir College requirement in writing proficiency. This requirement asks that the student demonstrate an ability to write English according to standards appropriate for all college work;
3. satisfy the Univerisity of California requirement in American History and Institutions. (See "Undergraduate Admissions, Policies and Procedures");
4. pass 45 four-unit academic courses or their equivalent. Eighteen of the 45 courses must be upper-division level. The residency requirement is that nine of the last 11 courses passed must be taken as a student in the College;
5. fulfill the general-education requirements described below;
6. show some form of concentration and focus of study. Ordinarily this is accomplished by completing a departmental major. Students in the College may attempt any major upon completion of the prerequisites. A student who does not choose to meet this requirement by means of a departmental or interdisciplinary major must complete a special project. As the name implies, this is a specialized form of concentration. It normally consists of a

combination of regular course work and independent study. Each such project must be approved by the provost. (See the paragraph "Major Programs and Special Projects", below.)

Honors in Muir College The College will award Honors with the Bachelor's degree to students with an exceptional grade-point average in their major and over-all course work.

To be eligible for College Honors, a student must have completed at least 80.0 quarter units in the University of California, San Diego and have the recommendation of the major department.

The honors designations are Honors, High Honors, and Highest Honors. Honors earned will be recorded on each student's diploma.

The General Education Requirements The Muir College general-education program is described as follows:

each student is required to complete one-year sequences from four of six categories: two from one side (fine arts, humanities, language) and two from the other (mathematical science, natural science, social science).

The specific courses in the six categories are approved by the Muir College Curriculum Review and Development Board. Each year this board, consisting of faculty and students, determines which of the course offerings of the various departments may be used in the general education program. The basic criterion is that a year sequence must be a unified and coherent treatment of a single subject or topic. The following points should be noted.

1. Only complete sequences may be applied to the general-education requirement. Ordinarily an entire sequence is taken in one academic year.

2. More advanced courses may, *with the consent of the provost,* be substituted for those listed.

3. The same sequence may be used both to satisfy part of the general-education program and to meet a departmental requirement or prerequisite.

4. Units obtained from Advanced Placement and similar examinations may not be used to satisfy the general-education requirements.

5. Students should request from the Office of the Provost an up-to-date list of general-education requirements before making their final selection of courses.

6. Courses taken to satisfy the general-education requirement may, in general, be taken for a letter grade or pass/not pass.

7. Muir undergraduates are reminded that students must be in good standing (2.0 G.P.A.) to undertake courses on a P/NP basis and that the average number of P/NP courses is one per quarter.

This general-education program was established by the faculty of the College to guide the students toward a broad and liberal education while allowing them substantial choice in the development of that education. It should be understood that this freedom carries with it the responsibility on the part of students for careful planning. Almost all of the major programs at UC San Diego have a pattern of prerequisites, some of them quite extensive. Students who do not plan well could find, in their junior year, that they have access to few majors without doing additional lower-division work. With careful planning, they may have access to a wide range of majors. Students of the college are encouraged to consult regularly with the academic counselors in the Office of the Provost as well as with members of the faculty concerning the selection of appropriate courses. Some examples of the choice which must be made are given in the paragraph "Major and Special Project".

For students who transfer to Muir College from another institution, the general-education requirements will be interpreted in this way: two semester courses or three quarter courses in a subject represented on the approved list will normally be accepted as completing one of the four required sequences. After the Office of Admissons evaluates a student's transcript, the Office of the Provost makes an evaluation of prior work for each student at the time of his or her first enrollment.

Major Programs and Special Projects Students in Muir College may attempt any major for which they have completed prerequisite courses. It was remarked above that many majors have precise and often extensive lower-division prerequisites. This means that students should plan their lower-division work carefully. Since many students change their plans concerning a major, it is often useful to plan with regard to general areas of interest rather than a specific major. Each academic department has, in its section of this catalog, a paragraph entitled "The Major Program." Students are encouraged to read these carefully, for they indicate both the extent of the prerequisites and the nature of the upper-division program. The following points are useful to keep in mind:

1. A substantial command of at least one modern foreign language is required by several departments (e.g., Linguistics, Literature);

2. Specific science courses are required by many departments. For example, Mathematics and APIS require Science 4A, 4B, 4C; Biology requires Science 3A, 3B, 3C, and 4A, 4B, 4C;

3. The physical and life sciences, applied sciences (APIS and AMES), together with certain of the social-sciences (economics and psychology), require at least one year of calculus.

The Muir Special Project major is intended for students who have specific talents and interests which are not accommodated by one of the departmental majors. A project normally includes both regular course work and independent study as well as a recommended back-up major; taken together, this must represent the same amount of work as an ordinary major. The project may be one of two kinds: creative work of some sort (e.g., a book of poetry, a collection of musical compositions) or a detailed program of study and research in a particular area. The latter results in a long paper representing a synthesis of the knowledge and skill acquired. In either case, a regular member of the faculty must serve as adviser to a student doing the project. It should be understood that the demands of a special project are great and a project is not appropriate for a student who simply does not want the discipline of a normal major. Further information may be obtained from the Office of the Provost.

The Office of the Dean of John Muir College performs many different general services. Its staff consists of several full time professionals, a number of student interns, and a close working relation with Page One — a student-staffed peer center. The staff is accustomed to dealing with problems concerning prospective careers, procedures for applying to graduate or professionals schools, decisions about withdrawing from school, legal problems, falling grades, getting involved in student government and other activities, planning and carrying out social, cultural and recreational programs for faculty, students and staff, assisting you in getting a thorough hearing if you feel that a faculty or staff member has treated you unfairly, and many other problems or concerns. If you are uncertain about where to go to get information or help with your problems or concerns, the Dean's Office staff will be able to help you.

The Office of the Dean is in Room 2125 of the Humanities and Social Sciences Building on the Muir campus, and Page One is located in the Lower Muir Commons.

The Faculty of Muir College

NAME	TITLE	DEPARTMENT
Alazraki, Jaime, Ph.D.	Professor	Literature
Alfvén, Hannes, Ph.D.	Professor	APIS
Anderson, Donald W., Ph.D.	Professor	Mathematics
Anderson, Norman, Ph.D.	Professor	Psychology
Anderson, Victor, Ph.D.	Professor	APIS
Antin, David, M.A.	Professor	Visual Arts
Antin, Eleanor, B.A.	Assistant Professor	Visual Arts
Arveson, William, Ph.D.	Professor,	Math
Axford, W. Ian, Ph.D.	Professor	APIS

Bailey, Frederick G., Ph.D.	Professor	Anthropology
Banks, Peter M., Ph.D.	Professor	APIS
Barnouw, Jeffrey, Ph.D.	Assistant Professor	Literature
Barrera, Mario, Ph.D.	Assistant Professor	Pol. Science
Bender, Edward, Ph.D.	Associate Professor	Mathematics
Berger, Bennett, Ph.D.	Professor	Sociology
Berman, Ronald S., Ph.D.	Professor	Literature
Booker, Henry G., Ph.D.	Professor	APIS
Bowles, Kenneth L., Ph.D.	Professor	APIS
Boynton, Robert, Ph.D.	Professor	Psychology
Bradbury, Jack, Ph.D.	Assistant Professor	APIS
Brody, Stuart, Ph.D.	Associate Professor	Biology
Campbell, Laughlin A., Ph.D.	Assistant Professor	Mathematics
Chen, Mathew, Ph.D.	Assistant Professor	Linguistics
Chrispeels, Maarten J., Ph.D.	Associate Professor	Biology
Christmas, Eric C.	Professor	Drama
Cohen, Alain J.J., Ph.D.	Associate Professor	Literature
Cohen, Harold	Professor	Visual Arts
Coles, William A., Ph.D.	Associate Professor	APIS
Collins, Randall, Ph.D.	Associate Professor	Sociology
Cooper, Lynn, Ph.D.	Assistant Professor	Psychology
Davis, Murray S., Ph.D.	Acting Associate Professor	Sociology
Deutsch, J. Anthony, Ph.D.	Professor	Psychology
Douglas, Jack D., Ph.D.	Professor	Sociology
Druian, Rafael	Professor	Music
Dryden, Daniel, M.F.A.	Assistant Professor	Drama
duBois, Page A.	Assistant Professor	Literature
Ebbesen, Ebbe B., Ph.D.	Associate Professor	Psychology
Erickson, Robert, M.A.	Professor	Music
Evans, John W., M.D., Ph.D.	Professor	Mathematics
Fantino, Edmund J., Ph.D.	Professor	Psychology
Farber, Manny	Professor	Visual Arts
Fejer, Jules A., D.Sc.	Professor	APIS
Fillmore, Jay P., Ph.D.	Associate Professor	Mathematics
Francois, Jean-Charles	Assistant Professor	Music
Fussell, Edwin S., Ph.D.	Professor	Literature
Gaffney, Floyd, Ph.D.	Professor	Drama
Gilpin, Michael, Ph.D.	Assistant Professor	Biology
Gragg, William B., Ph.D.	Professor	Mathematics
Graña, Cesar, Ph.D.	Professor	Sociology
Guillén, Claudio, Ph.D.	Professor	Literature
Gusfield, Joseph R., Ph.D.	Professor	Sociology

Halpern, Francis R., Ph.D.	Professor	Physics
Helstrom, Carl W., Ph.D.	Professor	APIS
Howden, William, Ph.D.	Assistant Professor	APIS
Howell, Stephen H., Ph. D.	Assistant Professor	Biology
Humble, Keith, Dip. in Music	Professor	Music
James, Luther,	Acting Associate Professor	Drama
Jameson, Fredric R., Ph.D.	Professor	Literature
Johnson, Bruce, M.A.	Assistant Professor	Sociology
Jordan, David, Ph.D.	Associate Professor	Anthropology
Jules-Rosette, Bennetta, Ph.D.	Assistant Professor	Sociology
Katsell, Jerome H., Ph.D.	Assistant Professor	Literature
Kirkpatrick, Susan, Ph.D.	Assistant Professor	Literature
Klima, Edward S., Ph.D.	Professor	Linguistics
Konecni, Vladimir, Ph.D.	Assistant Professor	Psychology
Korevaar, Jacob, Ph.D.	Professor	Mathematics
Kuroda, Sige-Yuki, Ph.D.	Professor	Linguistics
Large, John, Ph.D.	Assistant Professor	Music
Ledden, Patrick J., Ph.D.	Lecturer	Mathematics
Lee, Sing, Ph.D.	Associate Professor	APIS
Levy, Robert I., Ph.D.	Professor	Anthropology
Lin, James P., Ph.D.	Assistant Professor	Mathematics
Luo, Huey-Lin, Ph.D.	Associate Professor	APIS
MacLeod, Donald I.A.	Assistant Professor	Psychology
Mandler, George, Ph.D.	Professor	Psychology
Marin, Louis, Agrégation	Professor	Literature
Masry, Elias, Ph.D.	Associate Professor	APIS
McClelland, James, Ph.D.	Assistant Professor	Psychology
Meeker, Michael E., Ph.D.	Acting Associate Professor	Anthropology
Metzger,Thomas A., Ph.D.	Associate Professor	History
Mills, Stanley E., Ph.D.	Professor	Biology
Mitchell, Allan, Ph.D.	Professor	History
Monteon, Michael P., Ph.D.	Assistant Professor	History
Munsinger, Harry I., Ph.D.	Associate Professor	Psychology
Obeyesekere, Gananath, Ph.D.	Professor	Anthropology
Oesterreicher, Hans K., Ph.D.	Associate Professor	Chemistry
Ogdon, Wilbur L., Ph.D.	Professor	Music
Oliveros, Pauline, A.B.	Associate Professor	Music
Orloff, Marshall J., M.D.	Professor	Surgery
Parrish, Michael E., Ph.D.	Associate Professor	History
Pickowicz, Paul G., Ph.D.	Assistant Professor	History
Price, Paul A., Ph.D.	Associate Professor	Biology

Ramos, Reyes, Ph.D.	Assistant Professor	Sociology
Remmel, Jeffrey B., Ph.D.	Assistant Professor	Mathematics
Reynolds, George S., Ph.D.	Professor	Psychology
Reynolds, Roger, M.M.	Professor	Music
Rickett, Barnaby, Ph.D.	Associate Professor	APIS
Ritchie, Robert C., Ph.D.	Assistant Professor	History
Rodin, Burton, Ph.D.	Professor	Mathematics
Rosenblatt, Murray, Ph.D.	Professor	Mathematics
Ross, Lola R., Ph.D.	Associate Professor	Community Medicine
	Director	Interdisciplinary Sequences
Rotenberg, Manuel, Ph.D.	Professor	APIS
Roth, Moira, Ph.D.	Assistant Professor	Visual Arts
Ruiz, Ramon E., Ph.D.	Professor	History
Rumsey, Victor H., D.Eng.	Professor	APIS
Saier, Milton, Ph.D.	Assistant Professor	Biology
Sato, Gordon H., Ph.D.	Professor	Biology
Saville, Jonathan, Ph.D.	Associate Professor	Literature
Savitch, Walter J., Ph.D.	Associate Professor	APIS
Scheiber, Harry N., Ph.D.	Professor	History
Schwartz, Theodore, Ph.D.	Professor	Anthropology
Sharpe, Michael J., Ph.D.	Associate Professor	Mathematics
Silber, John J., Ph.D.	Professor	Music
Smith, Douglas W., Ph.D.	Assistant Professor	Biology
Soule, Michael E., Ph.D.	Associate Professor	Biology
Spiro, Melford E., Ph.D.	Professor	Anthropology
Spitzer, Nicholas, Ph.D.	Assistant Professor	Biology
Stewart, John L., Ph.D.	Professor, Provost of the College	Literature
Strasen, Barbara, M.A.,	Assistant Professor	Visual Arts
Swartz, Marc J., Ph.D.	Professor	Anthropology
Teilhet, Jehanne H., Ph.D.	Lecturer	Visual Arts
Todd, Michael C., M.A.	Assistant Professor	Visual Arts
Tschirgi, Robert, M.D., Ph.D.	Professor	Neurosciences
Turetzky, Bertram J., M.A.	Associate Professor	Music
Wagner, Arthur, Ph.D.	Professor	Drama
Warschawski, Stefan E. Ph.D.	Professor Emeritus	Mathematics
Wavrik, John J., Ph.D.	Associate Professor	Mathematics
Wayne, Don, Ph.D.	Assistant Professor	Literature
Wesling, Donald T., Ph.D.	Associate Professor	Literature
Williams, Ben A., Ph.D.	Assistant Professor	Psychology
Wong, Yen Lu, M.A.	Assistant Professor	Drama
Yip, Wai-lim, Ph.D.	Associate Professor	Literature

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Honorary Fellows of the College

Hannes Alfvén, *Scientist and Nobel Laureate*
† Georg von Bekesy, *Psychologist and Nobel Laureate*
Ernst Krenek, *Composer*
† Ernest Mandeville, *Philanthropist*
William McGill, *Psychologist and Educator*
Jonas Salk, *Scientist*
Claude E. Shannon, *Mathematician*
† Earl Warren, *Jurist and Statesman*
Robert Penn Warren, *Poet and Novelist*

† *Deceased*

Third College

The Third College enrolled its first students in the fall of 1970. It is a liberal arts and sciences college with academic programs in the humanities, social sciences, natural sciences, and mathematics. It has a distinctive academic focus on understanding the factors which determine societal change and development and the alleviation of contemporary social problems. The Third College is committed to the scholarly investigation and understanding of the factors which determine the quality of life in urban and rural settings in Western and non-Western countries, whether these factors be technological, political, economic, or cultural.

The programs of the College are also guided by the belief that education cannot be divorced from the social imperatives of our time. The Third College has, therefore, encouraged the development of academic programs both for those who wish to pursue pure scholarship solely for the sake of knowledge and for those who wish to prepare for professional careers and employment upon graduation. In terms of the latter, Third College offers programs on the law and teacher education, and has pioneered field-placement and internship programs to provide students with opportunities to apply their knowledge to real-world situations. In addition, Third College sponsors a number of activities which direct the intellectual resources of the University to matters of public importance and interest. Probably the best known of these activites are the lecture series and symposia sponsored by Third College and its five course groups and programs: Communications, Third World Studies, Urban and Rural Studies, Science and Technology, and the Third College Composition Program.

It is fundamental to the philosophy of Third College that students, faculty and staff comprise an intellectual community joined in the task of mutual learning. This philosophy finds expression in a collegiate advising and counseling system designed to provide students with full benefits from the rich and diversified academic programs at UC San Diego.

To insure the best possible academic programs and courses in all disciplines and their proper relationship to Third College and its students, Third College has organized its faculty (and the academic majors and programs of UCSD) into five course groups and programs: Science and Technology, covering the natural sciences and mathematics; Urban and Rural Studies, covering the social sciences with an urban focus; Third World Studies, covering the humanities and social sciences with an emphasis upon developing countries and minorities within the boundaries of the United States; Communications, covering the social sciences with a focus upon the analysis of small group and mass communications; and the Third College Composition Program.

These five course groups and programs are the primary sources of educational innovation and development in Third College. They have had an outstanding record of achievement.

The Graduation Requirements To receive a bachelor's degree from Third College, a student must:

1. satisfy the general University Requirement in Subject A, English composition;

2. satisfy the general University requirement in American History and Institutions;

3. complete and pass a minimum of forty-five four-unit academic courses with at least a "C" average. Eighteen of the forty-five courses must be upper-division level; At least three of the eighteen upper-division courses must be outside of the major discipline.

4. fulfill the core courses (general education requirements) by satisfactorily completing either Program A or Program B (see general education requirements);

5. complete a departmental or interdisciplinary major; and

6. satisfy the college residency requirement that nine of the last eleven courses must be taken as a Third College student.

Honors in Third College The College will award Provost's Honors to students who complete four consecutive quarters of at least twelve units with a grade-point average of 3.5 or better.

College Honors will be awarded with the bachelor's degee to students who have completed at least eighty quarter units in the University of California and have the recommendation of their major department and the provost. To receive such honors students must have 3.25 or above grade-point averages in both their majors and overall academic work. The levels are designated as cum Laude, Magna cum Laude, and Summa cum Laude. Honors earned will be recorded on each student's diploma.

The General Education Requirements The general education course requirements of Third College are designed to introduce students to the academic focus of Third College as well as to provide a foundation of knowledge from which Third College students may pursue any of the many departmental and interdisciplinary majors offered at UC San Diego.

Students must complete one of the following programs:

Program A	**Program B**
1 quarter composition	1 quarter composition
2 quarters mathematics	2 quarters mathematics
3 quarters natural science covering biology, chemistry and physics	3 quarters natural science covering biology, chemistry and physics
3 quarters Third World Studies	3-quarter courses consisting of one course each of communications
3 quarters Urban and Rural Studies	Third World Studies Urban and Rural Studies
2 quarters communications	3-quarter sequence in any social science or humanities and arts discipline (including foreign language but not studio courses)

With either Program A or Program B, a student may choose to declare and complete an optional minor consisting of at least six interrelated courses (usually in a single discipline) of which a minimum of three courses must be upper-division courses.

Language Third College does not require proficiency in a foreign language as a condition for graduation. However, a given major may require one or more foreign languages. Students should ascertain which foreign language(s), if any, are required for their chosen majors by consulting major programs under the respective departments of instruction. (see "Courses, Curricula, and Programs of Instruction", in this catalog.)

Transfer Students Transfer students accepted by Third College will, in general, be held to the lower-division general education requirements and to the lower-division prerequisites for a major. The general education requirements, however, will be interpreted rigorously only for those subjects that are directly related to the student's proposed major. The provost, in consultation with appropriate departments, will evaluate the credentials of each transfer student on an individual basis.

In order to transfer to Third College from another college or school within the University of California, a student will be required to have a C (2.0) average or better on all work attempted at any University of California campus. (See "Admission to the University: Advanced Standing".)

The Majors Third College students may major in any of the departmental or interdisciplinary majors offered at UC San Diego. For further information and specific details on majors, students should refer to "Courses, Curricula, and Programs of Instruction".

The Faculty of Third College

Name	Title	Department
Alexander, Edward, Ph.D.	Assistant Professor	Chemistry
Anderson, Alonzo B., Ph.D.	Assistant Professor	Psychology
Arneson, Richard J., Ph.D.	Assistant Professor	Philosophy
Bellman, Beryl L., Ph.D.	Assistant Professor	Sociology
Blanco, Carlos, Ph.D.	Professor	Literature
Blumberg, Rae Lesser, Ph.D.	Acting Associate Professor	Sociology
Brown, Willie C., Ph.D.	Assistant Professor	Biology
Engle, Robert E., Ph.D.	Associate Professor	Economics
Evans, Ronald J., Ph.D.	Assistant Professor	Mathematics
Fortes, P. A. George, M.D., Ph.D.	Assistant Professor	Biology
Frazer, William R., Ph.D.	Professor	Physics
Gough, David A., Ph.D.	Assistant Professor	AMES
Haff, Leonard R., Ph.D.	Assistant Professor	Mathematics
Harper, Elvin, Ph.D.	Associate Professor	Chemistry
Hecht, Chandra, Ph.D.	Assistant Professor	Sociology
Heifetz, Robert J., Ph.D.	Associate Professor	Urban and Rural Studies
Helinski, Donald R., Ph.D.	Professor	Biology
Helton, John, Ph.D.	Associate Professor	Mathematics
Hu, Te C., Ph.D.	Professor	APIS
Huerta, Jorge A., Ph.D.	Assistant Professor	Drama
Justus, Joyce E., Ph.D.	Assistant Professor	Anthropology
Kristan, William B., Jr., Ph.D.	Assistant Professor	Biology
Laitin, David D., Ph.D.	Assistant Professor	Political Science
Leong, John, Ph.D.	Assistant Professor	Chemistry
Lindenberg, Katja, Ph.D.	Assistant Professor	Chemistry

Luco, Juan, Ph.D.	Assistant Professor	AMES
Lumpkin, Oscar, Ph.D.	Assistant Professor	Physics
Lytle, Cecil, B.S.	Assistant Professor	Music
McMorris, Trevor, Ph.D.	Associate Professor	Chemistry
Mehan, Hugh, Ph.D.	Assistant Professor	Sociology
Nachbar, William, Ph.D.	Professor	AMES
Newport, Elissa L., Ph.D.	Assistant Professor	Psychology
Ngubo, Anthony, Ph.D.	Assistant Professor	Sociology
Ogawa, Roy, Ph.D.	Assistant Professor	Mathematics
Penn, Nolan E., Ph.D.	Professor	Psychiatry
Pinon, Ramon, Jr., Ph.D.	Assistant Professor	Biology
Popkin, Samuel L., Ph.D.	Acting Associate Professor	Political Science
Real, Michael R., Ph.D.	Assistant Professor	Communications
Reynolds, Edward, Ph.D.	Associate Professor	History
Romo, Ricardo, Ph.D.	Assistant Professor	History
Sanchez, Rosaura, Ph.D.	Assistant Professor	Literature
Schiller, Herbert I., Ph.D.	Professor	Communications
Schultz, Sheldon, Ph.D.	Professor	Physics
Shapiro, Martin, Ph.D.	Professor	Political Science
Simon, Melvin I., Ph.D.	Associate Professor	Biology
Solis, Faustina, M.S.W.	Associate Professor	Community Medicine
Stavrianos, Leften S., Ph.D.	Adjunct Professor	History
Stern, Herbert, Ph.D.	Professor	Biology
Thiess, Frank B., Ph.D.	Lecturer with Employment Security	Mathematics
Thomas, Charles W., II, Ph.D.	Professor	Urban and Rural Studies
Tolbert, Emory, Ph.D.	Assistant Professor	History
T'sou, Benjamin K., Ph.D.	Assistant Professor	Linguistics
Waterhouse, John, Ph.D.	Assistant Professor	Literature
Watson, Joseph W., Ph.D.	Associate Professor, Provost of the College	Chemistry
Williams, Sherley, Ph.D.	Associate Professor	Literature
Wiseman, Jacqueline P., Ph.D.	Professor	Sociology
Wulbert, Daniel E., Ph.D.	Associate Professor	Mathematics
Wynter, Sylvia, M.A.	Professor	Literature
Yguerabide, Juan, Ph.D.	Associate Professor	Biology

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Cunningham, J. Barry, M.A.	Associate Supervisor	Physical Education
Drake, Sandra E.,M.A.	Acting Assistant Professor	Literature
Fenner-Lopez, Claudio, M.A.	Lecturer	Visual Arts
Galarza, Ernesto, Ph.D.	Honorary Fellow of Third College	(Novelist and Educator)
Gorin, Jean-Pierre D., Ph.D.	Lecturer	Visual Arts
Isaman, David L., S.M.	Acting Assistant Professor	APIS
Lawrence-Wallace, Cynthia, B.S.	Supervisor of Teacher Education	Teacher Ed. Program
Luna, George W., Ph.D.	Acting Assistant Professor	Mathematics
Marshall, Margaret C., M.F.A.	Assistant Supervisor	Physical Education
Moss, Robert C., Jr., B.A.	Assistant Supervisor	Physical Education
Ngubo, Olive P., M.S.W.	Supervisor of Field Placement	Urban & Rural Studies
Obeyesekere, Ranjini, Ph.D.	Lecturer	Literature
Rodriguez, Juan, M.A.	Acting Assistant Professor	Literature
Shore, Herbert B., Ph.D.	Lecturer	Physics
Siembieda, William J., M.C.P.	Lecturer	Urban and Rural Studies
Somero, Meredith G., Ph.D.	Lecturer	Biology
Souviney, Randall J., M.A.	Supervisor of Teacher Education	Teacher Education
Sullivan, Daniel M.	Lecturer	Visual Arts
Waisman, Carlos, M.A.	Acting Assistant Professor	Sociology

Fourth College

The Character of the College Fourth College emphasizes academic preparations that will be applicable to a career, professional school, or graduate school, including but not limited to, health sciences, law, the visual and performing arts, management science, and several fields of engineering. Its faculty represents all disciplines offered on the campus, and its students pursue majors in all departments. Flexible graduation requirements will enable a student either to develop a broad program of study which covers many subjects or to focus in a particular area. The responsibility which this freedom imposes on the student cannot be taken lightly; the College is interested in attracting students who welcome such a challenge.

In addition to recognizing that its fundamental obligation is to provide undergraduate education of the highest quality, the College is committed to assisting its students in planning for their post-baccalaureate careers. This assistance involves, among other things, the systematic integration of academic advising and career planning. Additionally, the College's field-placement program provides students with opportunities for direct experience in prospective professions during their undergraduate years.

The Graduation Requirements

To receive a Bachelor of Arts degree from Fourth College a student must:

1. satisfy the University of California requirements in American History and Institutions and in Subject A (See "Undergraduate Admissions, Policies, and Procedures");
2. fulfill the general-education requirements described below;
3. attain a C average (2.0) or better in all work attempted at the University of California;
4. satisfy the College residency requirement that nine of the last 11 courses passed must be taken as a student in the College.
5. pass 45 four-unit academic courses or their equivalent (180 units);

To receive a Bachelor of Science degree from Fourth College a student must comply with requirements 1 through 4 above. Additionally, the total number of courses must be 48 (192 units) of which 15 must be upper division courses in the major. Presently the Bachelor of Science degree is offered in certain engineering programs.

Students who transfer to Fourth College from other institutions must complete the graduation requirements of the College. In order to determine which courses may be applied to the graduation requirements, the Office of the Provost will make an evaluation of prior work for each student at the time of his or her first enrollment.

The General Education Requirements

The faculty of the College, in planning the College program sought to impose a minimum number of explicit course requirements on students of the College. This plan stemmed from a firm conviction that each student should have the opportunity to develop a program best suited to his or her own interests, and carries with it a commitment from the faculty and staff of the College to provide extensive advising concerning individual academic programs and their possible career implications. Fourth College students work within the following academic plan:

1. each student must complete a two-course sequence in writing and a two-course sequence in any subject which requires formal or algorithmic reasoning. Normally the writing sequence is taken in the freshman year; students who must complete the Subject A requirement will do so with this course. Subjects which can be taken to satisfy the formal skills requirement are: calculus, symbolic logic, computer science. As the need or interest arises, other courses will also be offered;

2. each student will complete a major. Fourth College students may attempt any major offered at UC San Diego. Each department determines the courses required for its major; generally this will be a set of 12 to 18 upper-division courses. In addition, most majors require a certain amount of introductory course work and the beginning student is urged to plan his or her program to permit a wide choice of major fields. For example, calculus or a foreign language is required for a significant number of majors; a student who takes neither of these subjects excludes all these majors from further consideration;

3. in addition to a major, each Fourth College student must complete two programs of concentration. Each program of concentration is a focused collection of six courses. Of the total of 12 courses used for the programs, six must be upper-division courses, and in the case of a transfer student, six must be taken at UC San Diego. Each department will offer a program of concentration, usually with several options. A typical program of concentration will consist of a year-long lower-division sequence which serves as an introduction to the discipline (e.g., Economics 1A-B-C, or 2A-B-C) followed by one of several specified sequences in the upper division (e.g., Macroeconomics, Management Science, Law and Public Choice). A detailed list of these offerings for each department is available in the Provost's Office. As the interests of faculty and students dictate, programs of concentration which include work in more than one discipline will be developed. Two such programs are described below under the heading "Special Programs".

   At least one of the programs of concentration must be in a discipline area outside that of the student's major. A mathematics major could have one program of concentration in a related area, e.g. computer science, and one in some other discipline area, e.g. economics or literature. The programs of concentration are designed to provide the student with at least the vocabulary of two subjects other than his or her major. It is anticipated that many students will combine their major and one program of concentration to form a collection of courses particularly appropriate for certain post-graduate careers. In this regard, several departments have developed rather advanced programs of concentration (e.g., Materials Science, Systems Science, Bioengineering) which are

designed to complement related major programs. It is anticipated that more such programs will be developed as student interest becomes apparent.

Special Programs Scientific Perspectives is a program of concentration for Fourth College students not majoring in science. Each year the Departments of AMES, Biology, and Physics will offer a sequence of courses which comment on science and the relation of science to society, as seen from the perspective of the scientists themselves. Although any six of the courses constitute the minor, the courses listed as a two-or three-quarter sequence should be taken sequentially. No science prerequisites are required.

A program of concentration in Science, Technology and Public Affairs consists of six courses, at least four of which are from the offerings in the program and two are in related areas. For details, please refer to "Science Technology and Public Affairs in Courses, Curricula, and Programs of Instruction" in this catalog. The Science, Technology and Public Affairs Program offers an opportunity to study the important social policy issues that lie at the intersection of science, technology, and decision-making, and to develop awareness of the social and political factors that condition technological and scientific development as well as the impact of science and technology on the social order. The program will be attractive to students anticipating careers in law, administrative sciences, science, engineering, business and international affairs.

The basic writing course in Fourth College (Fourth College 10A/10B) is a two-quarter sequence taken by all freshmen. The course aims at helping the student discover his or her authentic concerns and within that perspective the materials and language for writing. The sequence is intended to move from completely free writing to writing of a structural and intellectual complexity comparable to that of a college term paper, using the student's own ideas, experiences, and environment as the subject matter. The classes are small; they are taught in an informal workshop style, devoting most of their time to the discussion of student papers. Ideally, each class should become a ready-made audience of friendly and increasingly competent critics giving more than enough feedback to enable its members to become skilled writers.

Fourth College is encouraging the departments to establish programs of intensive study for highly motivated students. To meet the requirements for a B.A. with major honors a student must be in a specified upper fraction of his or her class in the department; complete three more upper division courses than required for the usual B.A. program in his or her major for a total of 48 courses (192 units), and demonstrate individual achievement in the major field by completing an acceptable project appropriate to the major field — thesis, exhibition, performance, etc.

Recognition of Academic Achievement

Students of the college who complete at least 80 units of course work at UC San Diego and who maintain an excellent grade point average in all courses attempted are eligible to graduate with College Honors. The levels are cum Laude, Magna cum Laude, Summa cum Laude. All honors are approved by the department in which the student has majored and by the provost of the College.

The Faculty of Fourth College

NAME	TITLE	DEPARTMENT
Anagnostopoulos, Georgios H., Ph.D.	Associate Professor	Philosophy
Baker, Bruce S., Ph.D.	Assistant Professor	Biology
Berg, Darwin K., Ph.D.	Assistant Professor	Biology
Bunch, James R., Ph.D.	Associate Professor	Mathematics
Burkhard, Walter A., Ph.D.	Assistant Professor	APIS
Carpenter, Adelaide T., Ph.D.	Assistant Professor	Biology
Corrigan, Mary K., M.A.	Associate Professor	Drama
D'Andrade, Roy G., Ph.D.	Professor	Anthropology
Davis, Fred, Ph.D.	Professor	Sociology
Deak, Frantisek J., Ph.D.	Assistant Professor	Drama
DeLuca, Marlene A., Ph.D.	Associate Professor-in-Residence	Chemistry
Dryden, Deborah M., M.F.A.	Assistant Professor	Drama
Farrell, Peter, M.M.	Professor	Music
Fredman, Michael L., Ph.D.	Associate Professor	APIS
Granger, Clive W. J., Ph.D.	Professor	Economics
Holland, John J., Ph.D.	Professor	Biology
Hughes, Judith M., Ph.D.	Associate Professor	History
Kaprow, Allan, M.A.	Professor	Visual Arts
Kerr, Norbert L., Ph.D.	Assistant Professor	Psychology
Kyte, Jack E., Ph.D.	Assistant Professor	Chemistry
Lakoff, Sanford A., Ph.D.	Professor	Political Science
Langdon, Margaret H., Ph.D.	Associate Professor	Linguistics
Lawder, Standish, Ph.D.	Associate Professor	Visual Arts
Lugannani, Robert, Ph.D.	Associate Professor	APIS
Luker, Kristin, Ph.D.	Assistant Professor	Sociology

		REVELLE	THIRD		MUIR	FOURTH
			Program A	Program B		
LOWER DIVISION	Free Electives	3	10	12	12	20
	Restricted Electives	HUMANITIES (6) and FINE ARTS (at least 1) Total required 7 SOCIAL SCIENCE 3	0	Any 1-year sequence in one of the HUMANITIES, FINE ARTS (not studio or performance), or SOCIAL SCIENCE total 3	1 yr. in each of two from: HUMANITIES, FINE ARTS, FOREIGN LANGUAGE; total 6 1 yr. in each of two from: SOCIAL SCIENCE, NATURAL SCIENCE, MATH; total 6	FORMAL REASONING (Math, Logic, or Computer Science total 2
	Required Subjects	MATHEMATICS 3 CHEMISTRY 2 PHYSICS 2 BIOLOGY 1 FOREIGN LANGUAGE 3* (*3 courses is average to reach proficiency.)	MATHEMATICS 2 CHEMISTRY 1 PHYSICS 1 BIOLOGY 1 URBAN AND RURAL STUDIES 3 THIRD WORLD STUDIES 3 COMMUNICATIONS 2 COMPOSITION 1	MATHEMATICS 2 CHEMISTRY 1 PHYSICS 1 BIOLOGY 1 URBAN AND RURAL STUDIES 1 THIRD WORLD STUDIES 1 COMMUNICATIONS 1 COMPOSITION 1	0	WRITING 2
UPPER DIVISION	MAJOR	12-15	12-15	12-15	12-15	12-15
	MINOR	Required; non-contiguous 3-6	Optional	Optional	None	2 required; one non-contiguous 6-12
	FREE ELECT.	3-6	9-12	9-12	9-12	0-6
No. courses required		46 (184 units)	B.A. — 45 (180 units) B.S. — 48 (192 units)	B.A. — 45 (180 units) B.S. — 48 (192 units)	45 (180 units) 18 (U. D. courses)	B.A. — 45 (180 units) B.A. with Honors — 48 B.S. — 48 (192 units)

COMPARISON OF GRADUATION REQUIREMENTS IN THE COLLEGES OF UC SAN DIEGO
(Based on the assumption that the student takes four courses in each of twelve quarters)

Magde, Douglas, Ph.D.	Assistant Professor	Chemistry
Munk, Walter, Ph.D.	Professor	IGPP, SIO
Nee, Thomas B., M.A.	Professor	Music
Nodelman, Sheldon A., Ph.D.	Associate Professor	Visual Arts
O'Neil, Thomas M., Ph.D.	Professor	Physics
Pearce, Roy H., Ph.D.	Professor	Literature
Pei, Lowry C., Ph.D.	Assistant Professor	Literature
Rappaport, Armin, Ph.D.	Professor	History
Ringrose, David R., Ph.D.	Associate Professor	History
Rudee, M. Lea, Ph.D.	Professor, Provost of Fourth College	APIS
Schneider, Alan M., Sc.D.	Professor	AMES
Selverston, Allen I., Ph.D.	Associate Professor	Biology
Sham, Lu Jeu, Ph.D.	Professor	Physics
Shirk, Susan L., Ph.D.	Assistant Professor	Political Science
Smallwood, Dennis E., Ph.D.	Associate Professor	Economics
Smith, Timothy S., Ph.D.	Assistant Professor	Linguistics
Trangenstein, John A., Ph.D.	Assistant Professor	Mathematics
Wadsworth, Adrian R., Ph.D.	Assistant Professor	Mathematics
Wills, Christopher J., Ph.D.	Associate Professor	Biology
Wright, Will H., Ph.D.	Assistant Professor	Sociology
York, Herbert F., Ph.D.	Professor	Physics
Dann, Diana E., M.S.	Assistant Supervisor	Physical Education
Kobayashi, Bert N., Ph.D.	Associate Supervisor	Physical Education
McCaddon, Wanda, M.A.	Acting Assistant Professor	Literature
Martinez, Ronald L., A.B.	Acting Assistant Professor	Literature

Undergraduate Admissions, Policies and Procedures

All communications concerning undergraduate admission should be addressed to the Office of Admissions, 102 Matthews Campus, University of California, San Diego, La Jolla, California 92093.

Definitions

An Undergraduate Applicant: A student who wishes to complete a program of studies leading to a Bachelor of Arts or a Bachelor of Science degree.

A Freshman Applicant: A student who has graduated from high school but who has not enrolled since then in a regular session in any collegiate level institution.

An Advanced-Standing Applicant: A high school graduate who has been a registered student in another college or university or in college-level extension classes other than a summer session immediately following high school graduation. An advanced-standing applicant may not disregard his or her college record and apply for admission as a freshman.

Advanced-Standing Credit: Credit which an undergraduate student earns upon successful completion of college-level work which the University considers consistent with courses it offers. Such credit may be earned either before or after high school graduation. The acceptability of courses for advanced-standing credit is determined by the Office of Admissions.

A Nonresident Applicant: A student who lives outside the State of California and who is required to present a higher scholarship average than is required of California residents to be eligible for admission to the University.

A Foreign Applicant: a student claiming citizenship in another country.

Undergraduate Colleges and Majors

In the preceding chapter, which describes the educational philosophies of the four colleges presently in operation at UC San Diego, you will find information concerning some of the programs offered by each college. It is very important that you read the preceding chapter carefully, and that you decide which of the colleges is the right one for you. Although you may still be uncertain about your major, your application for admission must include the name of the college with which you plan to affiliate.

The listing below shows the names of programs listed alphabetically in this catalog in capitals; the lower-case subheads are the available concentrations within these programs or the general terms to help you locate a major in your desired field of study.

Following is a list of the undergraduate majors and areas of concentration available at UC San Diego:

ANTHROPOLOGY

APPLIED MECHANICS AND ENGINEERING SCIENCE (AMES)
- Applied Mechanics
- Bioengineering
  - Bioengineering with engineering emphasis
  - Bioengineering with premedical emphasis
- Chemical Engineering
- Engineering Sciences
- Systems Science

APPLIED PHYSICS AND INFORMATION SCIENCE (APIS)
- Applied Physics
  - Acoustics
  - Electromagnetics
  - Electronics
  - Optics
  - Solid State
- Computer Engineering
- Computer Science
- Electrical Engineering
  - Communication
  - Electronics
- Information Science
  - Acoustic Signal Processing
  - Communication Systems
  - Electronics
  - Optical Information Processing
  - System Theory

Art—see VISUAL ARTS

Biochemistry—see BIOLOGY, CHEMISTRY

Bioengineering—see AMES

BIOLOGY
- Biochemistry
- Biology
- Cell Biology
- Genetics
- Human Biology
- Microbiology
- Physiology
- Population Biology

Biophysics—see PHYSICS

CHEMISTRY
- Biochemistry
- Chemical Physics
- Chemistry
- Earth Sciences/Chemistry

CHICANO STUDIES
- Chicano Studies - History
- Chicano Studies - Literature
- Chicano Studies - Sociology

CHINESE STUDIES
CLASSICAL STUDIES
COMMUNICATIONS
- Communications - Sociology
- Communications - Visual Arts

Computers—see APIS
DRAMA
EARTH SCIENCES—see CHEMISTRY, MATHEMATICS or PHYSICS
ECONOMICS
- Economics
- Management Science

Education—see Footnote 1
Engineering—see AMES
English—see LITERATURE
French—see LITERATURE
Geology—see EARTH SCIENCES
German—see LITERATURE
HISTORY
- European History
- Nonwestern History (Africa & Asia)
- Western Hemisphere History (United States & Latin America)

Information Science—see APIS
Languages—see LITERATURE
LINGUISTICS
LITERATURE
- English-American
- French
- General Literature
- German
- Literature and Society
- Russian
- Spanish

Management Science—see ECONOMICS
MATHEMATICS
- Earth Sciences/Mathematics
- Mathematics

MUSIC
PHILOSOPHY
PHYSICS

Biophysics
Biophysics with premedical emphasis
Earth Sciences/Physics
Physics

POLITICAL SCIENCE
Pre-Law—see Footnote 2
Pre-Medical—see Footnote 3

PSYCHOLOGY
General Psychology
Cognitive Psychology
Human Development
Learning and Motivation
Physiological Psychology
Sensation and Perception
Social Psychology

Russian—see LITERATURE

SOCIOLOGY
Spanish—see LITERATURE
Systems Science—see AMES
Systems Theory—see APIS

Teacher Education Program—see Footnote 1
THIRD WORLD STUDIES

URBAN AND RURAL STUDIES

VISUAL ARTS

FOOTNOTE 1. to become a teacher in California, you must major NOT in education but in an academic subject or group of subjects, while at the same time taking special courses related to educational topics. UC San Diego offers a program leading to a preliminary Multiple Subjects credential within the framework of academic departments; there is no separate department of education. The main themes of the program are multicultural and child-centered education. To obtain a lifetime credential in California, the teacher must complete a fifth year of college within five years of receiving the B.A. degree and teach successfully, full time, for two years. (see Teacher Education Program for more information.)

FOOTNOTE 2. Law schools do not require any particular major; they require evidence of good performance in demanding subjects. Economics, history, literature, sociology, philosophy, psychology, engineering, etc., are all appropriate majors to pursue for this purpose.

FOOTNOTE 3. As with law schools, schools of medicine do not require a particular major, but they do want solid backgrounds in chemistry, mathematics, physics, and biology. Especially recommended as premedical programs are: AMES (Bioengineering), BIOLOGY, CHEMISTRY, PHYSICS.

Undergraduate Admissions

The University's undergraduate admission requirements, which are the same on all University of California campuses, are based on two principles. Simply stated, they are: 1. The best predictor of success in the University is high scholarship in previous work. 2. The study of certain subjects in high school gives a student good preparation for University work and reasonable freedom in choosing an area for specialized study.

Admission as a Freshman Applicant

The University defines a "freshman applicant" as a student who has graduated from high school but who has not enrolled since then in a regular session in any collegiate-level institution. This does not include attendance at a summer session immediately following high school graduation. If this definition does not aply to you, you must meet the requirements for admission as an advanced-standing student.

To be eligible for admission to the University as a freshman you must meet the Subject Requirement, the Scholarship Requirement, and the Examination Requirement, which are described below.

If you are not a resident of California you must also meet certain additional requirements that are discussed in the following pages. As a nonresident applicant you must show exceptional academic promise in order to qualify for admission.

Subject Requirement You must complete certain high school subjects with at least a grade of C in each semester of each course. (Counselors often refer to these subjects as the "a to f" list. See list below.) If you are a graduate of a California high school, these courses must appear on a list that your high school principal has certified will meet the course descriptions below, and that he or she has placed on file with the Director of Admissions. Any of these "a to f" courses may be used to satisfy the admission requirements even if they are taken prior to the tenth grade, so long as your high school gives you credit for them. The one exception is that courses in laboratory science must, in order to meet the "d" requirement below, be taken after completion of the ninth grade.

Courses taken in high school summer programs are considered as belonging to the following school year. For example, a summer school course taken after completion of the ninth grade is considered a tenth-grade course.

If you are a graduate of an out-of-state high school, the Office of Admissions will determine which of your courses are equivalent to those in the following list:

Subject Requirements ("a to f")

a. History 1 year
One year of United States history, or one-half year of United States history and one-half year of civics or American government, whichever combination has the higher grade.

b. English 3 years
Three years of English-composition, literature, oral expression, and others. Check with your counselor for a complete list.

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

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

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

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

Mathematics
A total of one year of advanced mathematics—intermediate algebra, trigonometry, or other comparable mathematics courses.

Foreign Language
Either an additional year in the same language used for "e" above or two years of a second foreign language.

Science
A year course in any laboratory science completed subsequent to the laboratory science used for "d" above.

Elective Courses
Although the 10 to 11 units listed above are the only courses used in computing the grade-point average, a total of 15 high school units is required for admission to the University. (A year course in high school is equivalent to one unit.) The remaining units provide an excellent opportunity for you to broaden your preparation for university work by taking elective courses in areas other than those in which you have concentrated.

Scholarship Requirement Not only must you earn at least a C in each of the courses required for admission, you must also earn an overall average of B in those on the list which you take after the ninth grade. If you have more than the required number of courses in one of the "a to f" categories, the ones with the best grades will be used to determine your grade point average. (A "B" average is equal to a 3.0 grade-point average.) If you are not a legal resident of California, your grade-point average in the required subjects must be 3.4 or higher.

In determining the required B 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 scholarship average, although

such courses do apply to the subject requirements. Your grades will be considered by the University exactly as shown on your official transcript, with no extra weight being given to honors, advanced, or accelerated courses. If there is to be any special weight given to grades in such courses, it must be done by the high school. Grades are counted on a semester basis unless a school gives only year grades. You may repeat up to a total of two semester courses in which you received a grade of D or lower, in order to meet the subject and scholarship requirements. When you repeat a course, the original D or F is not included in the grade-point average, but the final grade will not be counted higher than C. If the courses you repeat were taken before the ninth grade, they will be treated as if you were taking them for the first time.

Examination Requirement All freshman applicants must submit scores from the College Entrance Examination Board tests listed below. This requirement also applies to advanced-standing applicants with fewer than 12 quarter or semester units of transferable college credit. If you are applying for admission to the fall quarter, you should take the tests as soon as possible. The following tests are required:

1. Scholastic Aptitude Test; the verbal and mathematics scores submitted from this test must be from the same sitting.

2. Three Achievement Tests, which must include (a) English Composition, (b) one from among the social studies or one from among the foreign languages, and (c) one from mathematics or one from among the sciences.

If tests are repeated, the University accepts the highest scores received.

If you are a California applicant and your scholarship average in the required high school subjects is from 3.0 to 3.09 inclusive, you must earn a total score of 2,500 or higher in these tests. If your average is 3.1 or higher, no minimum test score is required. The scores of all applicants will be used to assist the University in counseling, guidance, and placement, and when possible, to satisfy the Subject A requirement. (See "Subject A Requirement.")

Admission by Examination Alone If you do not meet the scholarship and subject requirements for admission, you can qualify for admission as a freshman by examination alone. To do so, you must take the same CEEB tests discussed above but must earn higher scores. The required total score on the Scholastic Aptitude Test is 1,100, and you must earn at least 500 on each Achievement Test. If you are a California applicant, your total score on the three Achievement Tests must be 1,650 or higher. If you are a nonresident applicant, your total score on the three Achievement Tests must be 1,730 or higher. See your counselor to make arrangements to take the required tests or write to Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540. (Test fees should be paid to the Educational Testing Service, not the University.) Your test scores will be

regarded as official only if they are reported directly to the Admissions Office by the Educational Testing Service. The testing schedule is listed below:

Test Dates	Test Scheduled
October 16, 1976	SAT only
November 6,1976	SAT and Achievement
December 4, 1976	SAT and Achievement
January 22, 1977	SAT and Achievement
March 26, 1977	SAT and Achievement
May 7, 1977	SAT and Achievement
June 4, 1977	SAT and Achievement

Applicants should arrange to take the tests as early as possible so that the scores can be reported in time to be considered for admission.

Admission as an Advanced-Standing Applicant

The University defines an "advanced-standing applicant" as a high school graduate who has been a registered student in another college or university or in college-level extension classes other than a summer session immediately following high school graduation. An advanced-standing applicant may not disregard his or her college record and apply for admission as a freshman.

Scholarship Requirement As you will see below, the requirements for admission in advanced standing vary according to your high school record. If you are a nonresident applicant, you must also meet the additional requirements described at the end of this section. If you have completed fewer than 12 quarter or semester units of transferable college credits since high school graduation, you must also satisfy the examination requirement for freshman applicants.

The transcript you submit from the last college you attended must show, as a minimum, that you were in good standing and that you had earned a grade-point average of 2.0 or better. If your grade-point average fell below 2.0 at any one college you attended, you may have to meet additional requirements in order to qualify for admission.

Determining Your Grade-Point Average Your grade-point average is determined by dividing the total number of acceptable units you have attempted into the number of grade points you earned on those units. You may repeat courses that you completed with a grade lower than C up to a maximum of 16 quarter units without penalty. Only the grade earned in the repeated course will be included in the grade-point average.

The scholarship standard is expressed by a system of grade points and grade-point averages earned in courses accepted by the University for advanced standing credit. Grade points are assigned as follows: for each unit of A, 4 points; B, 3 points; C, 2 points; D, 1 point; and F, no points.

The advanced-standing requirements for admission listed here are experimental and will be in effect for applicants applying to terms from the Fall Quarter 1973 through the Spring Quarter 1977.

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

1. if you were eligible for admission to the University as a freshman, you may be admitted in advanced standing any time after you have established an overall grade-point average of 2.0 or better in another college or university;

2. if you were not eligible for admission as a freshman only because you had not studied one or more of the required high school subjects, you may be admitted after you have:

    a. completed, with a grade of C or better, appropriate college courses in the high school subjects that you lacked, and
    b. established an overall grade-point average of 2.0 or better in another college or university,
    c. completed twelve or more quarter or semester units of transferable college credit since high school graduation or have completed the CEEB tests required of freshman applicants.

Note: If you choose not to make up subject deficiencies, you may become eligible by the provision which follows:

3. if you were ineligible for admission to the University as a freshman because of low scholarship or a combination of low scholarship and a lack of required subjects, you may be admitted after you have earned a grade-point average of 2.0 or better in at least 84 quarter units (56 semester units) of college credit in courses accepted by the University for transfer. In other words, once you have earned a 2.0 average in at least 84 transferable quarter units, your high school record will not affect your eligibility.

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

If a nonresident applicant was lacking any of the required subjects in high school, he or she must complete college courses in those subjects with a grade of C or higher. A nonresident applicant who graduated from high school with less than a 3.4 grade-point average in the subjects required from freshman admission must have completed at least 84

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

Applicants from Foreign Countries

Admission regulations are basically the same for foreign students as for domestic students. It is recognized, however, that often a foreign student cannot fulfill all of the subject requirements although he or she will be expected to demonstrate adequate preparation for his or her chosen field. Only those applicants who present evidence of above average scholarship achievement will be considered for admission.

Courses at UC San Diego are conducted in Engish, and every student must have sufficient command of that language to benefit from instruction. To demonstrate such command, students whose native language is not English, and who have not previously studied in the United States or another English-speaking country, will be expected to take the *Test of English as a Foreign Language (TOEFL)* before coming to the U.S. Arrangements for taking this test may be made by writing to the Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540.

The results of this test will be used to determine whether the applicant's command of English is sufficient to enable him or her to pursue his or her studies effectively. Foreign students whose command of English is slightly deficient will be required to take an English course, and, therefore, a reduced program. For this reason, foreign applicants are strongly advised to perfect their English before coming to the United States.

In addition to an adequate English language background, foreign students must have sufficient funds to cover all fees, living and other expenses, and transportation connected with their stay in the United States. They should bear in mind that expenses are likely to be heaviest at the beginning (see "Fees and Expenses").

Foreign students are required to obtain health insurance for dependents who accompany them. Suitable insurance policies and additional information are available at the Student Health Service.

Additional Preparation for University Work

High school courses required for admission to the University are listed at the beginning of this section. This list is in no way intended to constitute an outline for a valid high school program. The courses listed were chosen largely for their value as predictors of success in the University. These required courses add up to 10 "Carnegie" units, while graduation from high school requires anywhere from 15 to 19. Courses

beyond our requirements should be chosen to broaden your experience in such fields as social sciences and the fine arts, and should fit in with your personal plans for the future.

If you intend, for example, to major in any science, more than two years of mathematics is essential. A science major without a working knowledge of trigonometry and at least intermediate algebra is likely to be delayed in getting his or her degree. Science courses also are extremely useful, and if you are a prospective science major you should take as many as possible from among chemistry, physics, and biology, in that order of priority. In foreign languages, our two-year entrance requirement is just barely adequate to get you started. So if you have any interest in language, or plan to enter a college program (undergraduate or graduate) that requires it, you should continue with the same language you have been studying.

For more detailed information on recommended high school courses, ask your counselor to show you a copy of the Universitywide publication *Prerequisites and Recommended Subjects.*

College-level Courses There are many steps you can take to earn credit which will be applicable to your graduation from college. Some of these steps may be taken even before you graduate from high school. Among them are the following:

Advanced Placement The Advanced Placement Examinations of the College Entrance Examination Board are taken, usually during the senior year, in conjunction with courses taken in high school. You will receive 10 quarter units of University credit for most examinations in which you earn a score of 5, 4, or 3. These credits will apply toward the total required for graduation from the University.

College Level Examination Program Usually known as "CLEP," this program provides an opportunity for students to receive college credit for education they have gained in various nontraditional ways. The tests are administered by many colleges, as well as through military services. For each of the General Examination tests, with the exceptions of Mathematics and English, a score of 500 or better carries 10 quarter units of University credit if you have no college work in that area. No credit is given for the math and English tests. Most of the Subject Examinations carry five units of credit for scores at or above the fiftieth percentile.

The local test center is at San Diego State University, Room 202, Old Library Building, San Diego 92182. Candidates should apply to CEEB for information, but should direct their registration forms to the test center of their choice.

Credit from Another College The University gives unit credit to transfer students for courses they have taken at other colleges and universities, including some extension courses. To be accepted for credit, the courses must be consistent with those offered at the University, as determined by the Admissions Office.

Many students who plan to earn a degree at the University find it to their advantage to complete their freshman and sophomore years at a California community college. Each community college offers a full program of courses approved for transfer credit. A student may earn 105 quarter units (70 semester units) toward a University degree at a community college. Subject credit for courses taken in excess of those units will still be granted.

The transferability of units from California community colleges and all other post-secondary institutions proceeds as follows: (1) transferability of units is decided by the Director of Admissions for the whole University of California, and these decisions are binding upon all UC campuses; (2) applicability of transferred units to breadth (general education) requirements is decided for each UC San Diego college by its provost; (3) applicability of units toward the major is decided by the appropriate UC San Diego department. Information about these matters may be obtained, before transfer, from the Office of Admissions and the Office of Relations with Schools at UC San Diego.

Students who have earned more than 135 quarter units before transfer should consult with the provost of the UC San Diego college they plan to enter.

Admission Procedures

Applying for Admission Application packets for undergraduate admission are available from high school and community college counselors or from any campus Admissions Office. Submit your completed application and the related materials to the Admissions Office on the campus where you wish to enroll on or after the appropriate date below:

Application Filing Dates

Fall Quarter 1977	**November 1, 1976**
Winter Quarter 1978	**July 1, 1977**
Spring Quarter 1978	**October 1, 1977**

All campuses observe the dates listed above for the beginning of application filing. Each campus will accept for consideration all applications filed during the first month of the filing period. After the first month the deadline will vary from campus to campus. The application to San Diego must include a choice of college (Fourth, Muir, Revelle, Third) before it can be completely processed. Each campus has enrollment quotas that limit the number of new freshman and new advanced-

standing students that may be accepted. Once these quotas have been filled, additional applications cannot be accepted and will be directed according to preferences listed on the application to another University campus where enrollments are still open.

Redirection Through its redirection program, the University has been able to assure that each qualified applicant is offered admission to one of the University campuses. If at the end of the first month of the application filing period a campus has more qualified applicants than it can accommodate within its enrollment quotas, redirection to alternate campuses becomes necessary. Fifty percent of the available space on a campus required to limit its enrollment is reserved for the most highly qualified on the basis of scholastic achievement. The other 50 percent provides for selection from among remaining qualified applicants on the basis of individual review of each application. This selection process will give consideration to such criteria as academic interests, available campus programs, hardship factors which prohibit or restrict a student from attending another campus, selective recruitment efforts, special achievements and awards, and similar considerations.

Equally important, you should file your completed application as early in the filing period as possible. You may be assured that as the number of applications exceed the quotas established for a campus, assistance will be provided to qualified applicants who are willing to consider admission to an alternate campus of the University. If redirection becomes necessary, you will be notified as early as possible in the admissions cycle.

If your plans change after you have filed for admission, and you prefer to register on a different campus, you must write to the Director of Admissions, 570 University Hall, University of California, Berkeley, California 94720, indicating the campus at which you now wish to register and the reason for your change. Your records will be transferred to the campus you indicate, provided facilities are available there. Such requests must be received within the filing periods shown above.

Application Fee There is a nonrefundable fee of $20 for filing an application for admission. Make your check or money order payable to The Regents of the University of California and attach it to your application form.

Duplicate Applications You should not file more than one application for admission to the University for the same quarter. Since the admission requirements are the same on all campuses, admission to the University entitles you to attend the campus you have selected if there is space available. If you apply for admission to more than one campus, the processing of your applications will be suspended until the Director of

Admissions is notified of the one campus for which you wish to be considered. That campus will then continue the processing of your records. Fees submitted with duplicate applications will not be refunded.

Transcripts Every applicant is responsible for requesting that the high school of graduation and each college he or she has attended send official transcripts promptly to the Office of Admissions where the application is filed.

If you are applying for admission as a freshman, ask your high school to submit a preliminary transcript showing your work through the junior year. The transcript also should list the courses you are now taking and those you plan to take. You must also arrange for a final transcript that includes your courses and grades for the senior year and a statement of graduation. If you have passed the California High School Proficiency Examination, a verification of your "Certificate of Proficiency" is required. If you have completed any college courses before or at the time of graduation, a transcript of your record from the college is required.

If you are applying for admission in advanced standing, the Office of Admissions will need transcripts from your high school of graduation and from each college you have attended. A preliminary transcript from your present college, listing the courses you are now taking and those you plan to take before transferring to UC San Diego, should also be requested.

The transcripts and other documents that you submit as part of your application become the property of the University; they cannot be returned to you or forwarded in any form to another college or university.

Notification of Admission When the application is received in the Admissions Office, and initial processing has been completed, you will be notified of the receipt of your application. With the normal volume of applications this processing usually takes from six to eight weeks.

The length of time before final notification of admission is subject to variation depending on the unique circumstances of each applicant. In general most applicants for the fall quarter will receive final notification by late spring. Applicants for the winter and spring quarters will be notified as soon as possible following receipt of all appropriate transcripts. In the case of advanced-standing applicants whose eligibility depends on their final semester of work, notification cannot be made until receipt of that transcript. Delays will occur if required records have not been received by the Office of Admissions. Inquiries by phone or mail will only interrupt the evaluation process and prolong the time before notification.

If admitted to the University, you will be asked to sign and return a Statement of Intention to Register (S.I.R.), accompanied by a nonrefundable fee of $50. This amount will be applied toward payment of the university registration fee, provided you register in the quarter to which you have been admitted.

A student who fails to register in the quarter for which he or she was admitted and who thereafter applies and is admitted to a subsequent quarter, must return a new Statement of Intention to Register together with a nonrefundable fee of $50.

Student Health Requirement Entering students are required to complete a medical history form and submit the results of a tuberculin test prior to registration and to send them to the Student Health Center. Forms and complete instructions are usually sent to entering students well in advance of registration or they may be obtained at the Student Health Center. Information submitted to the Student Health Service is kept confidential and is carefully reviewed to help provide individualized health care. Students are urged also to submit a physical examination form completed by their family physician, particularly if they plan to take part in intercollegiate athletic competition. Routine physical examinations are not provided by the Student Health Service.

Re-Application An application for admission is effective only for the quarter for which it is submitted. If you are not eligible for admission, or if you are admitted and do not register, you must file a new application if you wish to be admitted to another quarter. The new application will be considered in light of the admission requirements currently in effect and the space available on the campus.

If you find that attendance for the quarter admitted is precluded for reasons other than attendance at another institution, you may request a deferment of admission to a subsequent quarter by writing to the Admissions Office.

Registration of New Students

Prior to the quarter for which they have been admitted, new students will receive information from their colleges regarding orientation and initial registration for classes. All materials needed for registration will be provided at the College Provosts' Offices on the days assigned for new students' registration.

The Undergraduate Program The normal undergraduate program consists of an average of four courses each quarter for four years. Students wishing to take more than 16 units of credit in a quarter should refer to the quarterly *Schedule of Classes* for information regarding possible signatures of approval which may be required for their programs.

Confirmation of Program All students enrolled for classes will receive Study-List Cards. The Study-List Card confirms the student's official program as it appears on the registrar's file. Students will be held responsible for all the courses listed unless an appropriate Withdrawal Form or Change of Program Card (Add/Drop Card) has been filed with the Registrar's Office.

Fees and Expenses

The exact cost of attending the University of California, San Diego, will vary according to personal tastes and financial resources of the individual. Generally, the total expense for three quarters, or a college year, will average about $2,950 for residents of California and $4,855 for nonresidents (including foreign students).

It is possible to live simply and to participate moderately in the life of the student community on a limited budget. The best that the University can do to assist the student in planning his or her budget is to indicate certain and probable expenses. For information regarding student employment, loans, scholarships and other forms of financial aid at UC San Diego, see "Campus Services and Facilities" in this catalog.

Estimated Expenses for Undergraduate Residents of California

	FALL QUARTER	WINTER QUARTER	SPRING QUARTER	TOTAL
University Registration Fee	$100.00	$100.00	$100.00	$300.00
Educational Fee	100.00	100.00	100.00	300.00
Student Center Fee	6.00	6.00	6.00	18.00
Campus Activity Fee	6.00	6.00	6.00	18.00
Board and Room in Residence Halls	608.00	608.00	608.00	1824.00
Books (Approx.)	75.00	75.00	75.00	225.00
Personal Expenses	150.00	150.00	150.00	450.00
Total	$1045.00	$1045.00	$1045.00	$3135.00

NOTE: Changes in fees are subject to Regents' approval.

Undergraduate Registration and Academic Regulations

Registration

Prior to the quarter for which they have been admitted, new students will receive information from their colleges regarding orientation and initial registration for classes. All materials needed for registration will be provided at the College Provost's Offices on the days assigned for new students' registration.

Continuing students (those currently registered or eligible to register) should refer to the quarterly *Schedule of Classes* and the quarterly registration procedures letter for specific registration and fee-payment instructions. The *Schedule of Classes* is published prior to each quarter and may be purchased at the University Bookstore. The quarterly registration procedures letter accompanies the packet of registration materials mailed to all continuing students eligible to register.

A student who has not registered, i.e., enrolled for classes and paid fees, by the end of the second week of instruction will be removed from the registrar's file.

Definitions

A Registered Student: a student who has enrolled for classes and paid registration fees.

An Enrolled Student: a student whose Preferred-Program Card has been received and processed by the Registrar's Office and who has been assigned space in classes, but who has not paid registration fees.

Class Level: Regular students are classified as freshmen, sophomores (upon completion of 40.5 quarter units), juniors (upon completion of 84 units), seniors (upon completion of 135 units).

The Undergraduate Program: The normal undergraduate program consists of an average of four courses each quarter for four years. Students wishing to take more than 16 units of credit in a quarter should refer to the quarterly *Schedule of Classes* for information regarding possible signatures of approval which may be required for their programs.

Confirmation of Program: All students enrolled for classes will receive Study-List Cards. The Study-List Card confirms the student's official program as it appears on the registrar's file. Students will be held responsible for all the courses listed unless an appropriate Withdrawal Form or Change of Program Card (Add/Drop Card) has been filed with the Registrar's Office.

Change of Program After an official Preferred-Program Card has been filed with the Registrar's Office, an undergraduate may add or drop courses or sections of courses by submitting an Add/Drop card. Students should refer to the quarterly *Schedule of Classes* calendar as well as study list forms for add/drop procedures, deadline dates, and any signature and fee requirements which apply to each respective period.

Change of Address A student who changes his or her local or permanent address after enrollment, is expected to notify the registrar in writing at once. Change of address cards are available at the Registrar's Office, 101MC. The student will be held responsible for a communication from any University office sent to the last address given, and may not claim indulgence on the plea of having moved his or her lodgings and therefore of not having received the communication.

Concurrent Enrollment Concurrent enrollment in regular sessions at another institution or in University Extension while enrolled on the San Diego campus is permitted only when approved in advance by the provost of the student's college.

Approval for Enrollment Beyond 192 Units The minimum unit requirement for the bachelor's degree is 184 quarter units in Revelle College and 180 quarter units in Muir, Third and Fourth Colleges. A student is expected to complete the requirements for graduation within this minimum unit requirement.

Under special circumstances, a student may extend his or her undergraduate training beyond the minimum. However, a student who is attempting to achieve more than 192 quarter units will not be permitted to register without the approval of his or her college provost.

Bar from Registration A student may be barred from registering for classes for the following reasons:

1. failure to respond to official notices;
2. failure to settle financial obligation when due or to make satisfactory arrangements with the Business Office;
3. failure to complete the physical examination;
4. failure to present certification of degrees/status on leaving previous institution(s);
5. failure to comply with admission conditions.

Each student who becomes subject to a bar-from-registration-action is given advance notice and ample time to deal with the situation. However, if the student fails to respond, action will be taken without further notice and he or she is entitled to no further services of the University, except assistance toward reinstatement.

An undergraduate student wishing to have his or her status restored must secure a petition from the provost or dean who requested the barring action. Reinstatement is not final until this petition has been accepted by the registrar.

Final Examinations *Final examinations are obligatory* in all undergraduate courses except laboratory courses, or their equivalent, as individually determined by the Committee on Courses.

Each such examination shall be conducted in writing, whenever practical, and must be completed by all participants within the announced time shown in the *Schedule of Classes* for the quarter in question. These examinations may not exceed three hours duration.

In laboratory courses, the department concerned may, at its option, require a final examination subject to prior announcement in the *Schedule of Classes* for the term.

Final Grades As soon as possible after the end of each quarter, final grades will be mailed by the Registrar's Office. Students should carefully examine the transcript for omissions and clerical errors and get in touch with their instructor in case of error.

Fees and Residency

General

The university registration fee, the educational fee and the nonresident tuition fee (if applicable) must be paid for the student to be considered as registered. A student who has not registered, i.e., enrolled for classes and paid fees, by the end of the second week of instruction will be removed from the registrar's file.

Note: See "Estimated Expenses for Undergraduate Residents of California", page 68.

University Registration Fee The university registration fee is currently $100 per quarter for undergraduates. This fee, which must be paid at the time of registration, covers certain expenses for use of library books, for recreational facilities and equipment, for registration and graduation, for all laboratory and course fees, and for such consultation, medical advice, and hospital care or dispensary treatment as can be furnished by the Student Health Service or by health and accident insurance purchased by the University. No part of this fee is refunded to students who do not make use of these privileges. Exemption from this fee may be granted for surviving children of certain deceased California firemen or policemen. Students should check with the Financial Aids Office for full ruling.

In addition, there is a student center fee of $6 per quarter for undergraduates to be used for the construction and operation of the student centers.

Educational Fee The educational fee was established for all students begining with the Fall Quarter, 1970. The undergraduate educational fee is $100 per quarter. Resident students with demonstrated financial need may defer payment of the educational fee by accepting an obligation to repay, at a later date, the sum deferred. Students interested in this provision should contact the Financial Aids Office, Building 213, Matthews Campus.

In May 1974 the Regents adopted the reduced educational fee for part-time undergraduate students, effective Fall Quarter 1974. To be eligible for this reduced fee, 50% of the educational fee, undergraduates must be enrolled in less than nine units at the end of the third week of classes. Undergraduates enrolled in Special, Education Abroad and other special programs are excluded from this reduced fee policy. Extension courses taken by students in the concurrent enrollment program will be included in the student's total workload. Any student who receives a refund will be billed if, after the refund date, his or her units are increased to nine or more.

Nonresident Tuition Fee Students who have not been residents of California for more than one year immediately prior to the residence determination date for each term in which they propose to attend the University are charged, along with other fees, a nonresident tuition fee of $635 for the quarter. The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter.

Residence Requirements

General California residence is established by an adult (age 18 or older) who has relinquished his or her prior residence and is physically present within the state with the intent to make California the permanent home. California residence must be established more than one year prior to the term for which resident classification is requested. Indicia of California residence include, but are not limited to: registering and voting in California elections; designating California as the permanent address on all school and employment records, including military records if one is in the military service; obtaining a California I.D. card or drivers license; obtaining California vehicle registration; paying California income taxes as a resident; establishing an abode where one's permanent belongings are kept; licensing for professional practice in California, etc. Conduct inconsistent with the claim of California residence includes, but is not necessarily limited to: maintaining voter registration and voting in person or by absentee ballot in another state; obtaining a divorce in another

state; attending an out-of-state institution as a resident; obtaining a loan requiring residence in another state; maintaining out-of-state drivers license and vehicle registration, etc.

A student who is within California for educational purposes only does not gain the status of resident regardless of the length of his or her stay in California.

The residence of the parent with whom an unmarried minor (under age 18) child maintains his or her place of abode is the residence of the unmarried minor child. When the minor lives with neither parent his or her residence is that of the parent with whom he or she maintained his or her last place of abode. The minor may establish his or her residence when both parents are deceased and a legal guardian has not been appointed. The residence of an unmarried minor who has a parent living cannot be changed by his or her own act, by the appointment of a legal guardian, or by relinquishment of a parent's right of control.

A man or woman establishes his or her residence. A woman's residence shall not be derivative from that of her husband, or vice versa.

Exceptions

1. A student who remains in this state after his or her parent, who was theretofore domiciled in California for at least one year prior to leaving and has, during the student's minority and within one year immediately prior to the residence determination date, established residence elsewhere, shall be entitled to resident classification until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident so long as, once enrolled, he or she maintains continuous attendance at an institution.

2. Nonresident students who are minors or 18 years of age and can evidence that they have been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and have evidenced the intent to make California their permanent home may be eligible for resident status.

3. A student shall be entitled to resident classification if immediately prior to the residence determination date he or she has lived with and been under the continuous direct care and control of any adult or adults other than a parent for not less than two years, provided that the adult or adults having such control have been California residents during the year immediately prior to the residence determination date. This exception continues until the student has resided in the state the minimum time necessary to become a resident student, so long as continuous attendance is maintained at an institution.

4. Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild or spouse who is a

dependent of a member of the United States military stationed in California on active duty. Such resident classification may be maintained until the student has resided in California the minimum time necessary to become a resident. If a student is enrolled in an institution and the member of the military is transferred on military orders to a place outside the United States immediately after having been on active duty in California, the student is entitled to retain resident classification under conditions set forth above.

5. A student who is a member of the United States military stationed in California on active duty, except a member of the military assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification until he or she has resided in the state the minimum time necessary to become a resident.

6. A student who is an adult alien is entitled to resident classification if the student has been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States and has thereafter established and maintained residence in California for more than one year immediately prior to the residence determination date.

7. A student who is a minor alien shall be entitled to resident classification if the student and the parent from whom residence is derived have been lawfully admitted to the United States for permanent residence, provided that the parent has had residence in California for more than one year after acquiring a permanent resident visa prior to the residence determination date for the term.

8. Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, may be entitled to resident status.

New and returning students are required to complete a Statement of Legal Residence. The student's status is determined by the Attorney in Residence Matters' Deputy who is located in the Registrar's Office.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note that changes may have been made in the rate of nonresident tuition and the residence requirements between the time this catalog statement is published and the relevant residence determination date. Regulations have been adopted by the Regents, a copy of which is available for inspection in the Registrar's Office of the campus.

Those classified incorrectly as residents are subject to reclassification as nonresidents and payment of all nonresident fees. If incorrect classification results from false or concealed facts, the student is subject to University discipline and is required to pay all fees he or she would have been charged as a nonresident. Resident students who become

nonresidents must immediately notify the Attorney in Residence Matters' Deputy.

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Attorney in Residence Matters, 590 University Hall, 2200 University Avenue, Berkeley, California 94720. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Attorney in Residence Matters at the above address within 120 days after notification of the final decision by the Residence Deputy.

Miscellaneous Expenses, Fees, Fines and Penalties Books and stationery average about $75 per quarter. However, students should also be aware of the following possible expenses:

Statement of Intent to Register fee (new undergraduate)	$50.00
Application fee	20.00
Changes in Study List after announced dates	3.00
Duplicate registration and/or other cards from enrollment packet	3.00
Duplicate Student Card	3.00
Reinstatement fee	10.00
Request to Receive Grade "I" (undergraduate)	5.00
Removal of Grade "I" (graduate)	5.00
Special Course Subject A	45.00
Transcript of Record	2.00
Late filing of announcement of candidacy for B.A.	3.00
Late filing of Enrollment Cards	10.00
Returned check collection	5.00
Late payment of fees	10.00

(See also "Withdrawal from the University,"below)

Parking Fee Students who park motor vehicles on the campus are subject to parking fees. Parking permits are sold by the University Cashier. A copy of the campus parking regulations may be obtained from the cashier at the time of permit purchase.

General Degree Requirements

Each of the undergraduate colleges on the San Diego campus has specific requirements for a degree. (See "Choosing a College at UC San Diego") In addition, the following are required of all undergraduates:

American History and Institutions A knowledge of American history and of the principles of American institutions under the federal and state constitutions is required of all candidates for the bachelor's degree. This requirement may be met in any one of the following ways:

1. one high school unit in American history, or one-half high school unit in American History and one-half high school unit in Civics or American Government;

2. by passing any one-quarter course of instruction accepted as satisfactory by the Committee on Educational Policy and Courses. Courses suitable for fulfilling the requirement are: any United States history course and Political Science 10,11 or 12;

3. by passing an examination to be conducted by the Committee on Educational Policy and Courses. The student will have no more than two opportunities to pass the examination. A student who fails in the second attempt will be obliged to satisfy the requirement by passing one of the designated courses;

4. by presenting proof of having received a grade of 3 or higher on the Advanced Placement Test in American History administered by the Educational Testing Service, Princeton, New Jersey;

5. by presenting proof of having satisfied the present requirement as administered at another collegiate institution within the state;

6. by presenting proof of successful completion of a one-quarter or one-semester course in either American History or American Government at a recognized institution of higher education, junior colleges included, within the United States.

7. an alien attending the University on a F-1 or J-1 student visa may, by showing proof of his or her temporary residence in the United States, petition for exemption from this requirement through the office of his or her college provost.

Subject A: English Composition Every undergraduate must demonstrate an acceptable level of ability in English composition upon entrance or during the first year. This requirement may be met by:

1. achieving a score of 600 or better in the CEEB Achievement Test in English composition, or

2. achieving a grade of 5, 4 or 3 in the College Entrance Examination Board (CEEB) Advanced Placement Examination in English, or

3. entering the University with credentials showing the completion of an acceptable college-level course of four quarter units or three semester units in English composition with a grade of C or better.

Satisfaction of the Subject A requirement is determined by the Office of Admissions. Students not meeting the requirement in one of the ways described above must enroll in special courses designed to clear the Subject A requirement.

Senior Residence: Each candidate for the bachelor's degree must complete 36 of the final 45 units in residence in the college or school of the University of California in which the degree is to be earned.

Under certain circumstances, such as when a student attends classes on another UC campus or participates in the UC Education Abroad Program, exceptions may be granted by the provost.

Grading Policy

Grades in undergraduate courses are defined as follows: A, excellent; B, good; C, fair; D, barely passing; F, not passing (failure); I, undetermined (work of passing quality but incomplete). The designations P (Pass) and NP (Not Pass) are used in reporting grades on some courses. (See "Special Grade Options.") The designations S and U are used in reporting satisfactory and unsatisfactory work in undergraduate non-credit courses and specific graduate courses identified in the course descriptions. NR indicates that the instructor has not reported a grade. When an NR appears, the student should contact the instructor and request that a grade be submitted for the course.

Grade Points Grade points are assigned on a four-point basis: A, 4 points per unit; B, 3 points per unit; C, 2 points per unit; D, 1 point per unit; F and I, zero points. The grade-point average is computed by dividing the total number of grade points earned by the total unit value of courses attempted. P, NP, S, U, NR and I grades are excluded in computing the grade-point average.

Special Grade Options

Pass/Not Pass The Pass/Not Pass option is designed to encourage undergraduate students to venture into courses which they might otherwise hesitate to take because they are uncertain about their aptitude or preparation. Under such regulations as each college may determine, a student in good standing may take up to an average of one course per quarter on a Pass/Not Pass basis. Enrollment under this option must take place within the first two weeks of the course. A grade of Pass shall be awarded only for work which otherwise would receive a grade of C or better. Units passed shall be counted in satisfaction of degree requirements, but such courses shall be disregarded in determining a student's grade-point average.

After the registration packet has been filed, the Add/Drop Card will be used to change from Grade to P/NP, or vice versa. After classes commence, the instructor's signature will be required on this card. The last day to add courses will be the final date to make this change.

Only a grade of P or NP is to be assigned for a 199 course subject to the approval of the CEP Subcommittee on Undergraduate Courses. A department may impose additional limitations on its supervised special studies courses, i.e., Department of Biology.

Muir Colllege policy regulations state that:

1. Courses to be counted toward a departmental major or as prerequisites to the major may not be taken on a Pass/Not Pass basis except with the consent of the department chairman or his or her designated representative.

2. Courses taken to be counted towards a Muir Special Project may be taken for a letter grade only.

3. Course approval forms for 199s and Muir Special Project 199s must be completed and submitted to the department two weeks prior to the beginning of a new quarter. Students are reminded that 96 units is the minimum number allowed to be able to undertake a 199.

Revelle College policy regulations state that:

1. Courses taken Pass/Not Pass may not be used in satisfaction of any lower-division Revelle College breadth requirements except Fine Arts.

2. Upper-division courses to be counted toward a departmental major may not be taken on a Pass/Not Pass basis. Individual departments and/or advisers may authorize exceptions to this regulation.

3. The non-contiguous minor may be taken on a Pass/Not Pass basis.

4. All courses taken as electives may be taken on a Pass/Not Pass basis.

Third College policy regulations state that:

1. Courses to be counted toward a departmental major or as prerequisites to the major should not be taken on a Pass/Not Pass basis.

2. All courses taken as electives may be taken on a Pass/Not Pass basis while at the same time, the restrictions on the majors must be observed.

3. Courses to be counted toward a minor may be taken on a Pass/Not Pass or letter-grade basis.

Fourth College policy regulations state that a Fourth College student in good academic standing shall have the privilege of enrolling in an average of one course each quarter on a P/NP basis. The only restriction is that courses to be counted toward a departmental major or as prerequisite to the major must be taken for a letter grade.

Repeat of D,F, or NP Grades Undergraduates may repeat courses only when grades of D, F, or NP were received. When a D, F, or NP course is repeated and is one among the first 16 units repeated, it will not be counted in the grade-point average. In the case of repetitions beyond 16 units, the original course, grade, and grade points will remain on the permanent record and the grade-point average will be based on all grades assigned and total units attempted. Courses in which a grade of D or F has been awarded may not be repeated on a P/NP basis; and courses in which a grade of NP has been awarded may be repeated only on a P/NP basis.

Incomplete Grades The Academic Senate regulations state that the incomplete grade I for undergraduates shall be disregarded in determining a student's grade-point average except at point of graduation when he or she must have an overall 2.0 (C) on all work attempted at the University of California.

The grade Incomplete may be assigned in undergraduate courses when a student's work is of passing quality, but incomplete for good cause.

The form, Request to Receive Grade I, must be filed by the undergraduate student and approved by his or her instructor. The form shall state time and date of examination and/or when assigned course work will be completed. After obtaining approval from the instructor, a student must pay a $5 fee at the Cashier's Office. The Request to Receive Grade I form must be filed in the Registrar's Office by the student or instructor prior to or with the quarterly grade reports.

After the schedule date for completing the course work, any outstanding Incomplete grade will be lapsed to F, NP, or U, depending upon the student's enrollment for that course.

An undergraduate F assigned because a student failed to submit the Request for Incomplete form may be changed to I providing that the delay in submitting the request form was for verified illness or other emergency beyond the student's control.

Credit by Examination With the instructor's approval, undergraduate students in good standing may petition to obtain credit for some courses by examination. There will be a $5 fee for each Credit by Examination Petition submitted. For further information, consult the Office of the Provost in your college.

Scholastic Requirements The scholastic status of all UC San Diego undergraduates is governed by the following provisions:

1. A student is subject to probation if at the end of a term his or her grade-point average or cumulative grade-point average is less than 2.0 (C);

2. he or she is subject to disqualification for enrollment if his or her grade-point average for the quarter is below 1.5, or if he or she has completed two consecutive terms on academic probation.

Continued registration of an undergraduate who is subject to academic disqualification is at the discretion of the faculty of his or her college. On the San Diego campus the faculties normally delegate this responsibility to the provost.

If the provost feels the student will be able to overcome his or her academic deficiency, he or she will allow the student to continue on probation.

A student who has been dismissed, or who is on probation and wishes to transfer from one campus of the University to another, must obtain the approval of the dean or provost into whose jurisdiction he or she seeks to transfer. After completing a transfer, the student is subject to the supervision of the dean or provost on the new campus. See "Intercampus Transfer" below.

Application for Degree Every undergraduate, at the beginning of each quarter during his or her senior year, is required to file an Undergraduate Degree Application Card. This enables the provost of the college to determine whether or not the program the student is undertaking will satisfy degree requirements. The student will be notified of any deficiency.

Withdrawal from the University If a student decides to withdraw from the University after he or she has paid his or her registration fees, he or she must file a Request for Withdrawal form with the Registrar's Office before leaving the campus. This form serves two purposes: (1) a refund of fees if appropriate (see below); (2) withdrawal from classes without penalty of F grades. A student who decides to withdraw after the completion of a quarter and before registration fees have been paid for a subsequent quarter need not file a Request for Withdrawal since he or she will be automatically withdrawn. The effective date for calculating a fee refund is the day the student's withdrawal form is received in the Registrar's Office.

New Undergraduate Students Prior to the first day of instruction, the registration fee is refunded minus the $50 Statement of Intention to Register Fee.

Continuing and Readmitted Students There is a service charge of $10 for cancellation of registration or withdrawal before the first day of instruction. The following schedule of refunds is effective beginning with the first day of instruction and refers to calendar days:

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

The effective date of withdrawal used in determining the percentage of fees to be refunded is the date on which the student submits his or her withdrawal form to the Office of the Registrar. A student claiming an earlier date of withdrawal and therefore a higher percentage refund must submit written evidence to support his or her claim.

Absence/Readmission To The University

Students absent for no more than one quarter are considered to be continuing students and should contact the Registrar's Office for registration information.

Undergraduates in good standing who are absent for two or more consecutive quarters must file an application for readmission no later than eight weeks prior to the beginning of the quarter at the Registrar's Office, 101 Matthews Campus. A nonrefundable fee of $20 is charged for each application for readmission filed.

Whereas a formal leave of absence request for undergraduates is not required, students desiring to be absent are urged to consult with their Provost's Office. The provosts recognize the need for some students to "stop out" for a while. Each Provost's Office is prepared to deal, in a totally flexible manner, with any changes in the plans of the student, or with any problems the student may have.

Transcript of Records Application for a transcript of record should be submitted to the registrar several days in advance of the time needed. An application for a transcript must bear the student's signature; transcripts will be released only upon signed request of the student. A $2 fee is charged for one transcript; $1 is charged for each additional copy requested at the same time. Checks should be made payable to the Regents of the University of California.

Intercampus Transfer An undergraduate who is now, or was previously, registered in a regular session at any campus of the University of California, and has not since registered at any other institution, may apply for transfer in the same status to another campus of the University. The student who wishes to transfer must file an application on the present campus. Application forms for intercampus transfer are available in the Registrar's Office.

Graduate Studies

At the University of California, San Diego, all programs leading to masters' degrees and the Doctor of Philosophy degree are under the jurisdiction of the Graduate Council and administered by the Office of Graduate Studies and Research. The merging of administrative responsibilities for graduate studies and for research reflects the intention of the San Diego campus to emphasize the research character of graduate work and to distinguish between graduate studies and those programs leading to baccalaureate or strictly professional degrees. The Ph.D. degree should be regarded as a degree identified essentially with research and creative scholarship.

Graduate studies involve more than the accumulation of credits. Although certain formal requirements are noted, the plan of study cannot be programmed in advance simply by listing courses to be taken and by indicating the time to be devoted to research. There can be no guarantee that satisfactory research will be completed in any prescribed time. A Ph.D. degree is the culmination of creative effort; it should assure the capability of the recipient to continue original inquiry. In addition to requiring original research, the Office of Graduate Studies and Research strongly encourages all of its doctoral candidates to obtain teaching experience.

La Jolla has become one of the most important intellectual centers of the West. Not only has the University attracted many of the world's great scholars, but other research institutions such as the Salk Institute for Biological Studies and the Scripps Clinic and Research Foundation have enhanced the area's reputation. From the beginning, UC San Diego has determined to offer intellectual opportunities not elsewhere available. Much of the training it offers takes place outside the classroom—it is not only in the seminar but in independent research and in tutorial work that graduate study goes on. In addition to the permanent faculty, there are many visitors from other universities; there are opportunities to study at other branches of the University of California; and there is constant association between members of the University and those intellectuals who have come here to work within the institutes on campus. It is quite frankly the aim of this university to achieve a standard of excellence for graduate study; the freedom it offers, tempered by the discipline it demands, has already endowed UC San Diego with a unique spirit and an enviable list of accomplishments.

The Nature of Graduate Instruction

Graduate courses demand, on the part of both instructor and student, either a capacity for critical analysis or a specialization of research interests not normally appropriate to an undergraduate major. These courses normally carry a number in the 200 series and may be conducted in any of several ways: (1) as advanced lecture courses, (2) as seminars in which faculty and students present critical studies of selected problems

within the subject field, (3) as independent reading or study under faculty supervision, or (4) as research projects conducted under faculty supervision. In addition, courses at the upper-division level (100-197) may be taken in partial satisfaction of the requirements for an advanced degree. The main purpose of graduate study is to inspire independence and originality of thought in the pursuit of knowledge. The graduate student is accorded considerable liberty in choice of courses as long as the minimum academic and residence requirements are met.

Graduate Degrees Offered as of 1976-77

Anthropology	Ph.D.*
Applied Physics	M.S., Ph.D.
Biology	Ph.D.*
Chemistry	M.S., Ph.D.
Comparative Studies in Language, Society and Culture	Ph.D.
Earth Sciences	Ph.D.*
Economics	Ph.D.*
Engineering Sciences:	
Aerospace Engineering	M.S., Ph.D.
Applied Mechanics	M.S., Ph.D.
Bioengineering	M.S., Ph.D.
Engineering Physics	M.S., Ph.D.
Experimental Pathology	Ph.D.
History	M.A., Ph.D.
Information and Computer Science	M.S., Ph.D.
Linguistics	Ph.D.*
Teaching English to Speakers of Other Languages	M.A.†
Literature, Comparative	Ph.D.
Literature, English and American	Ph.D.
Literature, French	Ph.D.
Literature, German	Ph.D.
Literature, Spanish	Ph.D.
Marine Biology	Ph.D.*
Mathematics	M.A., Ph.D.
Mathematics (Applied)	M.A.
Music	M.A., Ph.D.
Neurosciences	Ph.D.*
Oceanography	Ph.D.*
Philosophy	Ph.D.*
Physics	M.S., Ph.D.

Physiology and Pharmacology	Ph.D.
Psychology	Ph.D.*
Sociology	Ph.D.*
Theatre	M.F.A.
Visual Arts	M.F.A.

*The master's degree may be awarded to students pursuing work toward the Ph.D. after fulfillment of the appropriate requirements.

†Pending.

Administration

The Office of Graduate Studies and Research

The Office of Graduate Studies and Research is supervised by a dean, assisted by an associate dean, who are appointed by the Chancellor. The dean is responsible to the Vice Chancellor, Academic Affairs and to the Graduate Council, a standing committee of the Academic Senate, for the administration of graduate affairs. The deans are members of planning and administrative committees of the University.

The Dean of Graduate Studies is responsible for graduate admissions, student degree programs, the administration of fellowships, traineeships, and other graduate-student support, and the maintenance of common standards of high quality in graduate programs across the campus.

The Office of Graduate Studies in the Health Sciences

The Office of Graduate Studies in the Health Sciences, an affiliate of the Office of Graduate Studies and Research, is located in the School of Medicine. This office is supervised by an associate dean who is responsible to the Vice Chancellor for Health Sciences and the Dean of Graduate Studies and Research. Graduate students in the health sciences should consult the associate dean on problems concerning their academic progress.

The Graduate Council

The Graduate Council is a standing committee of the San Diego Division of the Academic Senate. The primary function of the council is to exercise general responsibility for graduate-study programs and to implement university-wide policies, procedures, requirements and standards. Its members are selected by the Committee on Committees to give proper representation to the academic departments, colleges, and interdepartmental programs on the San Diego campus.

The Graduate Adviser

The graduate adviser is the deputy of the dean for the department or group and is the person to whom graduate students are to direct requests for information about graduate study in the particular program. The graduate adviser's duties include:

1. advising the dean on admission of graduate students;
2. advising graduate students regarding their programs of study and other matters pertinent to graduate work;
3. appointing individual advisers for each graduate student;
4. approving official study lists;
5. acting on the petitions of graduate students;
6. insuring that adequate records on all graduate students in the department or group are maintained, and supplying relevant information as requested by the dean;
7. assisting the dean in the application of university regulations governing graduate students, graduate study, and graduate courses;
8. advising the chairperson of the department and the dean in the planning and construction of the graduate program in the department or group.

Graduate Student Council

The Graduate Student Council (GSC) is the officially recognized graduate student representative body at UC San Diego and works for all graduate students—including those at SIO and the Medical School—in all academic, administrative, campus and state-wide areas. The GSC, composed of two representatives from each department and a chairperson, appoints graduate-student representatives to important campus organizations and committees including the Academic Senate, the Graduate Council, the Student Body Presidents' Council, the Graduate Senate. The GSC also sponsors group, departmental, and campus-wide graduate student social activities. The GSC collects no dues or fees, and any graduate student may apply to the council for help in any graduate student matter.

Graduate Advancement Program

The University of California, San Diego seeks to broaden its Ph.D. pool of students from those groups which, as a result of economic, educational, or societal inequities, have been only minimally represented in the University. The Graduate Advancement Program grew out of a need to facilitate the admission and support of these groups. Several forms of

financial assistance are available to those who demonstrate the academic potential to complete requirements for advanced degrees. The Office of Graduate Studies and Research, together with graduate departments, administers fellowships, scholarships, traineeships, nonresident tuition scholarships, teaching or language assistantships, and research assistantships; all of which are available on a competitive basis. Further information may be obtained from the Coordinator, Graduate Advancement Program, Building 108, Matthews Campus.

Graduate Women's Program

The Graduate Women's Program is primarily concerned with creating a supportive environment which recognizes the capabilities and motivations of women graduate students and encourages them to complete their degree programs. Opportunities are provided for women graduate students for informal get-togethers and for formal weekly discussions to explore issues of mutual concern on academic, professional, and personal levels. The program monitors the policies and actions of departments and administrative units to determine whether women are being discriminated against by the University. Additional activities of the program include recruiting women graduate students—specifically in the sciences—and providing general information and advice about admissions and financial aid opportunities. Assistance and information are available from the Coordinator, Graduate Women's Program, Building 108, Matthews Campus.

The Master's Degree

The Master of Arts and Master of Science degrees are offered under two plans: Plan I, Thesis Plan and Plan II, Comprehensive Examination. Since some departments offer both plans, students should consult with their advisers and their major departments before selecting a plan for completion of degree requirements.

Programs of Study

Plan I: Thesis Plan During the quarter following advancement to candidacy, the student electing Plan I must submit a thesis to the thesis committee. The thesis committee, appointed by the chairperson of the department and approved by the Dean of Graduate Studies, must consist of at least three faculty members (two from the candidate's major department and one, preferably tenured, from a different department).

Thirty-six quarter units are required: 18 units in graduate courses, including at least 12 units in graduate-level courses in the major field, 12 additional units in graduate or upper-division courses and six units in research course work, leading to a thesis to be approved by the committee.

For information covering thesis preparation, see *Instructions for the Preparation and Submission of Doctoral Dissertations and Masters' Theses*, which is mailed to students electing Plan I upon their advancement to candidacy.

When all members of the committee have approved the thesis, a Report of Thesis Examination for the Master of Arts or Master of Science Degree under Plan I must be completed. Acceptance of the thesis by the librarian represents the final step in the completion of all requirements by the student for a Master of Arts or Master of Science degree on the San Diego Campus.

Plan II: Comprehensive Examination Plan During the quarter following advancement to candidacy, the student electing Plan II must pass a comprehensive examination administered by the major department. A Report on Comprehensive Examination for the Master of Arts or Master of Science Degree under Plan II must be filed.

Thirty-six quarter units are required: 24 units in graduate courses, including at least 14 units in graduate-level courses in the major field, and 12 additional units in graduate or upper-division courses.

Residence Requirements The minimum requirement is three academic quarters, at least one of which must follow advancement to candidacy. Academic residence is established by satisfactory completion of six units or more per quarter, some of which must be graduate level.

A student must be registered in the final quarter in which the degree is to be awarded. (See "Registration in the Final Quarter.")

Advancement to Candidacy After completing all preliminary requirements of the depatment and a minimum of two quarters or more of residency, the student must file an Application for Candidacy for the Masster of Arts or Master of Science Degree, electing Plan 1 or Plan 11. Application for Candidacy must be filed no later than two weeks after the first day of the quarter in which degree requirements are to be completed.

General Requirements Only upper division and graduate courses in which a student is assigned grades "A," "B," "C," "P," or "S" are counted in satisfaction of the requirements for the Master of Arts and Master of Science degrees.

Graduate Work at Other Campuses of the University of California With the approval of the department concerned and of the Dean of Graduate Studies, work completed at other campuses of the University of California may satisfy one of the three quarters of the residence and one-half of the total units required for the master's degree at UC San Diego.

Graduate Work Completed Elsewhere On the recommendation of the major department and the approval of the Dean of Graduate Studies, a maximum of eight quarter units of credit for work completed in graduate standing at an institution other than the University of California may be applied toward a Master of Arts or a Master of Science degree at UC San Diego.

The Master of Fine Arts Degree

The Master of Fine Arts degree is offered under a modified thesis plan. A short written thesis that may be regarded as a position paper presenting a descriptive background for the student's work is required. There is no final examination, but great weight is given to the student's final presentation and the oral defense of the thesis.

Program of Study

Plan III: Modified Thesis Program During the quarter following advancement to candidacy, the student must submit a thesis to the thesis committee. The thesis committee, appointed by the chairperson of the department and approved by the Dean of Graduate Studies, must consist of at least three faculty members (two from the department and at least one, preferably tenured, from a different department).

Seventy-two quarter units are required leading to a Master of Fine Arts thesis to be approved by the committee. For information covering thesis preparation, see *Instructions for the Preparation and Submission of Doctoral Dissertations and Masters' Theses* which is mailed to students upon their advancement to candidacy.

When all members of the committee have approved the thesis, a Report on Thesis Examination for the Master of Fine Arts Degree under Plan III must be completed. Acceptance of the thesis by the librarian represents the final step in the completion of all requirements by the student for a Master of Fine Arts degree on the San Diego campus.

Residence Requirements The minimum requirement is six academic quarters, at least one of which must follow advancement to candidacy. Academic residency is established by satisfactory completion of six units or more per quarter, some of which must be graduate level. The entire program must be completed in residence at UC San Diego.

In exceptional circumstances, a student may be given a leave of absence for the purpose of study in major cities with eminent museums or collections. While appropriate credit may be allowed for the study, the period involved will not change the residence requirement of two years.

A student must be registered in the final quarter in which the degree is to be awarded. (See "Registration in the Final Quarter.")

Advancement to Candidacy After completing all preliminary requirements of the department and a minimum of five quarters or more of residency, the student must file an Application for Candidacy for the Master of Fine Arts Degree. Application for Candidacy must be filed no later than two weeks after the first day of the quarter in which degree requirements are to be completed.

General Requirements Only upper division and graduate courses in which a student is assigned grades "A," "B," "C," "P" or "S" are counted in satisfaction of the requirement for the Master of Fine Arts Degree.

The Doctor of Philosophy Degree

The Doctor of Philosophy degree is a research-oriented degree which requires individual study and specialization within a field or the establishment of connections among fields. It is not awarded solely for the fulfillment of technical requirements such as academic residence and course work. Candidates are recommended for the doctorate in recognition of having mastered in depth the subject matter of their discipline and having displayed the ability to make original contributions to knowledge in their field of study. More generally, the degree consititutes an affidavit of critical aptitude in scholarship, imaginative enterprise in research, proficiency and style in communication including—in most departments—proficiency in teaching.

Program of Study

The student's program of study is determined in consultation with the adviser who supervises the student's activities until the appointment of the doctoral committee. A doctoral program generally involves two stages.

The first stage requires at least three academic quarters of residence and is spent in fulfilling the requirements established by the Graduate Council and by the major department (course work, teaching, departmental examinations, etc.). When the department considers the student ready to take the qualifying examination, it arranges for the

appointment of a doctoral committee. Immediately upon passing the qualifying examination, administered by the doctoral committee, the student is advanced to candidacy.

The second stage, or in-candidacy study, is devoted primarily to independent study and research and to the preparation of the dissertation. Three quarters of academic residency should elapse between advancement to candidacy and the final defense of the dissertation. Most students will need three to five years to complete all of the requirements for the doctorate.

Residence Requirements The residence requirement for the Doctor of Philosophy degree is six quarters, three of which must be in continuous academic residence at UC San Diego. Residency is established by the satisfactory completion of six units or more per quarter, at least some of which must be at the graduate level. A student must be registered in the final quarter in which the degree is to be awarded. (See "Registration in the Final Quarter.")

Appointment of Doctoral Committee At least two weeks prior to a scheduled qualifying examination, the department arranges for the appointment of a doctoral committee. This committee conducts the qualifying examination, supervises and passes upon the dissertation, and administers the final examination.

The committee consists of five or more officers of instruction, no fewer than four of whom shall hold professorial titles of any rank. The committee members shall be chosen from two or more departments; at least two members shall represent academic specialities that differ from the student's major department, and one of these two must be a tenured UC San Diego faculty member.

Reconstituted Doctoral Committee For a variety of reasons a doctoral committee may have to be reconstituted. The request for reconstitution of a doctoral committee must be submitted in writing (including departmental affiliation of the members of the reconstituted committee) to the Dean of Graduate Studies by the chairperson of the student's major department.

Qualifying Examination and Advancement to Candidacy The doctoral committee administers the qualifying examination and authorizes the issuance of the Report on the Qualifying Examination and Advancement to Candidacy. Formal advancement to candidacy requires the student to pay a candidacy fee to the cashier prior to submitting the form to the Dean of Graduate Studies for approval.

If the committee does not issue a unanimous report on the examination, the Dean of Graduate Studies shall be called upon to review and present the case for resolution to the Graduate Council, which shall determine appropriate action.

Dissertation and Final Examination A draft of the doctoral dissertation should be submitted to each member of the doctoral committee at least four weeks before the final examination. The form of the final draft must conform to procedures outlined in the pamphlet *Instructions for the Preparation and Submission of Doctoral Dissertations and Masters' Theses,* which is mailed to students upon their advancement to candidacy.

The doctoral committee shall supervise and pass on the student's dissertation and conduct the final oral examination which shall be public and so announced in the campus publication *UC San Diego.* The dissertation must be filed with the University Librarian, who accepts it on behalf of the Graduate Council. Acceptance of the dissertation by the librarian represents the final step in the completion by the candidate of all requirements for the Doctor of Philosophy degree.

The petition, Report on the Final Examination and Filing of the Dissertation for the Degree of Doctor of Philosophy, must be initiated by the department, signed by members of the doctoral committee, chairperson of the (major) department and the librarian, and approved by the Dean of Graduate Studies.

Candidate in Philosophy Degree

In several departments, as approved by the Graduate Council, the intermediate degree of Candidate in Philosophy (C.Phil.) is awarded to students upon advancement to candidacy for the Ph.D. degree. The minimum residence requirement for this degree is four quarters, at least three of which must be spent in continuous residence at UC San Diego. The C.Phil. degree cannot be conferred after or simultaneously with the award of a Ph.D. degree.

Postgraduate Appointments

A UC San Diego student is not eligible for any UC San Diego postgraduate appointment until all requirements for the Ph.D. degree have been completed. Such appointments may begin the day after the librarian has accepted the dissertation.

Special Degree Programs

Graduate Programs in the Health Sciences The University offers research training programs in the health sciences leading to the Doctor of Philosophy degree. The purpose of these graduate programs is to prepare students for careers in research and teaching in the basic medical sciences. Graduate programs in the health sciences are conducted in two ways: (1) by regular campus-wide departments with activities related to the health sciences, for example, the Departments of Biology, Chemistry, and AMES, and (2) by interdisciplinary groups of faculty drawn from the

School of Medicine and from campus-wide departments. Program requirements are flexible, consisting of graduate courses and supervised laboratory or clinical investigation.

The following programs or departments provide research training opportunities in the biomedical sciences: Bioengineering, Biochemistry, Biology, Experimental Pathology, Neurosciences, Physics, Physiology/Pharmacology, Psychology, and Scripps Institution of Oceanography.

Ph.D.-M.D. Program Students may meet the requirements for both Ph.D. and M.D. degrees in a program offered jointly by the School of Medicine and Health Sciences Graduate Programs. Any student interested in such programs should consult the Associate Dean for Graduate Studies in the Health Sciences. The student must obtain approval of and be admitted to both the School of Medicine and the relevant graduate program. Although most of the work in the first two years of the program will normally be in the School of Medicine, the medical curriculum provides the opportunity for meeting many of the requirements for the Ph.D. The student must complete requirements for the Ph.D. in accordance with the regulations of a department or group and must in addition meet the requirements for the professional degree.

Five Year B.A.-M.A./M.S. Programs In the Departments of Applied Mechanics and Engineering Sciences, Applied Physics and Information Science, Chemistry, Mathematics, and Physics, UC San Diego students with distinguished academic records through their junior year are urged to elect in their senior year to begin work toward the master's degree to be awarded at the end of a year of graduate study. In their senior and fifth years such students can combine graduate and undergraduate courses, receiving the bachelor's degree at the end of the senior year and the master's degree at the end of the following year. They may apply at the beginning of their senior year for admission to graduate study at the end of that year. Such admission will be granted if, at the end of their senior year, they have satisfied departmental and Graduate Council requirements for admission to graduate study.

Accelerated Master's Program in Applied Mathematics The Department of Mathematics offers an accelerated program in Applied Mathematics whereby highly qualified juniors may be admitted to graduate standing at the end of their junior year and receive a master's degree at the end of what would have been their senior year.

Juniors with exceptional records in the field of mathematics, who will have successfully completed all requirements for the B.A. in Mathematics and the general education requirements of their college by the end of their junior year, may apply for admission to this program with the approval of the chairperson of the Department of Mathematics and the provost of their undergraduate college.

Joint Doctoral Programs Certain departments on the several campuses of the University of California cooperate with similar departments in the California State University System to offer joint programs of study leading to the doctorate. At UC San Diego, a joint program in chemistry is currently offered in conjunction with San Diego State University. Individuals interested in this joint program should consult the Department of Chemistry at San Diego State University.

Special Programs

Intercampus Graduate Student Exchange Program An advanced graduate student registered on any campus of the University of California who wishes to take advantage of educational opportunities for study and research available on another campus of the University may become an intercampus exchange student on that UC campus.

Informal arrangements between departmental faculty on the two campuses should be undertaken prior to submission of a student's application to assure that space in desired courses, seminars or facilities will be available.

No later than three weeks prior to the opening of the quarter, a student must complete the application entitled "Intercampus Exchange Program for Graduate Students." This application, signed by the student's adviser and the Dean of Graduate Studies of the home campus, is forwarded for signature by the host department and the Dean of Graduate Studies on that campus.

Registration is accomplished by the student registering and paying all required fees at the home campus, and then presenting a validated Identification Card and Study-List Card to the Office of the Registrar on the host campus.

An exchange student is not admitted to the Graduate Division at the host campus, but is considered a graduate student in residence at the home campus. Library, infirmary and other student privileges will be extended by the host campus. Grades obtained in courses taken by the student will be transferred to the home campus for entry on the student's official record.

Off-Campus Study (Other than Intercampus Exchange Program) The research and study programs of graduate students may require them to be off campus for extended periods. During such periods a student is required to remain a registered student at UC San Diego and to carry the required number of units of course work (9-12).

If the off-campus study is outside the state of California, one-half of the registration fee may be waived (not including the educational fee and the student center fee).

A student beyond the first year who holds a fellowship and wishes to continue to hold the fellowship while studying off campus must comply with the rules and regulations governing the award and request permission from the Dean of Graduate Studies.

Regulations concerning additional awards and compensation for employment as outlined under the financial assistance section apply to off-campus study as well as on-campus study.

University Extension Through a reciprocal agreement with University Extension at UC San Diego, a limited number of spaces in extension classes are open to registered UC San Diego graduate students without payment of additional fees. The number of spaces available for each quarter varies. The student must obtain a University Extension Application for Enrollment from the Office of Graduate Studies, and personally secure the necessary approvals.

Students wishing to offer University Extension course work in partial satisfaction of requirements for a higher degree must file a General Petition with the Office of Graduate Studies well in advance of proposed enrollment, so that approval may be obtained from the Graduate Council.

Education Abroad Program This statewide program is coordinated by the Office of International Education at UC San Diego. Study abroad is presently available on campuses in Africa, Brazil, France, Germany, Hong Kong, Israel, Italy, Japan, Lebanon, Mexico, Scandinavia, Spain, United Kingdom and Ireland, and the U.S.S.R.

A graduate student is eligible for the Education Abroad Program after completion of one full academic year at a UC campus with an overall B average and two years of university-level work in the language of the country (if applicable) with a B average. The student must submit an application to the Office of International Education accompanied by required supporting documentation.

Selection procedures involve an interview with members of the coordinating committee for the Education Abroad Program of the student's home campus, the statewide director of the Education Abroad Program and a final acceptance by the host university.

The student must register and enroll at UC San Diego and also at the host university and must obtain clearance from UC San Diego's Student Health Service. Full academic credit is received for courses satisfactorily completed.

Costs vary according to location. Teaching assistantships are occasionally available at some of the overseas campuses.

Complete information and application forms for the various campuses may be obtained from the Office of International Education, International Center, Matthews Campus, UC San Diego, or from the Director, Education Abroad Program, 1205 South Hall, University of California, Santa Barbara 93106.

See also "Education Abroad Program" in chapter entitled "Courses, Curricula and Programs of Instruction."

Foreign Language Training at the U.S. Defense Language Institute (West Coast Branch) University of California graduate students who have completed one quarter of graduate work have a unique opportunity to acquire fluency in foreign languages through the cooperation of the U.S. Defense Language Institute in Monterey. Courses in 32 languages are available at the Institute.

Each year 30 persons certified by the University of California Language Training Advisory Committee are admitted on a "space-available" basis. Complete information is available by writing to the Secretary, Language Training Advisory Committee, College Eight, University of California, Santa Cruz, California 95064.

Postdoctoral Study Postdoctoral students play a major role in UC San Diego's teaching and research programs. All interested candidates should make advance arrangements with the relevant department or research unit. The Office of Graduate Studies and Research has administrative responsibility for the enrollment and census of postdoctoral scholars undertaking training at UC San Diego. A scholar is enrolled by means of a Postdoctoral Study and Training Enrollment Form initiated in the office of the faculty sponsor and forwarded to the Office of Graduate Studies and Research for approval, after which an Identification Card is issued. The scholar completing postdoctoral studies at UC San Diego may request a Certificate of Postdoctoral Study from the Office of Graduate Studies and Research. This certificate will indicate the area of study and the dates enrolled.

Fees

The exact cost of attending the University of California, San Diego will vary according to personal tastes and financial resources of the individual. Each new student entering UC San Diego is required to submit a Statement of Legal Residence to the Office of the Registrar. No tuition is charged to students classified as residents of California. Nonresidents, however, are required to pay the current quarterly tuition fee irrespective of the number of courses taken. For the 1976-77 academic year, quarterly expenses may include the following fixed costs:

Fees Per Quarter*

	RESIDENT	NONRESIDENT
Tuition		635
Registration Fee	100	100
Educational Fee	120	120
Student Center Fee	6	6

Students should also be aware of the following charges:

Application fee for admission	$20
Changes in study list after announced deadline dates	3
Duplicate registration and/or other cards from enrollment packet	3
Duplicate student ID card	3
Petition for readmission	20
Removal of Grade "I"	5
Advancement to candidacy for Ph..D.	25
Transcript of record	2
Late payment of fees	10
Late filing of enrollment cards (including Preferred-Program Card)	10
Returned check collection	5
Filing fee	50

*Subject to change without notice. All receipts for payments made to the cashier, whatever their nature, should be carefully preserved. Not only do they constitute evidence that financial obligations have been discharged, but they may be required to support a claim that certain documents or petitions have been filed.

Nonresident Tuition Fee As noted, each new student entering UC San Diego is required to submit a Statement of Legal Residence to the Office of the Registrar. All students are classified as residents or nonresidents of the State of California for tuition purposes. The legal residence requirements are described in the following statement issued by the Office of the General Counsel, University of California:

Students who have not been legal residents of California for more than one year immediately prior to the residence determination date for each quarter in which they propose to attend the University are charged, along with other fees, a tuition fee of $635 for the quarter. The residence determination date is the opening day of the first of the University of California campuses to open for the term.

Legal residence is established by an adult who is physically present in the state while, at the same time, intending to make California his permanent home. The prior legal residence must be relinquished and steps must be taken at least one year prior to the quarter to evidence the intent to make California the permanent home. Some of the relevant indicia of an intention of California residence are: voting in elections in California and not in any other state; satisfying resident California state income tax obligations on total income; establishing an abode where one's permanent belongings are kept; maintaining active resident memberships in California professional or social organizations; maintaining California vehicle plates and operator's license; maintaining active savings and checking accounts in California banks; maintaining permanent military address or home of record in California if one is in the military service, etc. Conduct inconsistent with the claim of California residence would include, but not necessarily be limited to, the following: maintaining voter registration and voting in person or by absentee ballot in another state, if the basis of the franchise is legal residence; obtaining a divorce in another state; attending an out-of-state institution as a resident of the state in which the institution is located; obtaining a loan requiring legal residence in another state.

The student who is within the state for educational purposes only does not gain the status of resident regardless of the length of his stay in California. In general, the unmarried minor (a person under 18 years of age) derives legal residence from his father (or from his mother if the father is deceased), or, in the case of permanent separation of the parents, from the parent with whom the minor maintains his place of abode. A man or a woman may establish his or her residence.

A student who remains in this state after his parent, who was theretofore domiciled in California for at least one year prior to leaving and has, during the student's minority and within one year immediately prior to the residence determination date established residence elsewhere, shall be entitled to resident classification until he has attained the age of majority and has resided in the state the minimum time necessary to become a resident so long as, once enrolled, he maintains continuous attendance at an institution.

Nonresident students who are minors or 18 years of age and can evidence that they have been totally self-supporting through employment and acutally present in California for the entire year immediately prior to the opening day of the quarter and have evidenced the intent to make the state their permanent home may be eligible for resident status.

A student shall be entitled to resident classification if, immediately prior to enrolling in an institution, he has lived with and been under the continuous direct care and control of any adult or adults other than a parent for a period of not less than two years, provided that the adult or adults having such control have been domiciled in California during the year immediately prior to the residence determination date. This exception shall continue until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident, so long as continuous attendance is maintained at an institution.

Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild or spouse who is a dependent of a member of the armed forces of the United States stationed in California on active duty; such residence classification may be maintained until the student has resided in the state the minimum time necessary to become a resident, so long as continuous attendance is maintained at the University. If the member of the armed forces is transferred on military orders to a place outside of the United States immediately after having been stationed on active duty in California, the student who is the natural or adopted child, stepchild or spouse dependent on the member of the military, is entitled to residence classification under conditions set forth above.

A student who is a member of the armed forces of the United States stationed in California on active duty, except a member of the armed forces assigned for educational purposes to a state-supported institution of higher education, shall be entitled to residence classification until he has resided in the state the minimum time necessary to become a resident.

A student who is an adult alien is entitled to residence classification if the student has been lawfully admitted to the United States for permanent residence in accordance with all applicable provisions of the laws of the United States; provided, however, that the student has had residence in California for more than one year after such admission prior to the residence determination date. A student who is a minor alien shall be entitled to residence classification if the student and the parent from whom residence is derived have been lawfully admitted to the United States for permanent residence in accordance with all applicable laws of the United States, provided that the parent has had residence in California for more than one year after acquiring such permanent residence prior to the residence determination date of the term for which the student proposes to attend the University.

Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, may be entitled to residence classification.

A student in full-time attendance at the University who had resident classification on May 1, 1974 shall not lose such classification as a result of the adoption of the uniform student residency law on which this catalog statement is based, until the attainment of the degree for which he or she is currently enrolled.

New and returning students are required to complete a statement of Legal Residence, a form that is issued at the time of registration. Their status is determined by the Attorney in Residence Matters' Deputy, who is located in the Registrar's Office.

The student is cautioned that this summation regarding residency determination is by no means a complete explanation of the law. The student should also note that changes may have been made in the rate of nonresident tuition and in the residence requirements between the time this catalog statement is published and the relevant residence determination date. As this catalog statement is written, regulations are in the process of adoption and will serve to implement the uniform residency determination law enacted in Statutes 1972, Chapter 1100 (AB 666) as adopted by the Regents. A copy of the Regents' regulations is available for inspection on request being made to the Attorney in Residence Matters' Deputy in the Registrar's Office.

Those classified incorrectly as residents are subject to reclassification as nonresidents and payment of all nonresident fees. If incorrect classification results from false or concealed facts, the student is subject to University discipline and is required to pay all back fees he would have been charged as a nonresident. Resident students who become nonresidents must immediately notify the Attorney in Residence Matters' Deputy.

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Attorney in Residence Matters, 590 University Hall, 2200 University Avenue, Berkeley, California 94720. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student following a final decision on residence classification by the Attorney in Residence Matters' Deputy on the campus attended by the student, may make written appeal to the Attorney in Residence Matters at the above address within 120 calendar days of notification of the final decision by said Residence Deputy.

University Registration Fee The university registration fee is a quarterly fee required of all students regardless of number of courses taken. It must be paid at the time of the student's registration. This fee covers the use of recreational facilities and equipment, the International

Center, Student Employment Service, the Day Care Center, Crafts Center, Student Information Center, Arts and Lectures programs, and such medical consultation, dispensary treatment or hospital care as can be furnished by the Student Health Service or by health and accident insurance purchased by the University. No part of this fee is refunded to students who do not make use of these privileges. Exemption from this fee may be granted to surviving children of certain deceased California firemen or policemen. Students who believe they may qualify for an exemption on this basis must consult with the Student Financial Services Office, Building 214, Matthews Campus, for a ruling.

Reduced Registration Fee One-half of the established registration fee may be waived for graduate students:

1. whose research or study requires them to remain outside the State of California throughout the quarter. Students must file a General Petition for this privilege;

2. who are full-time employees of the University, as provided for in University of California's Nonacademic Personnel Rules, Rule 16, July 1969. Authorization for this privilege is secured from the personnel manager for staff employees, or from the Academic Personnel Office for individuals on academic appointments.
   Note: In accordance with Academic Senate Regulations, no voting member of the San Diego Division of the Academic Senate is eligible for a higher degree from UC San Diego.

The reduction pertains to one-half of the registration fee only. A student must pay, in addition, the full educational and student center fees.

Educational Fee The educational fee was established for all students beginning with the fall quarter, 1970. Resident students with demonstrated financial need, who are enrolled in at least six units of course work, may defer payment of the educational fee by accepting an obligation to repay, at a later date, the sum deferred. Students interested in this provision should communicate with the Student Financial Services Office, Building 214 Matthews Campus at least two months before the first day of the quarter.

Student Center Fee Every student is required to pay a student center fee each quarter.

Filing Fee A student on an approved leave of absence who has completed all requirements except for the final reading of his or her dissertation or thesis or the taking of the final examination is eligible to petition to pay a filing fee in lieu of registering and paying all required fees in the final quarter. The filing fee applies to both residents and non-residents. Students must apply for this privilege by means of a General Petition.

Refund of Fees Students who withdraw from the University during the first five weeks of instruction may receive partial refunds of registration fees. The date of withdrawal, as related to the fee refund schedule, shall be the date on which notice of withdrawal is submitted to the Office of Graduate Studies and Research. See the circular *Student Fees and Deposits* available from the Office of the Registrar.

Parking Fee Students who park motor vehicles (including motorcycles) on the campus are subject to parking fees. (See "Parking on Campus" in chapter entitled "Campus Services and Facilites.")

Penalty Fees Penalty fees are charged for failure to comply with normal deadline dates. To avoid such penalties, students should fulfill all requirements in advance of the deadlines listed in the Academic Calendar.

Transcript of Records Students may obtain transcripts of their UC San Diego record from the Office of the Registrar for $2 for the first copy, $1 for each additional copy. Transcripts must be requested several days in advance of date needed.

Financial Assistance

Types of Financial Assistance Available Several kinds of financial assistance are available to graduate students at the University of California, San Diego. These include fellowships and traineeships; assistantships in teaching, language instruction, and research; scholarships in full or partial payment of tuition and/or fees; and loans and grants-in-aid. Further details about these awards may be obtained from the department offices.

Descriptions in this section deal entirely with awards administered directly by the University. By "appointment or award" is meant employment for compensation, fellowship or scholarship-type awards, or any other formally recognized educational benefits.

Applicants for financial aid should note the following: "Pursuant to Section 7 of the Privacy Act of 1974, applicants for student financial aid or benefits are hereby notified that mandatory disclosure of their Social Security Number is required by the University of California to verify the identity of each applicant. Social Security Numbers are used in processing the data given in the financial aid application; in the awarding of funds; in the coordination of information with applications for Federal, State, University, and private awards or benefits; and in the collection of funds and tracing of individuals who have borrowed funds from Federal, State, University, or private loan programs."

Fellowships and Traineeships Fellowship and traineeship stipends are tax-free awards granted for scholarly achievement and promise which enable full-time students to pursue graduate studies and research leading to an advanced degree without requiring them to render any services.

Stipends range from $2,700 to $4,500 and, unless explicitly stated otherwise, do not include tuition or fees in addition to stipends. Part-time students and non-degree students are not eligible. Appointees must register for and complete a full program of graduate study and research each quarter (9-12 units of graduate-level work) and must remain in good academic standing, as indicated by yearly evaluations described under "Standards of Scholarship," and by quarterly reviews of course work completed. Fellows and trainees on 12-month tenure are required to devote full time to graduate study and research during the summer as well as during the academic year. A brief resume of the fellow's or trainee's proposed summer graduate study or research, approved by the appropriate adviser, is required by the Dean of Graduate Studies on or before the end of the Spring Quarter preceding the summer portion of the fellowship or traineeship tenure.

Fellows and trainees may not engage in remunerative employment without the prior approval of the Dean of Graduate Studies. Many fellowships and traineeships offer the privilege of participation in the teaching programs of the University.

The principal types of fellowships at the University of California, San Diego are the following:

1. Regents Fellowships
2. San Diego Fellowships
3. Fee Scholarships
4. Tuition Scholarships
5. Tuition/Fee Scholarships
6. U.S. Public Health Service Predoctoral Traineeships
7. Fellow-Research Assistantships
8. Dissertation Fellowships (California residents only)
9. Miscellaneous Fellowships (Special funds)

Assistantships Graduate students may be employed by the University of California, San Diego on a part-time basis (not to exceed 50 percent time) as research assistants, teaching assistants and language assistants. Assistantships do not include payment for tuition or fees and are subject to tax withholding for salaries received. To qualify for possible tax exemption, the student must be a candidate for a degree and be in a department which requires all candidates for the degree to perform equivalent research and/or teaching, whether or not compensated. Teaching assistants must also be enrolled in a 500 series teaching course to be eligible for a tax certification by the University. Eligible students,

upon request to their major departments, may obtain tax certificates for submission to the Internal Revenue Service. Final decision on tax exemption rests with the Internal Revenue Service.

Form W-4E, Exemption from Withholding (of Federal Income Tax), may be used in place of Form W-4, Employee's Withholding Allowance Certificate, if no tax liability was incurred the previous year and no tax liability is anticipated during the current year, i.e., (1) gross income is $2,350 or less if single, or (2) combined gross income of married graduate student and spouse is $3,400 or less. This exemption must be revoked by filing Form W-4 with the employer within 10 days from the day federal income tax liability is anticipated or on or before December 1st if federal income tax liability is anticipated for the following year. (See Form W-4E for further details.)

Appointees are required to register for and complete a full program of graduate study and research each quarter (9-12 units of graduate-level work) leading to a higher degree and must remain in good academic standing, as indicated by yearly evaluations, described under "Standards of Scholarship," and quarterly reviews of course work completed.

Application Procedures Entering students may obtain application materials with instructions from academic department or group offices. Only one application form is needed to apply for admission and for any of the following: fellowships, traineeships, and assistantships (teaching, language, or research).

An applicant who plans to seek fellowship assistance should submit scores on the verbal and quantitative tests of the Graduate Record Examination (GRE), a national test for admission to graduate school. It is administered several times a year throughout the United States and at centers in 96 countries by the Educational Testing Service. See Academic Calendar for examination dates. Direct inquiries to the Graduate Record Examinations, Educational Testing Service, Princeton, New Jersey 08540.

In order for a student to be considered for a fellowship, traineeship, or graduate scholarship for the ensuing academic year, an application for admission with financial aid and all supporting materials, including scores of the Graduate Record Examination, must be received by the Office of Graduate Studies and Research by January 15. No assurance can be given that such applications can be processed after January 15. Applications for assistantships may be accepted after that date, but many departments offer assistantships at the same time they consider applications for fellowships. Therefore, applicants for such appointments are strongly urged to submit their applications as early as possible.

Continuing and returning students should consult with their departments.

The awarding of fellowships and similar awards for the following academic year will be announced not later than April 1. UC San Diego adheres to the agreement of the Association of American Universities and the Council of Graduate Schools of the United States, under which successful applicants for awards are given until April 15 to accept or decline such awards. An award accepted from one of the member universities may be resigned at any time through April 15. However an acceptance given or left in force after that date commits the student to not accept another appointment without first obtaining formal release for that purpose.

Loans and Grants-in-Aid See section on Financial Assistance in chapter entitled "Campus Services and Facilities."

Time Limits for Graduate Student Support A graduate student may not serve as a teaching assistant, teaching fellow, language assistant or reader (or any combination of these titles) for more than four years. In addition, the total length of time for all financial support provided by UC San Diego (excluding loans) may not exceed six years for the Ph.D. candidate, ten quarters for a Master of Fine Arts candidate, or seven quarters for a Master of Science or Master of Arts candidate.

Fellowships and Loans from Outside the University In addition to fellowships, traineeships, and loans administered by the University, other types of graduate-student support are available through federal agencies and private foundations. Students wishing to explore such sources of support for their studies at the University of California, San Diego are urged to consult one of the many directories available through the reference departments of large libraries in the United States, or the fellowship adviser in the Office of Graduate Studies and Research (Building 108, Matthews Campus). Most application deadlines occur in the fall or early winter. Among the many organizations which have awarded fellowships to students at UC San Diego are the National Science Foundation, the United States Public Health Service, and the Danforth Foundation.

California residents may apply for a California State Graduate Fellowship to assist in payment of the university registration fee, the student center fee and the educational fee. The deadline for application is usually mid-December, and application materials and additional information can be obtained from departmental offices, or the Office of Graduate Studies and Research.

General Policies and Requirements

Student Conduct Graduate students enrolling in the University assume an obligation to conduct themselves 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 *University Policies and Campus*

Regulations Applying to Campus Activities, Organizations and Students, copies of which are available at the Office of Graduate Studies and Research.

Student Appeals Because department chairpersons — in consultation with faculty colleagues — have primary responsibility for maintaining the excellence of graduate programs, and because faculty within a department are in the best position to judge their students' academic performance, graduate student appeals of an academic nature (i.e., course grades, examination results) should first be made to the individual faculty involved, and, if necessary, the department chairperson.

Graduate students who wish to appeal actions of individual faculty, departments or administrators that result in disqualification from further graduate study or from receiving financial support based on merit may do so if

1. the student feels that due process was not followed in arriving at a decision which resulted in disqualification;
2. the student feels that personal prejudice affected the academic judgment rendered.

Students wishing to appeal a decision on these grounds should address such appeals to the Dean of Graduate Studies.

In resolving student appeals, the Dean of Graduate Studies may seek a review and recommendation by the members of the Graduate Council. However, the dean's decision in all cases is final.

Foreign Language Requirements Some departments require candidates to demonstrate language proficiency in one or more languages, or proficiency in computer technology, as part of the formal requirements for the Ph.D. degree. In these cases, the testing of proficiency is the responsibility of the department concerned, and no record of the satisfaction of such requirement is filed with the Office of Graduate Studies and Research, or entered on the official record by the Office of the Registrar.

Grades

Standards of Scholarship A graduate student is expected to remain in good standing (maintain a grade-point average of 3.0 in all upper division and graduate work taken) in order to continue in a program of study leading to a higher degree. A student's grade-point average is computed by dividing the total number of grade points earned by the total unit value of courses. P, NP, S, U, NR, and I grades are excluded in computing grade-point average. A graduate student is subject to

dismissal when the overall grade-point average falls below 3.0; if the cumulative average falls below 3.0 in two consecutive quarters, the student may not be permitted to continue.

In addition, each department prepares, not later than the second week of each spring quarter, a detailed, written evaluation of each of its graduate students who has not advanced to candidacy. These evaluations are designed to inform students of their individual strengths, weaknesses, and progress and to improve communications between faculty and graduate students. Evaluations are made available to students who may elect to add written comment before a copy of the evaluation is sent to the Office of Graduate Studies and Research.

Grading System Grades and grade-points are described as follows:

A	Excellent	4.0 grade-points/per unit
B	Good	3.0 grade-points/per unit
C	Fair	2.0 grade-points/per unit
D	Satisfactory (barely passing)	1.0 grade-points/per unit
F	Failure (not passing)	0 grade-points/per unit
I	Incomplete but work of passing quality (reverts to F if not made up by last day of instruction of the following quarter)	No grade-points
IP	In Progress	(provisional grade; replaced when full sequence is completed)
P/NP	Pass/Not Pass (used in reporting grades for undergraduate/graduate courses outside a student's major)	No grade-points
S/U	Satisfactory/Unsatisfactory (used in individual research or study)	No grade-points
NR	No Report (no grade reported by instructor)	No grade-points

All grades except Incomplete, In Progress and No Report are final when filed in an instructor's course report at the end of the quarter.

Only courses in which grades of A, B, C, P (Passed) or S (Satisfactory) are earned can be counted in satisfaction of the requirements for a higher degree.

"I" (Incomplete) Grade An "I" is assigned when work is of passing quality but incomplete for reasons beyond the student's control, e.g., illness. An "I" (Incomplete) which has not been removed by the last day of instruction of the following quarter after it was incurred shall lapse automatically into an "F," "NP" or "U", depending upon the student's enrollment option, and shall then be computed in the student's GPA. Procedure for removing an Incomplete grade is outlined below.

To Remove an "I" (Incomplete) Grade The student must obtain a petition, Removal of Grade "I", from the Office of the Registrar, secure appropriate signatures and pay the required fee. The approved petition must be filed with the Office of the Registrar no later than 4:30 p.m. on the last day of instruction in the next quarter in which the student is registered.

"IP" (In Progress) Grades An "IP" is assigned when a course extends over more than one quarter, and the evaluation of a student's performance may not be possible until the end of the final term. A student who has dropped out without completing the entire sequence may be assigned final grades and unit credit for any term(s) completed, provided that the instructor has a basis for assigning the grades and certifies that the course was not completed for good cause. An "IP" not replaced by a final grade will remain on the student's record. Courses graded "IP" are not used in calculating a student's grade-point average until graduation. At that time course units still graded "IP" on a student's record must be treated as units attempted in calculating the GPA; thus units graded "IP" will be considered as "F's."

Pass/Not Pass Graduate students in good standing (not subject to dismissal) may take graduate or undergraduate courses outside their major departments on a Pass/Not Pass basis. Up to one quarter of the total course units required for a degree may be taken in this way, but it is recommended that no more than one such course be taken per quarter with this grade option. The grading option for these courses must be approved by the students' advisers on the Study-List Cards at the beginning of the quarter. Units graded "P" shall be counted in satisfaction of degree requirements, but shall be disregarded in determining a student's grade-point average.

Satisfactory/Unsatisfactory In certain graduate courses approved by the department and by the Graduate Council, the grades Satisfactory/Unsatisfactory may be used. Such courses are identified in course listings.

Registration on an S/U basis must take place at the beginning of the quarter.

Units graded "S" shall be counted in satisfaction of degree requirements, but shall be disregarded in determining a student's grade-point average, and no credit shall be allowed for work marked Unsatisfactory.

Repetition of Courses A student assigned a grade of D, F, NP or U may repeat the course on the same grading basis for which it was first taken. That is, a course in which a grade of D or F has been received may not be repeated on a P/NP or S/U basis. When a course is repeated with a passing grade, the units count but once in satisfaction of unit requirements for a higher degree; however, in computing a grade-point average for courses assigned grades of A, B, C or D, both grades will

remain on the transcript, and will be used in calculating the overall grade-point average.

No report An "NR" listed on a transcript is a computer-produced abbreviation assigned by the registrar indicating that the student was listed on a course report, but no grade was turned in by the instructor. When an "NR" appears, the student should take steps to remove the "NR" entry from his or her record. An "NR" which has not been removed by the last day of instruction of the following quarter after it was incurred shall lapse automatically into an "F" and shall be computed in the student's GPA.

Final Grades A copy of the transcript is sent to each student at the end of every quarter. While course reports submitted by instructors at the end of the quarter are generally considered final, students should carefully examine their transcripts for omissions and clerical errors and consult with instructors in case of error.

Exceptions A student may request an exception to the normal procedures and requirements governing graduate studies by submitting a General Petition, available from the department. The petition must state clearly the reasons for requesting the exception and bear all required signatures before being filed with the Office of Graduate Studies and Research.

Teaching Some departments require all students seeking a graduate degree to participate in the teaching program of the department and to enroll in a teaching course in the 500 series. The nature and extent of the duties required for each department are described under "Courses, Curricula and Programs of Instruction." Teaching units are not considered an overload on study-list limits.

Certificate of Completion Upon request, the Office of the Registrar will issue a certificate of completion to any graduate student who has completed all requirements for a higher degree but whose diploma has not yet been issued.

Certificate of Resident Study/Foreign Students In addition to a formal transcript, the Office of the Registrar will issue a "Certificate of Resident Study" to any foreign student whose visa status requires a return home before completion of studies in the United States. The student must have completed at least three quarters of full-time resident study with a grade-point average of at least 3.0, not covered by a diploma or other certificate.

Admission Requirements and Policies

General Requirements An applicant for admission to the University for graduate studies and research must present evidence of receipt of a

baccalaureate degree from an accredited institution of higher learning or the equivalent with training comparable to that provided by an appropriate undergraduate program in the University of California.

If the candidate's preparation is found to be deficient, or if it fails to provide a proper foundation for advanced work, additional course work may be required for the purpose of removing such undergraduate deficiencies. In this case a longer period of resident study may be required than would otherwise be necessary.

The Dean of Graduate Studies or the prospective major department may deny admission if an applicant's scholastic record is undistinguished, if the preparation is judged inadequate as a foundation for advanced work, or if the department's facilities are already filled to capacity.

Application for Admission A prospective graduate student must file with the Office of Graduate Studies and Research, Building 108, Matthews Campus, a completed graduate application form, accompanied by a nonrefundable application fee, one official copy of the transcript of record from each college and university attended, and test scores or other supporting documents as required.

A single form is used to apply both for admission and for fellowships and assistantships. Applicants seeking financial assistance should file the application form and all supporting materials as early as possible. (See "Financial Assistance, Application Procedures.")

An applicant who plans to seek financial assistance in the form of a fellowship or graduate scholarship is required to submit scores on the verbal and quantitative tests of the Graduate Record Examinations (GRE), a national test for admission to graduate school. The test is administered several times a year throughout the United States and at centers in 96 other countries by the Educational Testing Service. (See Academic Calendar for examination dates.) Inquiries should be directed to the Office of the Registrar, UC San Diego, or to the Graduate Record Examinations, Educational Testing Service, Princeton, New Jersey 08540. Applicants are urged to take the GRE as early as possible — preferably in October, but no later than December.

Applicants not seeking financial aid must file all application materials at least two months before the opening of the quarter in which they plan to enroll. Since many departments and groups admit only for the fall quarter, and others have admission application deadlines earlier than those set by the Office of Graduate Studies and Research, applicants are urged to communicate with their prospective major departments as early as possible.

Application forms and detailed instructions may be obtained from the departments and groups. An applicant need not have completed studies in progress in order to apply, but in some cases (especially where grades

or preparation appear to be marginal) the graduate office or the department may defer action until a supplementary or final record of work is available, including evidence of the receipt of a degree.

Official admission to graduate study at the University is contingent upon review of an applicant's records, an affirmative recommendation by the prospective major department or group, and action by the Office of Graduate Studies and Research. Only the written notice of the Dean of Graduate Studies constitutes formal approval of admission to a graduate program of study at the University of California, San Diego.

Special Note to Applicants from Other Countries Applicants from outside the United States must satisfy the same requirements for admission as native applicants. In addition to an acceptable academic background, applicants must have a fluent command of the English language to benefit from graduate study at UC San Diego. Every student whose native language is not English and whose undergraduate education was conducted in a language other than English must take the Test of English as a Foreign Language (TOEFL). Arrangements for taking the TOEFL may be made through the Educational Testing Service, P.O. Box 592, Princeton, New Jersey 08540.

Foreign applicants must also possess sufficient funds to cover all fees, transportation, and living expenses while studying in the United States and are required to complete a Confidential Financial Statement.

All applicants, citizen and noncitizen alike, are charged a nonrefundable graduate application fee. If currency regulations forbid payment in advance, the fee must be paid after the applicant's arrival on campus. Registration may not take place until after this fee has been paid.

Applicants not seeking financial aid must file all application materials at least four months before the opening of the quarter in which they plan to enroll.

Duplication of Degrees Normally duplication of advanced degrees is not permitted. However, a student may petition the Graduate Council in advance for exceptions to this policy if the degree desired is in a field of study distinctly different from the field in which the first degree was obtained. A professional degree is not regarded as a duplicate of an academic degree.

Non-Degree Study (Requires review and approval by the Dean of Graduate Studies)

There is no "student-at-large" classification at the University of California, San Diego; application for admission must be made to a specific department or group. Applicants who wish to take "course work only" within a department or group and who do not intend to pursue a higher degree at UC San Diego may request admission for non-degree

study. Applicants for non-degree study must satisfy all admission requirements and are not eligible for fellowship and assistantship consideration.

Visiting Student A graduate student who wishes to enroll in course work for credit at UC San Diego for a limited period of time, such as a reciprocity student in the Education Abroad Program, must be admitted in regular status even if planning to continue further study at another institution.

Reapplication Students who fail to register in the quarter for which they first applied may request reconsideration of their applications for a later quarter within the same academic year. Application for admission to the following academic year may be made by submitting a statement of activities and official transcripts for any academic work taken since the first application. In no case are application files retained for more than two consecutive academic years. Application for admission after this two-year limit must be made by completing a new application form and providing all necessary documents.

Readmission A student whose status has lapsed because of an interruption in registration must petition for readmission at least eight weeks prior to the first day of the quarter in which he or she wishes to re-enroll. The student must submit supplementary transcripts for all academic work taken since last enrolled in UC San Diego, pay a readmission fee of $20, complete a General Petition, a Statement of Activities and a Statement of Legal Residence. Readmission is not automatic.

A student who has been granted a leave of absence for three or more consecutive quarters must be cleared by the Student Health Service prior to his or her return.

Medical History Forms All new students, graduate or undergraduate, and all students returning to the San Diego campus after an absence of three or more successive quarters, must submit a completed medical history form to the Student Health Service.

Entering students are required to complete a medical history form prior to registration and to send it to the Student Health Service. A report of a tuberculin test must be submitted also. In addition, students are urged to submit a physical examination form completed by their family physician, particularly if they plan to take part in intercollegiate athletics. Information sent to the Student Health Service is held confidential and is carefully reviewed to help provide individualized health care. Routine physical examinations are not provided by the Student Health Service.

Information and required forms are mailed to all new students by the Student Health Service well in advance of registration.

Registration Requirements and Procedures

New students must enroll on or before the deadline date set for each quarter. Enrollment packets may be picked up at the major department after the student arrives on campus.

Continuing and returning students may register by mail and must enroll during the period designated by the Office of the Registrar; enrollment packets are sent directly to the departments.

Students (full-time or part-time) are not officially registered for classes until they have completed the entire registration procedure outlined below, prior to the beginning of each quarter.

Full-Time Student Every full-time graduate student in good standing must be enrolled for 9-12 units unless granted a formal leave of absence by the Dean of Graduate Studies.

Students are required to be registered each quarter of each academic year until the completion of all requirements for the degree, including the filing of the thesis or dissertation. Failure of a student to register or to take a leave of absence will constitute evidence of withdrawal from graduate study. A student who is on leave of absence or who has withdrawn from the University is not entitled to withdraw books from the library or to use other University facilities or faculty time.

Part-Time Student A student who takes fewer than nine graduate units a quarter is considered "part-time", is admitted as a regular student, and must pay the same fees as a full-time student.

Registration Procedures A student is not officially registered for classes until the entire registration procedure outlined below has been completed ***each quarter.***

1. Using current copy of *Schedule of Classes* available from the University Bookstore, complete the Preferred-Program Card and all other forms in the packet.

2. Secure graduate adviser's signature on completed Preferred-Program Card (Study-List Card).

3. File completed registration packet including Preferred-Program Card with the Office of the Registrar prior to the deadline date.
   NOTE: Deadlines differ for new and continuing/returning students. See Academic Calendar and *Schedule of Classes.*

4. ***Pay required fees to the Office of the Cashier prior to the registrar's deadline date. When paying fees, present the Fee Card enclosed in registration packet together with Student Identification Card for validation.***

Late Registration Students will be assessed late fees if not enrolled and registered by the registrar's published deadline dates.

A $10 late filing fee will be assessed if a student does not enroll (file the enrollment packet with appropriate signatures) with Registration and Scheduling, Building 102, Matthews Campus, by the deadline dates published in the Academic Calendar and in the *Schedule of Classes.*

Additionally, a $10 late registration fee will be assessed if the student has not completed registration (paid fees) prior to 3:00 p.m. on the deadline for completing registration as outlined in the Academic Calendar and the *Schedule of Classes.*

A student who has not completed registration (enrolled and paid fees, including late fees if required) by the end of the second week of the quarter (registrar's deadline date) must petition for permission to register late.

Student Identification Card A validated Student Identification Card entitles the student to library privileges, a student health card and use of other university facilities. If the card is lost, a duplicate may be obtained from the Office of the Registrar. (See "Fees and Expenses.") Identification cards must be surrendered to the Office of the Registrar when petitioning to withdraw or to go on leave of absence.

UC San Diego students working on campus during summer months may request Temporary Student Identification Cards from their departments.

Changes of Name or Address Students must file official change of name or address forms with the Office of the Registrar when applicable.

Preferred-Program Card (Study List) A student must complete the Prefered-Program Card (Study-List Card) included in the registration packet, listing all course work, independent study, or research to be undertaken for each quarter of registration. The Preferred-Program Card must be approved by the graduate adviser and filed with the Office of Registration and Scheduling. Following enrollment, each student will receive confirmation of class enrollments on an official Study-List Card. Only successfully completed course work appearing on the Study-List Card will be credited toward a degree. Unapproved withdrawal from a course listed on the Study-List Card will result in a failing grade.

Study-List Limits A graduate student in a regular quarter is limited to 16 units in undergraduate courses or to 12 units in graduate courses, or to a total made up of 12 to 16 in proper proportion — i.e., 6 graduate and 8 undergraduate, when taking both undergraduate and graduate courses.

Research assistants and others employed part-time register for 9-12 units; if half-time employment involves research or other activities which are awarded graduate credit, the student's graduate adviser may authorize registration for a full program of study. Students engaged full-time in other occupations are limited to 6 units.

To obtain approval for exceeding these study limits, a student must complete a General Petition (in advance of the start of the quarter) and submit it to the Dean of Graduate Studies.

Teaching units (500 series) above the maximum are not considered an overload.

Changes in Study Lists After the Preferred-Program Card has been filed with the registrar, a student may add or drop courses or change sections of a given course during the first and second week of classes without fee by completing an Add/Drop Card, available at the Office of the Registrar, with the approval and signature of the instructor and the student's adviser. If a change is being made from a letter grade to or from S/U or P/NP, the instructor's signature is required. Add/Drop Change Cards must be completed in full and must include identical course information as listed in the *Schedule of Classes.* When changing units in a variable-unit course, a student must drop the course, then re-add it with the correct number of units.

If a change is made in the third and subsequent weeks, the student must complete a Change of Study-List Card (completing both sides of the card), secure the appropriate signatures, and pay a fee to the cashier.

Properly executed changes in study lists must be filed with the Office of the Registrar in order for the student to receive credit for added courses and be relieved of responsibility for dropped courses.

Registration in the Final Quarter for the Award of the Degree A student completing course work, using University facilities including the library, or making any demands upon faculty time (other than final reading of the thesis or dissertation, or administering the comprehensive or doctoral examination), must register in the final quarter in which he or she expects to receive the degree.

Continuous Registration All full-time and part-time graduate students are required to be registered each quarter until all degree requirements have been completed (including filing of the thesis or dissertation, and the final examination) or to be on an approved leave of absence.

A student who fails to register or to file an approved leave of absence by the registrar's deadline dates will be assumed to be withdrawn from UC San Diego, and will be dropped from the official register of graduate students. A student who decides to continue study at a later date must

petition for readmission, pay the non-refundable readmission fee, and be considered for admission with all others requesting admission to that quarter.

Leave of Absence/Extension Prior to leaving the campus, a student who discontinues his or her studies with the intention of resuming them during a later quarter must file a formal Leave of Absence/Request for Withdrawal for the period (1-9 quarters). The Dean of Graduate Studies may grant a request for an extension beyond the three years with a supporting letter from the chairperson of the department or group. A student who fails to file a leave of absence, or who allows a leave to expire will be considered withdrawn and must apply formally for readmission.

Prior to the end of the second week of instruction of the quarter in which the leave is to begin, a student must secure the approval of the graduate adviser and the chairperson of the (major) department, clear through Special Services, Student Financial Services, and Loan Office, and obtain approval of the Dean of Graduate Studies. The student's validated Identification Card must be attached to the leave of absence.

A student may request an extension of an approved leave *prior to the expiration of the leave.*

A new Statement of Legal Residence is required for all graduate students returning from a leave of absence of one quarter or more. In addition, a student who has been on leave of absence for three or more consecutive quarters must be cleared by the Student Health Service prior to reenrolling at UC San Diego.

A student on leave of absence status may not make use of university facilities, nor place any demands upon faculty including discussion of dissertation work (either directly or by correspondence) during the period of the leave.

A student on leave of absence cannot be employed at UC San Diego in any capacity and may not hold a fellowship, traineeship, or similar appointment administered by the University.

Withdrawal A student withdrawing from the University must obtain a Leave of Absence/Request for Withdrawal and secure appropriate signatures. The approved form must be filed with the registrar and the Student Identification Card surrendered.

Students who withdraw during the first thirty-five days of instruction will receive refunds of fees in proportion to the amount of time they attended classes. The date of withdrawal used in calculating the refund shall be the date on which notice of withdrawal is submitted to the Office of Graduate Studies and Research.

A student who has registered (enrolled and paid fees) and fails to file a Request for Withdrawal (no later than two weeks before the end of the quarter) will receive a grade of "F" or a nonpassing grade in each course, thus jeopardizing eligibility for readmission.

Bar from Registration/Non-Academic After suitable warning and opportunity to rectify the matter, a student may be barred from further registration for a variety of non-academic reasons, including failure to comply with official notices, to settle financial obligations when due, to complete medical examination requirements or other related matters.

Bar from Registration/Academic Academic disqualification is determined by the Dean of Graduate Studies on recommendation of the chairperson of the student's department, and normally relates to unsatisfactory academic performance, e.g., failure to maintain a grade-point average of 3.0 or better, or failure to comply with conditions set at time of admission to a graduate degree program.

Appendix

National Examination Information There are a variety of nationally-administered examinations which may be taken to meet requirements for admission to graduate study or to satisfy certain requirements for advanced degrees. Several examinations of importance to UC San Diego students are listed here.

Graduate Record Examination (GRE)

Address: Educational Testing Service, Box 955, Princeton, New Jersey 08540

Purpose: To appraise intellectual qualification of candidates for admission to graduate study and help sponsors of fellowship programs select the recipients of their awards.

Application: Information and forms are available at the Office of the Registrar, UC San Diego, or the above address.

Applications must be submitted to Educational Testing Service (see above for address) at least *four weeks* prior to scheduled examination dates in the United States and Puerto Rico and at least six weeks in all other countries. In an emergency, it may be possible to take the GRE without registering beforehand.

Examination Schedule: Six times a year in the U.S.; five times a year in 96 countries; several additional times a year in eight major U.S. cities (dates change each year).

Fee:	Aptitude Test	$10.50
	One Advanced Test, or	10.50
	Aptitude and One Advanced Test	21.00
	Late Registration Penalty	4.00

Graduate School Foreign Language Testing Program (GSFLT)

Address: Educational Testing Service, Box 519, Princeton, New Jersey 08540

Purpose: To measure ability to read and understand literature written in French, German, Russian, or Spanish in order to meet foreign language requirements for advanced degrees.

Application: Information and forms are available from the above address or the San Diego State University Testing Office, Old Library, 202, 5402 College Avenue, San Diego 92115. Telephone 286-5216

Applications must be submitted to the university administering the examination at least one month prior to scheduled examination dates.

Examination Schedule: Four times a year (dates change each year)

Fee: $11

Miller's Analogy Test (MAT)

Address: The Psychological Corporation, 304 East 45th Street, New York, New York 10017

Purpose: A high-level mental test which provides information to support candidates for admission to graduate study.

Application: Information and applications are available from the above address or from the San Diego State University Testing Office, Old Library, 202, 5402 College Avenue, San Diego, California 92115. Telephone: 286-5216

Examination Schedule: The third Thursday of every month at 3:00 p.m. at San Diego State University. Student should arrive at least 15 minutes prior to exam to pick up and take reservation card to bookstore cashier's office to pay the fee.

Fee: $5

Test of English as a Foreign Language (TOEFL)

Address: Box 899, Princeton, New Jersey 08540

Purpose: To help foreign students demonstrate their English language proficiency at the advanced level required for graduate study.

Application: Information and forms are available at the Registrar's Office, UC San Diego, or the above address.

Applications must be submitted to the appropriate agency at least *six weeks* prior to the scheduled examination date.

Examination Schedule: Four times a year (dates change each year) in about 125 countries.

Fee: Test $15; Late Registration Penalty $3

Campus Services and Facilities

A broad range of special services and facilities is availabe to students at UC San Diego, undergraduate and graduate alike. (Services limited to graduate students will be found under the section entitled "Graduate Studies".

Academic Services and Programs

OASIS (Office of Academic Support & Instructional Services Extension 3755) is a program designed to provide tutorial services and academic support to those undergraduate students who request help.

Tutorial Services: The Tutorial Program offers free, long-term tutoring on a quarterly basis in the lower division math and science sequences for all four colleges. In addition, the Math/Physics Clinic and Biology/Chemistry Clinic offer problem-oriented help on a walk-in basis for those students who do not need long-term tutoring. A Tutorial Listing Service is also available to students who request tutoring in those courses not covered by the Tutorial Program.

Other Academic Support Services: The OASIS staff offers courses to improve reading, study skills, note-taking and exam preparation. In addition, consultation is available for educational research and/or evaluation.

For further information and to sign up for any of these services, call or come to the Student Affairs Building.

The Computer Center The UC San Diego Computer Center operates two major computing systems: A CDC 3600 and a Burroughs B6700, which are available from six remote job entry stations conveniently located around the campus. The Center offers non-credit courses in computer programming and seminars on advanced topics without charge to students, faculty and staff. It is not necessary to register in advance for these classes. For further information: Room 1157 AP&M Bldg., Muir Campus, Extension 4050. (See also "Research at UC San Diego".)

Educational Opportunity Program (EOP) Students who are considering application for undergraduate admission to UC San Diego and who feel they need special support services may contact the EOP Office in the Student Affairs Building, Extension 4253. This program supplements such regular University services as admissions, counseling, financial aid, and graduate and career placement. It is generally helpful to all students as an additional University resource, but is particularly helpful to minority students and/or those who will need financial assistance to matriculate at UC San Diego.

Physically Disabled Students The EOP Office provides an analysis of needs and an educational plan for physically disabled students who anticipate problems. The EOP staff handles paperwork for students under the sponsorship of the California Department of Rehabilitation. Contact EOP Office in the Student Affairs Building, Extension 4250.

Veterans Affairs The EOP Office also provides information regarding veterans' educational assistance and veterans' dependents' educational benefits. If you have any questions before you arrive on campus, contact your nearest Veterans Administration Office. Be certain to check in with the EOP office, Student Affairs Building Extension, upon your arrival at UC San Diego. Students who are already receiving benefits under the G.I. Bill or dependents' programs should come to the EOP Office immediately after initial registration and every quarter thereafter while registered at the University.

Veterans who need tutorial assistance in any of their courses should contact the EOP Office as soon as possible to obtain needed help.

The University Library The University Library of the University of California, San Diego consists of the Central University Library, the Science and Engineering Library, the Biomedical Library, the Scripps Institution of Oceanography Library, and the Cluster Undergraduate Library. The library contains more than one million volumes and receives 20,000 periodical and other serial publications.

The library, through its Instructional Services Program and the Contemporary Issues section in Muir College, offers courses and information on the use of academic libraries. These courses, and the reference services offered at each of the campus libraries, are designed to assist students and faculty with research and instruction.

An important new reference service is the compilation of subject bibliographies using a computerized literature searching system, a process which not only saves library users the work of manually searching printed indexes, but also allows more thorough searching on desired topics. Contact the reference department of any library unit for information on the charges for this service and the procedures for requesting it.

The *Central University Library,* occupied in 1970, consists of the general and specialized graduate and research collections in the arts, humanities, and social sciences. The library's special collections of rare and valuable books include important collections of the Renaissance, D.H. Lawrence, Ernest Hemingway, Baja California, the Spanish Civil War, Pacific Voyages, and the Archive for New Poetry.

The *Science and Engineering Library*, in Urey Hall, contains strong collections in aeronautics, astrophysics, atomic energy, chemistry, electronics, engineering, instrumentation, mathematics, missiles research, physics and space sciences.

The *Biomedical Library*, in the Basic Sciences Building of the Medical School, contains research collections in biology and medicine. A branch of the Biomedical Library is maintained at the University Hospital.

The *Scripps Institution of Oceanography Library* has outstanding collections in oceanography, marine biology and underseas technology, and also specializes in geology, geophysics and zoology publications.

The *Cluster Undergraduate Library*, in the Humanities-Library Building, has a general collection to serve the basic needs of undergraduate students.

Foreign Student Adviser See section "Office of International Education."

Education Abroad Program The Education Abroad Program provides an opportunity for an inter-cultural experience at UC centers located in Africa, Asia, Europe and Latin America while allowing normal progress toward a degree.

The program is described in detail in the Courses and Curricula section of this catalog under the Education Abroad heading.

University Extension University of California Extension is a self-supporting system through which the University endeavors to meet the lifelong educational needs of the adult population. Courses are offered in several communities throughout the county in addition to San Diego and the La Jolla campus. This year's enrollment is estimated at 35,000.

University Extension offers many of the academic and cultural resources of the University to the community as well as a broad range of its own programs.

Programs in education, business, social services, government, science and the humanities are aimed at helping professionals update their knowledge and prepare for advancement.

University Extension also offers personal enrichment and involvement in current issues for the individual who seeks continued growth and learning. Lecture series, seminars, workshops and field trips are some of the approaches used. Both credit and non-credit courses are offered.

University Extension is also a national leader in the development of media-based courses. Courses by Newspaper, Radio and Television are created at University Extension for use by colleges and universities throughout the United States.

Veterans may use educational benefits available to them under state and federal laws to enroll in Extension courses provided courses are part of prescribed educational objectives approved by the Veterans Administration.

Explore, a quarterly catalog listing University Extension courses, is available at the Extension office on Matthews Campus or will be mailed free to your home. For a copy of *Explore* or enrollment information write University Extension Q-014, UC San Diego, La Jolla, California, or telephone (714) 452-3400.

Concurrent Registration Concurrent registration permits adults in the community to enroll in many University courses on a space-available basis. In addition, qualified high school students may, with the approvals of their high school counselors, the UC San Diego Office of Relations with Schools and the instructor of the course involved, participate in the Concurrent Registration Program. Extension students should be aware that it is entirely up to the faculty member in charge of a course to determine whether the Extension student's qualifications are suitable for the course and whether the class size and instructor's workload are such as to permit the faculty member to accept the student in the class. At his or her own option the instructor may require the student to present evidence that he or she has satisfied the prerequisites for the course. In exchange for this privilege, an equal number of University students may enroll in Extension courses free of charge.

UC San Diego undergraduate students who wish to enroll in Extension courses should contact the provost's office of their college for information; graduate students should call at the Office of Graduate Studies and Research for necessary enrollment forms.

STUDENT AFFAIRS

Vice Chancellor and Dean, Student Affairs Office (Extension 4370) This office provides direction and support to all Student Affairs services and programs. The office is located in the Student Center.

College Deans' Offices (Revelle, Extension 3492; Muir, Extension 3587; Third, Extension 4391; Fourth, Extension 4350). The staffs of the College Deans' Offices perform many different functions and provide help, advice, counseling and referral in many areas. They regularly coordinate with other offices on such issues as: career planning problems, procedures for applying to graduate school or professional schools, decisions about remaining in or withdrawing from school, legal problems, grade problems, involvement in student governments and other activities, handling financial concerns, housing concerns, assisting with specialized concerns for physically limited students, assisting in hearing procedures regarding grievances against faculty or staff members, and other services.

Contact your College Deans' Office for assistance, particularly if you are uncertain of what office or resource would best be able to aid you with your problem or concern.

Campus Programming Board Extension 4090 The Campus Programming Board is a Chancellor's committee composed of students, faculty, and staff of UC San Diego. The Board is responsible for bringing to the campus programs of lectures and readings, the arts, and quality entertainment which is consistent with the educational objectives of UC San Diego. The Board's chairman is Dr. Robert Hamburger. The Board's office (Arts & Lectures) is located in the Student Center.

Counseling Services

Counseling and Psychological Services (Information: 452-3755) The functions of Counseling and Psychological Services are:

1. to provide professional assistance to students having difficulties coping with academic, vocational, personal, or emotional problems;

2. to provide professional consultation to the university community in matters of student behavior in order to prevent problems and enhance the student experience;

3. to consult with professionals and non-professionals working with students on this campus, e.g., deans, administrators, members of the faculty, etc.;

4. to promote and conduct basic and applied research, both independently and in cooperation with other offices and departments concerning various aspects of student development;

5. to participate, upon request, in the general education functions of the University and to conduct special pregrams related to student development, as needed, and

6. to provide internship experiences for graduate students in mental-health disciplines.

Counseling is available to any regularly enrolled graduate or undergraduate student, and spouse, on an individual or group basis. The services offered include:

1. *Personal Counseling* Students who have general problems that may be limiting their effectiveness are encouraged to seek counseling. The most usual problems include anxiety, loneliness, unsatisfying personal relationships, concerns about issues of sexuality, drugs, or alcohol, academic achievement, or other general concerns.

2. *Counseling* Students who are uncertain of their major or of their career goals may explore their interests and skills, and the options available to them.

3. *Workshops* Periodically, short-term, issue-oriented groups are offered. Among topics explored are identity, goal-setting, heterosexual relations, marital relations, academic coping skills.

Members of Counseling and Psychological Services are clinical psychologists, counseling psychologists, social workers, educational psychologists, and specialists in human behavior. Most major cultural and ethnic groups are represented on this staff. Psychologists have offices at all colleges, as well as in a central location. The counseling relationship is private and confidential; no records of interviews are kept.

Career Planning And Placement

Career Planning & Placement offers a continuously updated group of services to undergraduate and graduate students. These services address general career planning issues, job hunting, employment and continuing education.

General Career Advising (Information: 452-3750) All students are offered advising, learning experiences, and information on:

1. *Career Planning* enables students to understand and appraise training and skills they have acquired, and to relate their ideas, expectations, and values to career possibilities.

2. *Specific Occupational Exploration* Students acquire knowledge of career areas of choice, plan their education as necessary, and seek entrance in a career field most compatible with their needs.

Health Sciences Advising (Information: 452-3752) Those students interested in future health career opportunities are helped through:

1. *Health Careers Advising* provides individual/group counseling, seminars, self-help materials to help students explore the full-range of career opportunities in health. Note: *freshmen* and *sophomores* are urged to use this service as a systematic way for evaluating what is available.

2. *Pre-Medical/Dental Advising Services* assists those students who have narrowed their career focus to gaining admission into medical or dental school. Provides advising, seminars, and establishes and maintains on-request files for letters of recommendation. Note: juniors should check how/when/where of medical/dental school application during the late fall quarter.

Employment Career Planning & Placement provides job-listing, referral, interviewing, and advising services to students seeking employment. Services offered are:

1. *Job Planning* (Information: 452-3750) Individual and group advising helps students relate skills to occupational fields of choice, identify and approach potential employers, and learn job-hunting techniques. Note: this service is recommended for students at all academic levels seeking part-time, summer, or career employment.

2. *Part-Time Employment* (Information: 452-4500) Off-campus part-time employment opportunities are listed which can be used by currently enrolled students and their spouses to earn extra money and explore career possibilities. Other services are:

   a. an On-Call Employment File maintained for students interested in short-duration jobs of an immediate nature;
   b. listings of live-in positions, which offer room and board (and sometimes a small salary) in exchange for work.

   Note: employment *CANNOT* be arranged by correspondence; persistence in checking jobs posted is the best guarantee for finding employment. Foreign students should obtain any necessary work permits from the Office of International Education; students under the age of 18 must obtain a work permit from their local high school or the State Labor Department Office. Freshmen are discouraged from working during their first quarter at UC San Diego.

3. *Full-Time Employment* (Information: 452-3750) Career-related employment listings are received and posted from local, statewide, and national employers.

4. *On-Campus Recruiting Service* (Information: 452-3750) This service affords students the opportunity of talking with representatives from business, government, and graduate/professional schools. Students can interview for particular jobs, or obtain information about types of educational and working opportunities and enterprises available.

5. *Teacher Placement Service* (Information: 452-3750) provides advising, placement files, and educational job listings to those degree candidates and alumni seeking teaching positions, particularly at two- and four-year colleges.

Career Information Library (Information: 452-3750) gives students and alumni self-help access to a large spectrum of career literature on occupations, employers, medical/dental schools, other graduate schools and continuing education programs, and career analyses. Also available is an audio cassette library on health science professions.

On-Campus Student Employment Located at 210 Matthews Campus, On-Campus Student Employment Office is the personnel office for students working under staff (or combination staff and academic) titles on campus. Only currently registered UC San Diego students and those with a Letter of Admission are eligible for referrals to postions listed in this office. Students interested in on-campus employment must complete an information card for use in the Student Employment Office. Employment *CANNOT* be arranged in advance or by correspondence, since the majority of jobs are available at the time they are listed and must be filled immediately. Students taking a full course load are currently limited in the number of hours they may work on campus. Students may be employed full time during the summer months. Freshmen are discouraged but not barred from seeking employment their first quarter at UC San Diego. Students with financial difficulties are urged to confer with the financial aid counselor for their college in the Student Financial Services Office. Foreign students will be asked to obtain a work permit from the Office of International Education before applying for referrals. Work Study placement is handled through the Student Employment Office. Students with Work Study awards may begin to receive Work Study referrals for open positions on September 20.

Financial Assistance

All financial assistance for undergraduate and medical students and need-based aid for graduate students is administered by the Office of Student Financial Services and is described in this section. Information relating to graduate-student support in the form of fellowships and assistantships is presented in the section entitled "Graduate Studies".

The University of California, San Diego, expects that students and their families will bear as much of the necessary cost of the student's education as their circumstances will permit. In those cases where resources are insufficient to meet a normal budget, the Student Financial Services Office will attempt to help students find supplemental financial aid. Applications and requests for information should be addressed to Student Financial Services Office, Q-013, University of California, San Diego, La Jolla, California 92093. (Phone 452-4480)

No student should leave the University for financial reasons before exploring all possible avenues of aid with a financial-aids counselor. Financial assistance, loans, grants and work-study, unless otherwise designated, are processed by the Student Financial Services Office. A Parents' Confidential Statement, tax return, and/or other appropriate documents substantiating need will be required of all students seeking financial assistance. Applications for all forms of financial aid should be submitted to the Student Financial Services Office on time. Note deadline described below.

Parents' Confidential Statement (PCS) To permit an evaluation of need, parents of all entering and continuing students who apply for scholarships are required to provide financial information on the Parents' Confidential Statement. This form should be filed by December 1 with the College Scholarship Service, P.O. Box 1025, Berkeley, California 94701, and must indicate that a report is to be sent to the University of California, San Diego. A word of caution: the filing of the Parents' Confidential Statement does not constitute an application for a scholarship or financial aid.

Independent Students Nationally, in awarding aid, it is assumed that parents are responsible for financial assistance to meet college expenses. A student's desire for independence does not release parents from this responsibility. The student who claims financial independence must:

1. not have been claimed as an exemption by his or her parents for federal or state income-tax purposes for the preceding tax year;

2. not have lived at home for the calendar year preceding the time when he or she expects to receive aid;

3. have some visible means of support and,

4. have severed family ties (the financial assets of the parents must not be available to him or her in excess of $600 per year).

To be considered independent, an applicant under 25 must file each year a notarized Parents' Affidavit of Financial Non-Support signed by the parents or guardian. Applicants must also provide copies of 1040 forms filed by their parents and themselves.

Financial Assistance — Undergraduates

Scholarships The Committee on Undergraduate Scholarships and Honors awards more than 200 scholarships annually to undergraduate students enrolled at the San Diego campus. These scholarships are donated by private individuals, organizations, corporations, and by the Regents of the University.

All scholarship awards are made on a competitive basis, consideration being given to scholastic achievement, financial need (except for students applying for Regent's Honoraria) and promise. Eligibility for a scholarship is determined from the applicant's statements on the application form, appropriate letters of recommendation, official transcripts and the Parents' Confidential Statement, and/or acceptable proof of independence and appropriate 1040 forms.

Applying for a Scholarship Applications are available in the Student Financial Services Office. Completed applications for the following academic year must be returned between December 1 and January 15. Applications postmarked or presented in person after January 15 will not be accepted for scholarship consideration.

Announcement of Awards Scholarship awards are announced by June. Most scholarships are awarded for one year; financial assistance for succeeding years will depend upon the student's academic performance in the University and continuing need. Every effort will be made to offer other assistance, such as loans, grants, etc., to supplement scholarship awards. Applicants with financial need who do not receive scholarships will be considered for loans, grants, and work-study.

Regents' and President's Scholarships The highest honor that may be conferred upon an undergraduate student is the awarding of a Regents' or President's Scholarship. Regents' Scholarships are granted by the President of the University of California and the Chancellor of the San Diego campus, consideration being given to academic excellence and promise. Regents' Scholars receive an initial honorarium of $100, dormitory-assignment preference, and an annual stipend to cover the difference between student resources and the yearly standard cost of education. The term of appointment is four years for students entering from high school and two years for all others.

President's Scholarships, granted by the President of the University of California, are awarded to students of exceptional academic achievement who demonstrate financial need. A President's Scholar can receive up to a $500 stipend. The appointment is for one year only, but a student may reapply each year.

All scholarships aplicants are reviewed for these two major awards. An applicant who wishes to be considered for an honorarium only is not required to submit a Parents' Confidential Statement.

President's Undergraduate Fellowship Program This program is designed to assist unusually talented undergraduate students to carry out special studies and projects under faculty supervision. The prospective fellow and his or her faculty sponsor must submit a project proposal, including a tentative budget, by May 15th preceding the academic year for which the award is to be made. The Chancellor, acting with the advice of the Committee on Undergraduate Scholarships and Honors, will select the fellows by June 1 each year. Stipends will be based on need, to be determined by the cost of the project and the student's own resources.

The Alumni Awards Program The Alumni & Friends, UC San Diego have begun an awards program to honor undergraduate students demonstrating high academic achievement. The awards are granted to individuals selected from applicants by the Committee on Undergraduate Scholarships and Honors and after interviews with the Scholarship Committee of the Alumni & Friends. Students who wish to be considered

for an Alumni Award may file an application with the Student Financial Services Office.

Junior College Transfer Scholarships These are two-year awards made to students transferring from junior college who upon enrollment in the University will have completed 56 or more transferable junior college units and who have a grade-point average of at least 3.0.

Grants

Basic Educational Opportunity Grants (Special Application Required) The Basic Educational Opportunity Grant Program is a federal aid program designed to provide financial assistance to those who need it to attend post-high school educational institutions. Basic Grants are intended to be the "floor" of a financial aid package and may be combined with other forms of aid in order to meet the full costs of education. The amount of your Basic Grant is determined on the basis of your own and your family's financial resources.

You will be eligible for a grant if you meet several important criteria:

1. you have established your financial need by means of the Basic Grant application;

2. you will be enrolled in an undergraduate course of study and have not previously received a Bachelor's degree from any institution;

3. you are a U.S. Citizen or are in the United States for other than a temporary purpose and intend to become a permanent resident or are a permanent resident of the Trust Territories of Pacific Island.

The Basic Educational Opportunity Grant Award is a grant and, unlike a loan, does not have to be repaid. It is estimated that during the 1976-77 academic year the awards will range between $50 and $1000.

The dealine for submitting this application is *March 15, 1977.*

Educational Fee Grants These grants are awarded only to undergratuates in their first year of attendance at the University of California. Students must be California residents and have financial need. Eligible students will receive grants up to a maximum of $100 per quarter for the first three consecutive quarters of attendance.

Improved Access Grants This program is restricted to students who transfer to the University of California from a post-secondary educational institution (with preference to community college transfers) other than the University of California, who have completed (including work in progress) at least 84 quarter units (or 58 semester units) and not more than 135 quarter units (90 semester units) of acceptable transfer

work at the time of admission. To be eligible, a student must have a cumulative grade-point average of not less than 2.0 in acceptable transfer courses and be eligible for financial aid.

College Opportunity Grant (Special Application Required) The College Opportunity Grant is awarded by the State of California to entering undergraduates who are United States citizens and California residents, and who demonstrate financial need. COG awards are renewable and range from $300 to $1,536 per academic year. The award may also include payment of all or part of the UC San Diego registration fees. Individuals wishing further information or applications may contact a high school counselor or write directly to the California Student Aid Commission, College Opportunity Grant Section, 1410 5th Street, Sacramento, California 95814. The 1976-77 deadline was December 6, 1975. Please check with Student Financial Services for current deadlines.

Financial Assistance: Undergraduate and Graduate

College Work/Study Program This federally financed program provides funds for student employment by the University or by public and private non-profit organizations. Students who are U.S. citizens from moderate- and low-income families will be considered. Students who receive work-study awards will receive instructions and job referrals. The Work-Study Program provides experience in many fields, including city planning, mental health, community service in economically depressed areas, recreation, library work, experimental sciences (chemistry, physics, biology, oceanography and related fields), hospital and business administration, and office work. Pay ranges from $2.70 per hour.

President's Work/Study The program is administered in the same manner as the federal program, except that funding is provided by the Regents of the University and the student is limited to on-campus jobs. Foreign students with financial need may apply for this aid.

University of California Grant Program The University of California Grant-In-Aid Program provides non-repayable grants-in-aid to students who demonstrate financial need, without reference to grade-point average.

California State Scholarships and Fellowships (Special Application Required) All financial aid applicants are required to apply for a California State Scholarship. Scholarships are awarded by the State of California to entering and continuing undergraduate students, and awards range from $300 to $600 to be applied toward registration and educational fees. Undergraduates may obtain applications for this program from the UC San Diego Student Financial Services Office, or the California Student Aid Commission, 1410 5th Street, Sacramento, California 95814.

Fellowships are awarded to first and second year graduate students, and awards usually cover total fees required for registration. Graduate students may obtain applications for this program from the UC San Diego Office of Graduate Studies and Research, their major department, or the California Student Aid Commission. GRE scores are required.

Applicants for scholarships and fellowships must be United States citizens and California residents. Awards are based on academic achievement and financial need and usually may be renewed for succeeding years. *The California State Scholarship and Fellowship deadline usually occurs in November or December.*

Loans

Loans are not intended to provide full support, but should be used to supplement other resources. Students with financial need are encouraged to request loan assistance as supplementary aid. Information about all available loans may be obtained from the Student Financial Services Office.

Educational Fee Loan Continuing University of California students who are residents of the State of California and demonstrate financial need may qualify for a deferral of the Educational Fee. Educational Fee loans, depending upon need, can range from $100 to $300 per year for undergraduates and $120 to $360 per year for graduates. Each continuing student who receives financial aid from the University Student Financial Services Office will be offered this Educational Fee loan as part of the award.

Repayment of the Educational Fee loan shall begin nine months subsequent to the completion of a student's higher education, including graduate study. Students who terminate their higher education will be required to begin payment of the loan nine months subsequent to termination. The repayment period may not exceed ten years, and the note will bear interest at the rate of three percent per annum on the unpaid balance beginning nine months after the student leaves school. Minimum quarterly repayment is at least 2½ percent of the total fees deferred or $30, whichever is greater, plus interest. Interest shall not accrue, and payments need not be made in whole or part for a maximum of four years while a student is serving on active duty in the Armed Forces or Action Corps.

Regents' Loan Funds These funds are provided by the Regents of the University to full-time graduate and undergraduate students. The amount of this loan is determined by financial need. Eligible students may receive up to $1,000 per academic year. Students, regardless of age, are required to obtain co-signers. Foreign students may apply for this loan. Regents' loans normally are repayable in 10 equal semi-annual payments beginning upon graduation or withdrawal from the University of California (whichever occurs first) but not later than six months from that date.

Interest at the rate of 3 percent per annum accrues from the beginning of the repayment period.

National Direct Student Loans A student is eligible for a National Direct Student Loan if he or she is a United States Citizen or holds an immigrant visa and is carrying at least one-half the normal full-time academic workload. An undergraduate student may borrow up to $2500 during the first two years. The aggregate sum for all undergraduate studies may not exceed $5000. A graduate or professional student may apply for up to $2500 annually with a $10,000 maximum for his or her total academic career. Loans are granted for educationally related expenses and are intended to supplement a student's resources in order to meet standard costs of attending the University. Students under 18 years of age are required to obtain a co-signer. These loans are interest-free until nine months after graduation or withdrawal from student status. Repayments begin at that time. Minimum repayment is $30 per month, including interest at three precent per annum and may extend up to a ten-year period. Cancellation prior to July 1, 1972 will apply to those loans. Loans made subsequent to June 30, 1973 include cancellation provisions up to 100 percent of the total debt only for those who serve as full-time teachers of disadvantaged or handicapped students in non-profit elementary or secondary schools, as defined by federal guidelines. Staff members in pre-school programs (Headstart) may also qualify for this cancellation benefit, depending upon their salary scale. Members of the Armed Forces may qualify for up to 50 percent cancellation at the rate of 12½ per cent per annum for service in an area of hostilities.

Short Term Loans These funds, made possible by gifts to the University, are granted in small amounts to help students in short-term emergencies, and usually must be repaid within 30 days.

Guaranteed Student Loans (Special Application Required) These loans are available to full- and part-time students who are citizens or nationals of the United States, or persons who are in the United States for other than a temporary purpose and intend to become permanent residents thereof. Undergraduate students may borrow up to $2500 per academic year, subject to bank policy, with a total maximum of $7500 for all years of school. Graduate students may borrow an aggregate sum up to $10,000. The federal government guarantees the loan to the lender in case of death or default of the borrower and, if the student is eligible, will pay the full rate of interest on the loan up until nine months after he or she is no longer enrolled as a full-time student. Interest on a Guaranteed Student Loan is 7% per year. If the adjusted family income is $15,000 or less, the government will pay the interest on loans of $2,000 or less until repayment begins.

If a student wishes to apply for the interest subsidy and the adjusted family income is $15,000 or greater, or if any student wants to apply for the subsidy on a loan greater than $2,000, he or she may submit a Parents' Confidential Statement (PCS for dependent students) or a Student's Financial Statement (SFS for independent students) *with* his or

her application. The Financial Aids Office will perform a needs analysis to determine eligibility for the subsidy. (If a current PCS or SFS is already on file, another need not be submitted.) Repayment starts between nine and twelve months after the borrower leaves school with a minimum monthly payment of $30 with up to a maximum of 10 years of repayment. During repayment, the borrower will pay the interest. Repayment may generally be deferred if the student is continuing his or her education in another accredited institution or is serving in the Armed Forces, or the Action Corps. During such periods of deferment, the federal government will continue to pay the interest if the interest subsidy was approved at the inception of the loan. This loan may be obtained from a participating bank, savings and loan or credit union. Students who may require this assistance should bank where such a loan is available.

Guaranteed Student Loan Applications are available in the Student Financial Services Office, beginning July 1, for the following academic year.

Financial Assistance, Graduate

See section entitled "Graduate Studies."

On-Campus Housing

(Mail Code Q041) Revelle, John Muir, and Fourth College each have residence-hall accommodations. Residence halls are arranged around a suite plan with students sharing a common living-study area. Most of the rooms are designed for double occupancy. The limited single rooms are usually reserved by returning students. The residence-hall contract provides for a mandatory board plan. The cost for room and board is approximately $1,825 plus a $45 deposit for the 1976-77 school year (fall-winter-spring quarters), and will vary depending upon payment plan chosen and type of room accommodation.

Single and double rooms in apartments at John Muir and Third College are available. UC San Diego will offer two-bedroom apartments for two, three or four single undergraduate students. They will be located at the Mesa Apartments approximately a mile and a half from the campus. A board plan is available for all apartment dwellers on an optional basis.

A housing brochure is sent to all interested applicants. A housing contract is sent to all students who are accepted at UC San Diego and who qualify.

The resident dean of the applicable college assigns rooms and apartments in the residence halls. The Housing and Food Services Administration Office, located in Building 206, Matthews Campus, administers housing contracts, accepts housing payments, and handles other details related to housing.

Apartments for married students consist of 56 one-bedroom units and 31 two-bedroom units in the Coast complex, and 256 two-bedroom units in the Mesa complex, with an additional 50 new two-bedroom and three-bedroom units at Mesa. Students with children have priority for all two-bedroom apartments, although some units are presently allocated for married couples without children and single graduate students. The apartments in both complexes are unfurnished except for stoves, refrigerators, disposals, and living-room drapes. Most Mesa apartments are carpeted. Coin-operated washers and dryers are supplied in the community buildings on the apartment grounds. Rental rates for two-bedroom apartments range from $165 to $215 per month including utilities and one parking space.

Accommodations for single graduate students are limited to nineteen single apartments at Coast and a few two-bedroom units at Mesa which can be shared by two to four students. There is a waiting list for the apartments.

You may write to, or apply in person at the Residential Apartments Office, 9258 A Regents Road, La Jolla, Ca. 92093, for brochures and applications for Coast or Mesa apartments at UC San Diego.

The Off-Campus Service Office, Extension 3670, can also assist others in finding suitable accommodations in the surrounding communities of Clairemont, Del Mar, La Jolla, Pacific Beach, and Solana Beach.

OFF-CAMPUS SERVICE OFFICE

Off-Campus Housing This office provides a listing and referral service for students, faculty, and staff from UC San Diego. In addition, legal counseling related to landlord/tenant problems is also available.

Transportation This office is responsible for the Coast Cruiser, a student run bus service. The bus makes regular runs from UC San Diego to Leucadia and back. Bus schedules may be obtained at the Off-Campus Service Office, in the Student Affairs Building, at the University Bookstore, or in any of the UC San Diego libraries.

The San Diego Transit Corporation operates three bus routes to UC San Diego. Two routes originate from downtown San Diego and approach the campus via Pacific Beach and La Jolla, terminating at UC San Diego Mesa Apartments. The third bus route originates at Fashion Valley and approaches the campus from the University City area via Genesee Ave.

For further information regarding either off-campus housing or transportation, contact Nick Aguilar or Gloria Spencer in the Off-Campus Service Office, Student Affairs Building, or phone 452-3670.

Center for the Contemporary Crafts Located in the middle of the campus, the Crafts Center offers studios and art/crafts instructional facilities in ceramics, jewelry, enameling, glass arts, and a photographer's workshop.

Classes are offered without University credit (0 units), enabling students the freedom to explore creative expression in many art media without academic pressures. Registration is at the Crafts Center building, and takes place the first week of each quarter. Specific times and scheduled course offerings can be obtained at the Center.

Office of International Education The Office of International Education has both foreign and domestic functions. It is responsible for the proper documentation of all non-immigrants on the campus, whether they be foreign students, postdoctoral fellows, or faculty. In addition to the official documentation required, the Office of International Education assists with hospitality programs, counseling, and other needs of the foreign community. All new students, researchers, and faculty who are citizens of a country other than the United States are asked to call at the Office of International Education, International Center, Matthews Campus, as soon after their arrival on campus as possible and to bring their passports with them so that their visa status may be verified.

Departments are required to advise the Office of International Education of both the arrival and departure of visiting foreign faculty members.

Office of Religious Affairs The Office of Religious Affairs is a cooperative venture of the religious community to provide religious counseling, coordinate the activities of the various religious student groups, arrange speakers and programs of interest to the general campus, and serve as a theological resource for the educational enterprise. For further information: 507 Matthews Campus, Extension 2521

Recreational Facilities, Department of Physical Education, Gymnasium, Extension 4032 Two gymnasiums, tennis courts, natatorium and playing fields are important centers of campus life and may be used by all students at no charge. Students are entitled to lockers, towel issue, and the use of many items of recreational equipment. A nominal fee is charged for use of the golf driving range (next to the Mesa Apartments) and for sailing privileges at the Santa Clara facility on Mission Bay, as well as for recreational privileges for spouses and children of UC San Diego students.

Recreational Athletics Office, Recreation Gymnasium, Extension 4037
Recreation Supervisors:
Renee Cadena, B.A.
J. Michael Hipp, B.A.
Lee Johnson, Ph.D.
Charles Patrick

Recreation Activities Intramurals provide a diversity of sports in which all students may participate each quarter. Recreation is a popular activity on campus and is perhaps the best method for meeting new friends. Leagues are arranged by the competitive desires of the participants and thus range from the highly skilled to those merely out for exercise and fun with little or no regard for winning. The emphasis is toward coed (men and women on the same team) sports as the department believes the social aspects are every bit as important as the physical ones. Activities include men's and coed competition in flag football, innertube waterpolo, floor hockey, volleyball, basketball, soccer, softball, tennis and kickball. Come and join the fun.

Recreational Clubs The Recreational Athletic Clubs play a varied and active role in the students' life on campus. At present there are twenty-six clubs open for participation. These include: Aikido, Belly Dance, Bicycle, Cheerleaders, Black Tong Society (Kung Fu), Conditioning, Dance Drill Team, Dance Workshop, Fencing, Fitness, Folk Dance, Frisbee, Gymnastics, Israeli Dance, Karate, Muir Outing, Pep Band, Scuba, Snow Ski, Sports Car, Soaring, Surfing, Table Tennis, Tennis, Yoga (Hatha and Kundalini), and Women's Swim Club. Informal meetings and activity sessions are held weekly during the academic year at which films, clinics, speakers, tounaments, trips, special events, dances, carnivals, concerts and business affairs are discussed.

Aquatic Sports The aquatic Center at Santa Clara Point on Mission Bay is only seven miles from campus. Classes are offered in waterskiing, sweep rowing, surfing, scuba diving and sailing (Hobie Cats, Sloops and Cat Rigged). Recreational sailing is also available.

Student Information Center: EDNA University Student Center. Telephone: 452-4636. Hours: 8 a.m.-12 a.m., Monday-Thursday; 8 a.m.-2 a.m., Friday; 9 a.m.-2 a.m., Saturday 10 a.m.-10 p.m., Sunday. The Student Information Center is a central information and referral point for students. If the EDNA staff cannot answer your question, they will refer you to the proper person or agency. Some of their functions are the following:

1. explaining operations of campus offices and maintaining information on student, staff, and faculty locations;

2. maintaining information on all campus events from major concerts to departmental seminars and information on events in San Diego County, from other college campus activities to schedules for the Civic Theater;
3. answering questions regarding academic matters, e.g., classes, registration, academic advisers, and library hours;
4. referring students with personal problems to the appropriate office or center;
5. maintaining information on current issues of interest to the UC community, such as general elections, campus referenda, and special projects on campus;
6. obtaining medical assistance for students at any time of the night or day;
7. providing special services for students which include message relay service, ride board, buy-and-sell service, and recommendations on various services in the area such as restaurants, barbershops, beauty parlors, stores of all kinds, dentists, doctors, legal aid, abortion counseling, drug counseling, draft counseling, auto insurance, bus schedules, plan schedules, etc. They also give suggestions for recreational activities and have information on the San Diego Zoo, Disneyland, Sea World, etc.

Selective Service Although it appears that there will be no draft for a time, any questions about lotteries, classifications, physical examinations, or conscientious objection should continue to be directed to the EOP Office, Student Affairs Building, Extension 4250.

Student Health Service, Extension 3300. Entering students are required to complete a Medical History Form and present evidence of a recent tuberculin skin test prior to registration and to send them to the Student Health Center. The information submitted to the Student Health Service is kept confidential and is carefully reviewed to help provide optimal health care. Students are also urged to submit a physical examination form completed by their family physician, particularly if they plan to enter into intercollegiate athletic competition.

A comprehensive health care program for students is included among the benefits provided by the university registration fee. A well-qualified medical staff is in attendance at the Student Health Center on campus, and students are encouraged to come and discuss any health problem. Professional and confidential attention is assured. Appointments may be made in person or by telephone. Outpatient service is available from 8 a.m. to 11:30 a.m. and 1:00 p.m. to 4:30 p.m., Monday through Friday. Emergency care is made available after hours. Infirmary care is provided at the Student Health Center for illness not requiring hospitalization. Low cost dental and optometric care are also available.

All registered students are automatically covered under a student health insurance program during the fall, winter, and spring quarters. Upon prior authorization from a Student Health Service physician, hospitalization, surgery, and specialist consultation can be obtained as

necessary for acute illness or injury. The faculty of the School of Medicine and the facilities of the University Hospital are extensively utilized in providing this care. Every possible effort is made also to assist students with handicaps or chronic conditions. It should be noted, however, that pre-existing illnesses are not covered by the student health insurance plan.

A comprehensive and economical insurance policy is available for purchase by students for the summer quarter. Registered students may purchase a similar policy for their married spouses and/or dependent children, renewable each quarter.

Medical history froms and physical examination forms are sent to students. Further information on insurance may be obtained at the student health center after arrival on campus. Students should also obtain copies of the *Student Health Almanac,* which explains the operation of the Student Health Service and the insurance program in detail.

The Student Center Phone: 452-4022 8 a.m.-5 p.m. Open: 8 a.m.-12 a.m., Monday-Thursday; 8 a.m.-2 a.m., Friday; 9 a.m.-2 a.m., Saturday; 10 a.m.-10 p.m., Sunday. The Student Center is the central meeting place for members of the UC San Diego community. Step One, which opened in April of 1974, contains the Student Information Center, meeting rooms, lounges and a game room. Also available in this facility are offices for student organizations and various administrative units in Student Affairs. Among these units are the Vice-Chancellor of Student Affairs and Director of the Student Center.

Step Two opened in March of 1976 and has four new buildings. There are two buildings for Student Organizations and Student Coops, a large dining and lounge facility building and a building for Student Affairs units, which include OASIS, EOP, Off-Campus Employment, Arts and Lectures, Student Legal Services, Career Planning and Placement and the Off-Campus Services Office.

Should students desire to create a student organization or need advice on creating a program, the staff of The Student Center offers assistance. Members of the staff will act in an advisory capacity to student organizations, as well as in the interpretation and enforcement of University rules and regulations.

Miscellaneous Services and Facilities

The Alumni & Friends, UC San Diego Former students, their parents, and friends of the University are invited to membership in *The Alumni & Friends, UC San Diego.* More than an alumni association in the customary definition, this organization affords its members broad

participation in University programs. It sponsors a number of vital activities including scholarships, legislative relations and student programs of interest to both the community and the University.

Members of *The Alumni & Friends* enjoy many special benefits, including library privileges on all Unviersity of California campuses, a subscription to UC San Diego, a discount on the first enrollment in a University Extension course or concurrent enrollment, use of UC vacation centers throughout California, participation in special-rate tours, substantial discounts on Department of Drama and La Jolla Civic/University Symphony season tickets, and others.

Students and friends are invited to visit the Alumni Affairs Office, 212 Matthews Campus, or call 452-4490 for further information.

Art Gallery Mandeville Center, Extension 2864 Art Gallery exhibitions cover a wide range of fields, from 18th Century prints and drawings to contemporary works. The Gallery also sponsors performances by modern dancers and readings by contemporary poets. Gallery hours are from 12 noon to 5 p.m. Sunday through Friday.

Bookstore 201 Matthews Campus, The University Bookstore makes available an extensive selection of all types of books including textbooks required for UC San Diego courses, supplementary reading materials, paperback books, technical reference books, medical books and a wide variety of general-interest trade books. In addition, the bookstore carries a full line of sundries and gifts including personal items, snacks, magazines and newspapers, clothing, posters, and school supplies. Hours are 8 a.m. to 4 p.m. Monday through Friday, with special hours during rush periods at the first two weeks of every quarter.

Bus Service Students are encouraged to use available bus services. San Diego Transit Corporation operates three bus lines which serve the campus and pass through adjacent communitites on the way. Route 34 originates in downtown San Diego and serves Ocean Beach, Pacific Beach and La Jolla on the way to UC San Diego where the route terminates. Route 30 is an express which originates in downtown San Diego, travels along I-5, through Pacific Beach and La Jolla on the way to the campus.

Route 41 originates in Fashion Valley and serves Clairemont and University City, passes through the campus and terminates at Del Mar Heights Road north of campus. The Coast Cruiser operated by the campus makes six round trips per day between the campus and Leucadia via Pacific Coast Highway.

For current information and schedules of routes, contact the Transit Coordinator in Building 204 Matthews Campus or call 452-4235.

Check Cashing With proper identification, students may cash personal checks up to $25 for a small charge at the Central Cashier's Office, 401 Matthews Campus (Hours: Monday through Friday, 8 a.m.-3 p.m.), the University Bookstore, 201 Matthews Campus (Hours: Monday through Friday, 8 a.m.-4:45 p.m.), and the Central Box Office, Student Center (Hours: Monday through Friday, 10 a.m.-2 p.m.).

Day Care Center The UC San Diego Day Care Center offers full day care (part-time also available) for UC San Diego affiliated children from as soon as they walk to age 5½. The Center is open five days a week from 7:45 a.m. to 5:15 p.m. For information call Extension 2768, Ms. Foulks, or visit the Center, which is located across the street from Graphics and Reproduction Services, Bldg. 510, Matthews Campus.

Duplicating Services 510 Matthews Campus, Extension 3020 Several kinds of duplicating services are available on the campus. In the Central, Biomedical, Science and Engineering, SIO and Cluster I Libraries, self-service duplicating machines are available at 6 cents a copy. The bookstore has a self-service duplicating machine which makes copies for 10 cents a page.

Students may also use the Graphic and Reproduction Services on a cash basis when the work is directly related to the individual's studies. Requests should be made to Graphic and Reproduction Services, 510 Matthews Campus, or to any of the Quick Copy Centers located at the various colleges, accompanied by a a signed statement that the work is directly related to the academic program. Payment may be made by submitting a check payable to the Regents of the University of California or presenting a cashier's receipt from the Central Cashier's Office, 401 Matthews Campus, in the amount of the total cost of the work performed.

The copier machine located in Graphics and Reproduction Services, 510 Matthews Campus, is especially good for thesis work requiring excellent copy quality. Copies cost 6 cents each and students are required to book in advance for the use of the machine. Payments may be made as stated above.

Food Services A variety of food services is available on the UC San Diego campus. Winzer Commons in the Basic Science Building, the Coffee Hut on Revelle Campus, Revelle Cafeteria and Snack Bar, Muir Cafeteria and Snack Bar, Third College Snack Bar, Student Center Snack Bar and the Matthews Cafeteria and Snack Bar offer a wide selection of meals and snacks. Check individual locations for hours of operation.

Mobile "host" trucks which vend drinks, sandwiches, dairy products, pastries and candies make periodic stops on each of the campuses. The bookstore and the Notions Store (Blake Hall, Revelle Campus) stock a limited selection of foodstuffs and vending machines are located throughout the campus.

Lost and Found 500 Matthews Campus, Extension 4361 Lost and Found is located at the Police Department. Any article found on campus should be taken to the Police Department where it will be placed in Lost and Found.

Parking on Campus 400 Matthews Campus, Extension 4223 Parking permits are required on the UC San Diego main campus from 7 a.m. to 5 p.m. Monday through Friday and at Scripps Institution of Oceanography from 7 a.m. to 5 p.m. every day. This requirement is enforced through the issuance of parking citations payable to the San Diego Municipal Court. Parking permits are available at the Central Cashier, 401 MC, upon proof of vehicle ownership. Rates are the equivalent of $4 per month and must be paid in advance from date of purchase through June 30. A *grace period* is granted at the beginning of the fall quarter (September 20-24, 1976). Students who intend to purchase a parking permit when required may park in student parking areas (identified by yellow stripes) without a permit during the grace period. No other grace periods are granted during the year.

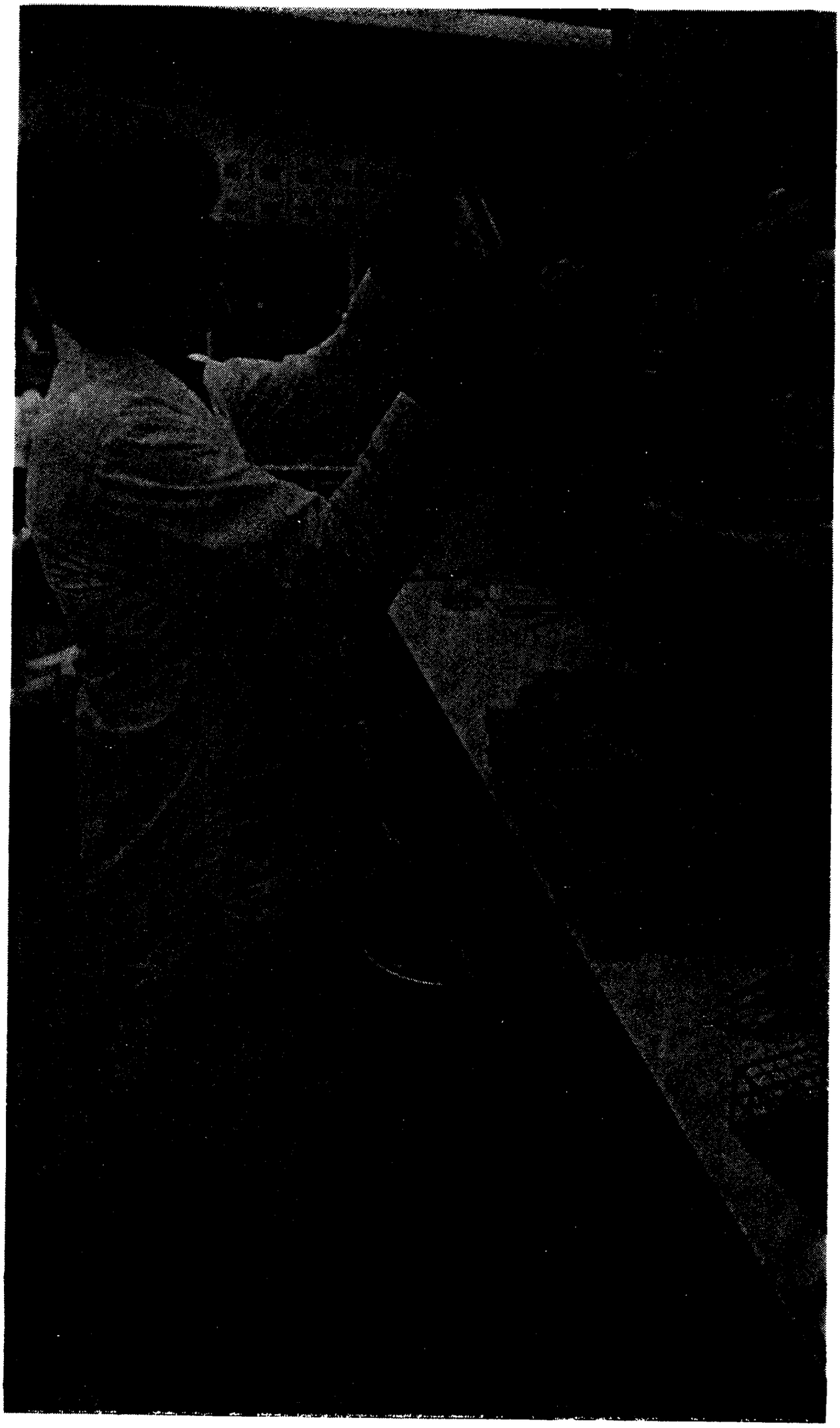
Post Office 104 Argo Hall, Revelle Campus, Extension 2052 The Argo Hall Post Office is a contract station operated under the rules and regulations of the U.S. Postal Service, where stamps, money orders, etc. may be purchased, and parcels and letters mailed. It is open during the following hours:

10:30 a.m.-1:00 p.m., 1:30-4:30 p.m., Monday-Friday.

The post office provides Monday through Saturday distribution of mail to resident students during the academic year.

University Police Department 500 Matthews Campus, EMERGENCY ON-CAMPUS, DIAL HELP (4357), OFF-CAMPUS DIAL, 452-HELP Telephone for Routine Business 452-4360 The University Police Department provides round-the-clock coverage. Along with police duties, officers have advanced first-aid training and are equipped with one of the finest ambulances in San Diego County.

The University Police Department is service-oriented. Its purpose is to promote and protect the individual rights of students, faculty and staff alike by reasonable enforcement of University regulations as well as of state and federal laws.



Research at UC San Diego

Several institutes, centers and projects at UC San Diego promote advanced research programs and provide opportunities for graduate-student support in several broad disciplines, often spanning the areas of knowledge encompassed by several academic departments. The senior staff of these units are faculty members in related academic departments. The study programs of graduate students supported by institutes and centers are administered by the academic departments in which they are enrolled. Institutes and centers presently in operation at UC San Diego are described below.

Organized Research Units — University-Wide Institutes

Institute for Geophysics and Planetary Physics (IGPP) The San Diego branch of the University-wide Institute of Geophysics and Planetary Physics was established in 1960. Present research concentrates on the study of the earth's strain field by measurements of gravity, tilt, displacement, and longitudinal strain; of earthquake mechanisms; of seismicity of the oceans; of the normal modes of the earth; and of tides, waves, turbulence, and circulation in the oceans. The Institute does not grant degrees, but makes its facilities available to graduate students from the various departments who have chosen to write their dissertations on geophysical problems. Members of the Institute staff now hold joint appointments with the Departments of the Scripps Institution of Oceanography, Applied Mechanics and Engineering Sciences and Physics.

Institute of Marine Resources (IMR) was established in 1954 to provide a center at the University of California concerned with marine resources. The broad objective of the Institute is to acquire and disseminate knowledge of the sea's resources, not only the contents and nature of the ocean and its boundaries, but also the social, legal, economic, and political aspects and constraints of its uses. The Institute's programs involve research, education and public service in relation to man's uses of marine resources, including food science, marine products, transportation, recreation, waste disposal, and production of energy, and the processes and conflicts that extend or limit these uses. There are a great many opportunities for graduate students, as the diversity of these subjects indicates. Within the Institute, the Sea Grant College Program offers traineeships to California graduate students in the physical, biological and social sciences to provide experiences in the performance of marine research while completing thesis requirements through their own campus or department. Further information on this and other IMR programs is available from the Scripps Institution of Oceanography Graduate Department.

Organized Research Units — Campus-Wide Institutes

Institute for Information Systems (IIS) is a center for collaborative research for departments concerned with all aspects of information theory, communications research, systems analysis, and related topics. The cooperating units are the Departments of Applied Mechanics and Engineering Sciences, Applied Physics and Information Science, Linguistics, Mathematics, Neurosciences, Psychology, and the Computer Center. The work of IIS is concerned with such topics as information theory, detection theory, information storage and retrieval, general linguistics, human information processing, probability theory, coding in the nervous system, and brain models. Apart from individual and cooperative research projects, the activities of the Institute include interdisciplinary seminars, post-doctoral research and instruction, conferences, and research workshops.

Institute for Pure and Applied Physical Sciences (IPAPS) is an interdisciplinary research unit which brings together members of the Departments of Applied Mechanics and Engineering Sciences, Physics, and Scripps Institution of Oceanography. The Institute is concerned with nuclear physics, hydrodynamics, molecular and solid-state physics, theory of liquids, catalysis, and numerical methods. Specific subjects of research include superconductivity, ferromagnetism, ferroelectricity, phase stability and melting points, plasma physics, hydromagnetics, high-temperature gas dynamics, turbulence, fluid mechanics, nuclear structure and reactions, laser physics, atomic and molecular structure and reactions, and numerical analysis.

Centers

Center for Developmental Biology The object of this Center is to promote teaching and research in the field of developmental biology. Various disciplinary groups within the biomedical sciences are associated with the Center. The common aim of these groups is to study developmental problems in different types of organisms, with approaches ranging from the molecular to the behavioral. Current research and instructional programs are in the field of developmental genetics, photobiology, reproductive biology, cytodifferentiation, biochemical embryology, tissue-tissue interactions, and morphogenesis of subcellular components.

The Energy Center During the 1972-73 academic year, graduate research programs and graduate courses were initiated on energy-production techniques and energy policy. These interdisciplinary activities are being coordinated by faculty members including representatives from the Departments of Applied Mechanics and Engineering Sciences, Applied Physics and Information Science, Biology, Chemistry, Economics, and Physics. A limited number of graduate research assistantships is available for work on energy-related programs. For further information, write to the

chairman of the academic department in which graduate study is to be performed.

Center for Human Information Processing is an autonomous unit of the Institute for Information Systems. It is intended to provide facilities for research and to support research-related activities of psychological and interdisciplinary projects in the areas of perception, psychophysics, attention, memory, detection theory, judgment and choice, information integration, social psychology, and cognitive functions. The work of the Center concentrates on theoretical and research projects, postdoctoral studies, workshops, conferences, and discussion groups.

The Center for Iberian and Latin American Studies (CILAS) coordinates and assists interdisciplinary research and instruction as they relate to the cultures of the Spanish and Portuguese speaking peoples. The staff includes faculty members from the Departments of Anthropology, Community Medicine, Drama, History, The Institute of Geophysics and Planetary Physics, Literature, Political Science, Psychiatry, Sociology, and Visual Arts. The Center operates across these traditional departmental boundaries to encourage inquiry in four sub-areas: the historical cultures of Iberia, the varied experiences of Latin America, the past and present life of the Chicanos of the Southwest U.S., and the problems of interaction of the *Frontera* of borderland region societies of Southern California and Baja California, Mexico.

CILAS research assistants have prepared a guide to selected Ibero-American holdings of the Central Library and compiled an inventory of current research interests of faculty and graduate students for coordination of projects and grant applications. Other activities on the UC San Diego campus include aiding in coordination of Arte Picante: A contemporary Chicano Arts Festival, held during the Winter Quarter of 1976, and sponsorship of speakers for the fall of 1976. The Center is organizing symposia for fall 1976: one symposium planned with "Fronteras 1976," the regional Bicentennial project, is entitled "San Diego de Alcalá: the Colonization of California." This will include the performance of the Lope de Vega dramatic work *San Diego de Alcalá* followed by a scholarly symposium. A second symposium to deal with contemporary Argentina is also being planned.

CILAS is working on the development of projects for extended academic scholarship to be pursued in Spain and Mexico as well as at UC San Diego and is also facilitating exchange for foreign students and faculty. A project for studies on contemporary Spain on this campus in conjuction with the Catédra Seminario Menédez Pidal (an autonomous research institute of the University of Madrid) which sponsors faculty-graduate students humanistic laboratories is being developed. Similar facilities are planned for studies in Mexico, border studies and Chicano research projects on the UC San Diego campus.

Center for Music Experiment and Related Research (CME) was initiated through a grant from the Rockefeller Foundation and is evolving as a continuous process based on four concepts:

Studio for Technical Research — Those engaged in this area will examine the relationship between various aspects of technology and the needs of the arts, both through experiment with existing equipment and through the construction of custom devices.

Studio for Extended Performance — This component will establish a practical interplay between the research of the artist and of the scientist, concentrating on performance as evidence of its efforts.

Colloquium — The colloquium will focus on current interdisciplinary expertise in musico-theatric activity, technological innovation and human behavior. The focus will underlie colloquia, lectures, discussions and demonstrations which will be held on an occasional basis.

Documentary Unit — Two functions are envisioned for this unit: recording and archiving the activities of the Center, and providing public access to these materials through publication.

CME attempts to act as a generator of basic questions and as a deliberate experimental station, trying out various routes and reporting on their character to the public and the profession.

Center for Research in Language Acquisition is an independent unit of the Institute for Information Systems. The focus of the Center is on first and second language acquisition and the many disciplines it involves (e.g., linguistics, psychology, sociology and anthropology). The Center's facilities are designed to accommodate laboratory research projects by the faculty and graduate students. Present research interests are concerned with social variables that affect foreign language acquisition in children, the psycholinguistic characterization of the process of acquisition of sign by deaf children, and psychoacoustic differences between children and adults that co-vary with differences in success in acquiring quasi-native accents in a foreign language.

Projects

Project for Art/Science Studies The Center works closely with the Department of Visual Arts to promote the application of scientific knowledge, research skills, and technology to the practice and scholarship of the arts. Its current study of lasers in the conservation of art is part of the Center's aim to develop a new range of disciplines which might be called the sciences of design. The Center provides a bridge between the UC San Diego community and the larger community of the arts through publications, seminars, and joint projects.

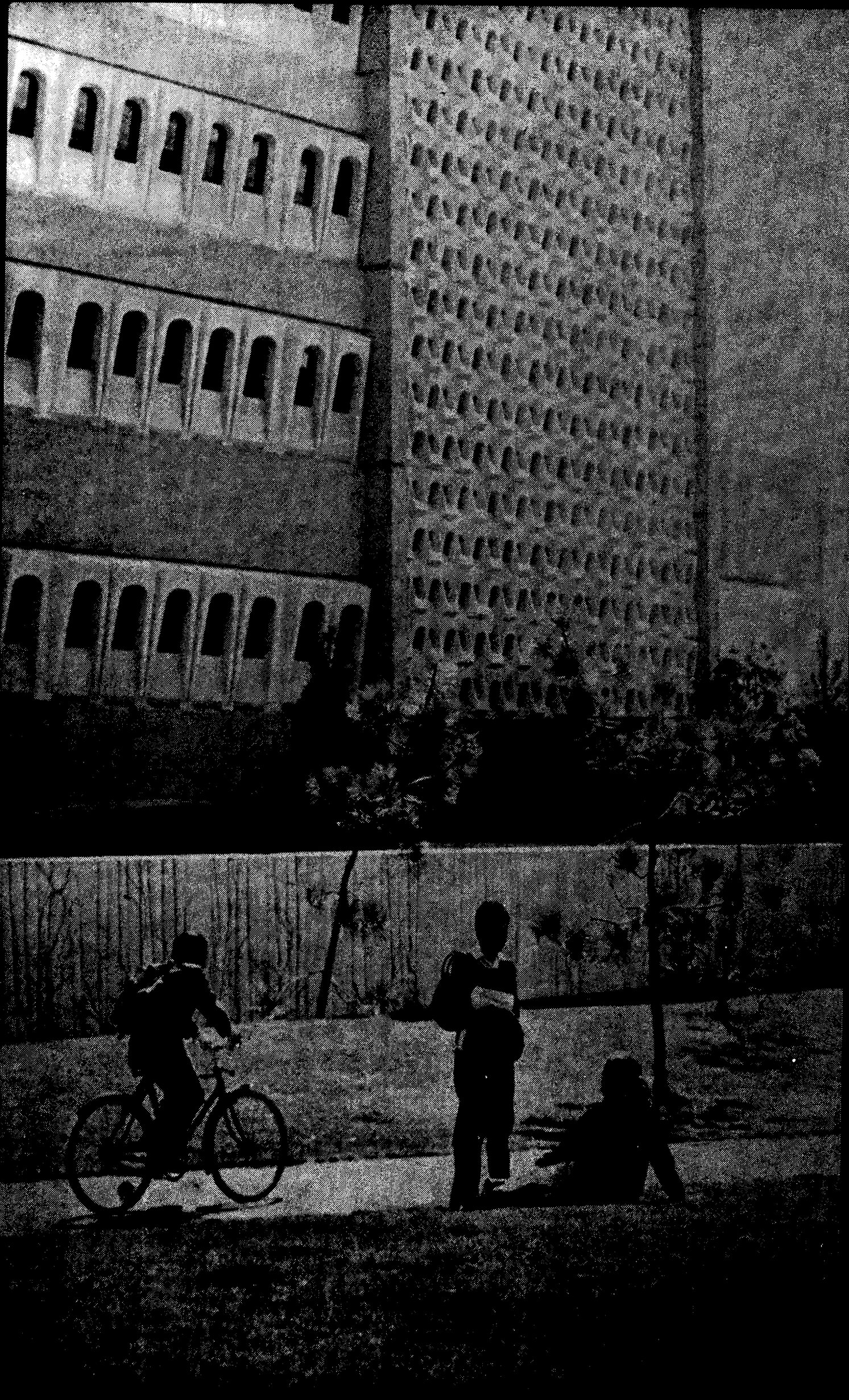
Campus-Wide Research Facilities

The Computer Center The UC San Diego Computer Center operates two major computer systems, both located on the first floor of the AP&M Building in Muir College. The Burroughs B6700 computer offers a wide variety of programming languages and classes of service, and may be reached either by coming to the AP&M Building, or by means of a variety of remote terminals. The CDC3600 is a second-generation computer with excellent facilities in the FORTRAN language. Users may reach a variety of computers located at other universities, including the IBM 360/75 at UCSB and the CDC 7600 at Laurence Berkeley Laboratory.

The Center's facilities are used to support instruction, research, and administrative activities. Most students and research staff members do their own programming. Open shop access is available by job submission via the input/output stations or remote terminals, but large jobs are run under the control of a professional operations staff. Non-credit programming courses are offered at frequent intervals and at various levels of sophistication. These courses supplement the programming instruction available in the credit courses offered by many departments. The Center provides a consulting staff to aid users on special problems. Documents are available on most of the Center's many facilities. The larger manuals are sold through the campus bookstore, while smaller write-ups are available at no charge through the Center's consulting office or the on-line documentation facility.

The Computer Center regularly has a need for a small staff of student programmers, generally to work on the maintenance or development of large system programs, or utility library programs. Occasionally, part-time employment in the Center provides support for students working on advanced degrees in information and computer science.

The University Library See page 120.



The School of Medicine

The School of Medicine offered its first internship and residency programs in July, 1966, and enrolled the charter class of undergraduate medical students in September, 1968. This class graduated in June, 1972. The ninth freshman class will be enrolled in September, 1976. The Basic Science Building, Administrative Wing, and Biomedical Library of the Medical School Complex on the La Jolla campus are completed, and the 850-bed Veterans Administration Hospital opened in February, 1972. Construction of a new Medical Teaching Facility will commence shortly. The 350-bed University Hospital in Hillcrest is continually being enlarged, modernized, and modified in accord with its new and changing roles, and construction of additional Clinical Teaching Facilities is well under way. The building program and faculty acquisition are thus approaching "steady state". Freshman student enrollment increased to 96 in 1974. Thus, a total annual enrollment of almost 400 medical students is expected by 1977. Freshman enrollment will reach 128 students within one to three years thereafter.

The UC San Diego School of Medicine curriculum takes advantage of unique opportunities for integration of teaching and research that exist on this campus, where the Medical School and the University are developing simultaneously. According to the Medical School's academic master plan, some positions are assigned to the general campus for faculty whose scientific interests relate to medicine and human biology. These faculty members are appointed to the campus Departments of Applied Mechanics and Engineering Sciences, Biology, Chemistry, Economics, Mathematics, Physics, Psychology, Scripps Institution of Oceanography, and Sociology. They occupy School of Medicine space, teach in the medical curriculum, create special courses, and contribute to interdisciplinary teaching, emphasizing areas of their disciplines most useful to medical students.

The main purpose of the curriculum is to develop critical, objective, and humane physicians equipped to meet change and to continue self-education. Students acquire understanding of basic medical sciences and clinical disciplines, and are encouraged to choose their own specialized areas of interest for eventual development into careers in the broadly diversified medical community. Individual student capabilities are enhanced through access to the best facilities and personalized counseling. Thus, the curriculum provides flexibility; form and content are adapted to individual needs of each student.

The curriculum is divided into two major components: the Core Curriculum and the Elective Programs. The two are pursued concurrently throughout the four years of schooling, the Core Curriculum predominating in the early years, and the Elective Program in the latter. The Core Curriculum includes those aspects of medical education deemed essential to every medical student, regardless of background or ultimate career direction. In the first two years, this part of the work includes courses in

biomathematics, cell biology and biochemistry, organ physiology and pharmacology, neurosciences, pathology/microbiology/epidemiology, human anatomy, social and behavioral sciences, and an introduction to clinical medicine. At faculty option, students with advanced training in a core discipline may take additional work in this or another area, utilize available time to overcome deficits in preparation, or begin independent study. In the last two years, core courses in clinical medicine include the major clinical specialities taught in hospital settings, clinics, and diverse health-centered programs in the community. Students are involved in the clinical facilities for much of the time they are engaged in learning diagnosis and therapy. The role of medicine and of the physician in society is also studied.

Elective programs provide choices suited to each student's background, ability, and career objectives. Each student is expected to choose a "Concentration Area" suited to his or her needs, and combining didactic, clinical, field, library and research experiences at UC San Diego or elsewhere. Electives occupy about a fourth of students' time in the first two years and more than half their time in the last two years. Students must demonstrate competency in their Concentration Areas prior to graduation. In general, this takes the form of written reports prepared as though for publication, but another format may be selected after consultation with faculty.

With faculty approval, students may accelerate or decelerate their progress through the curriculum in accord with their educational backgrounds, abilities, and career objectives.

Selection Factors

Selection is based on the applicant's scholastic record, letters of recommendation, performance on the Medical College Admission Test, and personal interviews.

To insure that applicants with the potential to become qualified physicians are not refused admission simply because of financial need or remedial academic deficiency, the school enrolls a limited number of promising disadvantaged students, provides appropriate tutorial services, and maintains a comprehensive financial assistance program.

A complete catalog and information on the foregoing programs are available upon request to:

The Office of Admissions
UC San Diego School of Medicine M-006
University of California, San Diego
La Jolla, California 92093

Programs for Prospective Medical Students

UC San Diego offers no special premedical major. An undergraduate student considering medicine as a career may choose any major or concentration leading to the bachelor's degree, provided he or she elects those additional courses which the medical school of his or her choice may require for admission. Admission requirements differ among medical schools, but most desire a solid foundation in the natural sciences—biology, chemistry, physics, mathematics—and a broad background in the humanities, social sciences and communication skills. A premedical/dental advisory program is available through the campus-wide Career-Education Planning Services.

The Scripps Institution of Oceanography

The Scripps Institution was originally an independent biological research laboratory. It became an integral part of the University of California in 1912 and at that time was given the Scripps name in recognition of the interest and financial support of Miss Ellen Browning Scripps and Mr. E. W. Scripps. The scientific scope of its research has grown to embrace physical, chemical, geological and geophysical studies of the oceans as well as biological studies. Continuing investigations are conducted of the topography and composition of the ocean bottom, of waves and currents, and of the flow and interchange of matter betrween seawater and the ocean bottom or the atmosphere. Its own research ships have extended the geographic scope from the Institution's beach and the adjacent coastal waters to all of the world's oceans.

The education program has grown hand in hand with the research program. Instruction is on the graduate level only, and students are not usually admitted except as candidates for the Ph.D. Although there is a rapid rate of increase, there are relatively few persons with graduate degrees in oceanography currently active as marine scientists, of whom a significant portion are Scripps graduates. Their studies are marked by a high degree of interdisciplinary and international collaboration. Many nationalities are represented among the staff and student body.

Cruises of the Institution's six research vessels vary from local, limited-objective trips to 'round-the-world expeditions. For example, during early 1976, R/V *Alpha Helix* will work off the coast of Peru, in a cooperative analysis of coastal upwelling ecosystems with the University of Washington, Duke University, and the Instituto del Mar, of Peru. For the remainder of the year and through May 1977, scientists aboard the vessel will be conducting physical oceanography, biological, and physiological research in the Amazon River Basin, from the Atlantic Ocean to an area some 2,000 miles up the river. R/V *Melville* will operate in the Central Equatorial Pacific during 1976, and R/V *Thomas Washington* will conduct geophysical investigations in the western Pacific, in Indonesian and Japanese waters, and in the Philippine Sea.

Academic work is conducted through the SIO Department and its seven curricular groups: biological oceanography, physical oceanography, marine biology, geological sciences, marine chemistry, geophysics, and applied ocean sciences. The seventy-six professors are complemented by an academic staff of more than a hundred research scientists, many of whom have a regularly scheduled part in the instructional program.

Investigations supported by contracts and grants funded from extra-University sources, primarily federal, cover a wide latitude of marine research. The general research effort is conducted by three divisions, designated Marine Biology Research Division; Geological Research Division; and Ocean Research Division, including the Geochemical Ocean

Sections Study (GEOSECS) and North Pacific Experiment (NORPAX) programs. The diversity of their work is extended by three special-purpose laboratories: the Marine Physical Laboratory, the Physiological Research Laboratory, and the Visibility Laboratory, and by other specialized groups such as the Deep Sea Drilling Project and by the Marine Life Research Group, sponsored by the State of California. A ship operations and marine technical support unit provides essential services and facilities to all research units of the Institution, and also administers the scientific collections.

Organizationally separate, but closely affiliated and in proximity to Scripps, are the La Jolla Laboratory of the University of California's Institute of Geophysics and Planetary Physics and the Institute of Marine Resources. The Institute of Marine Resources administers two programs in addition to its regular research programs: UC's Sea Grant College Program, with thirty-seven projects supported on six of the nine campuses; and the Food Chain Research Group. The Southwest Fisheries Center, located on the San Diego campus, is one of thirty major laboratories and centers operated by the National Marine Fisheries Service, a component of the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce. SFC also is headquarters for the Inter-American Tropical Tuna Commission. There is also a developing relationship with the UC San Diego School of Medicine, as exemplified by joint faculty appointments and the establishment of a Neurobiology Unit.

The combination of a large scientific staff and extensive facilities provides an extraordinary opportunity for the small student body (approximately 185) to enjoy close contact with existing oceanographic concepts and active participation in research.

See "Scripps Institution of Oceanography" in "Departments of Instruction" for further details regarding programs of study, requirements, degrees and courses. For additional information, write:

Graduate Student Information
Scripps Institution of Oceanography
1166 Ritter Hall, A-008
University of California, San Diego
La Jolla California 92093

The Faculty of Scripps Institution of Oceanography

NAME	TITLE	DEPARTMENT
Anderson, Victor C., Ph.D.	Professor	APIS
Arrhenius, Gustaf O., Ph.D., D.Sc.	Professor	SIO
Arthur, Robert S. Ph.D.	Professor	SIO
Backus, George E., Ph.D.	Professor	SIO
Bada, Jeffrey, Ph.D.	Associate Professor	SIO
Benson, Andrew A., Ph.D.	Professor	SIO
Berger, Wolfgang H., Ph.D.	Associate Professor	SIO

Bradner, Hugh, Ph.D.	Professor	AMES
Bramlette, Milton N., Ph.D.	Professor Emeritus	SIO
Brune, James N., Ph.D.	Professor	SIO
Bullard, Edward C., Ph.D.	Professor Emeritus	SIO
Bullock, Theodore H., Ph.D.	Professor	Neurosciences
Cox, Charles S., Ph.D.	Professor	SIO
Craig, Harmon, Ph.D.	Professor	SIO
Curray, Joseph R., Ph.D.	Professor	SIO
Davis, Russ E., Ph.D.	Associate Professor	SIO
Dayton, Paul K., Ph.D.	Assistant Professor	SIO
Duntley, Seibert Q., Sc.D.	Professor	SIO
Engel, A. E. J., Ph.D.	Professor	SIO
Enright, James T., Ph.D.	Professor	SIO
Epel, David, Ph.D.	Professor	SIO
Fager, E.W., Ph.D., D. Phil.	Professor Emeritus	SIO
Faulkner, D.J., Ph.D.	Associate Professor	SIO
Fox, Denis L., Ph.D.	Professor Emeritus	SIO
Gibson, Carl H., Ph.D.	Associate Professor	AMES/SIO
Gieskes, Joris M. T. M., Ph.D.	Associate Professorr	SIO
Gilbert, J. Freeman, Ph.D.	Professor	SIO
Goldberg, Edward D., Ph.D.	Professor	SIO
Goodman, Daniel, Ph.D.	Assistant Professor	SIO
Guza, Robert T., Ph.D.	Assistant Profesor	SIO
Hammel, Harold T., Ph.D.	Professor	SIO/Medical
Haubrich, Richard A., Ph.D.	Professor	SIO
Hawkins, James W., Jr., Ph.D.	Associate Professor	SIO
Haxo, F.T., Ph.D.	Professor	SIO
Heiligenberg, Walter F., Ph.D.	Associate Professor	SIO
Hendershott, Myrl C., Ph.D.	Associate Professor	SIO
Hessler, Robert R., Ph.D.	Professor	SIO
Holland, Nicholas D., Ph.D.	Associate Professor	SIO
Hubbs, Carl L., Ph.D.	Professor Emeritus	SIO
Inman, Douglas L., Ph.D.	Professor	SIO
Isaacs, John D., B.S.	Professor	SIO
Johnson, Martin W., Ph.D.	Professor Emeritus	SIO
Jordan, Thomas H., Ph.D.	Assistant Professor	SIO
Kastner, Miriam, Ph.D.	Assistant Professor	SIO
Keeling, Charles D., Ph.D.	Professor	SIO
Lal, Devendra, Ph.D.	Professor	SIO
Lewin, Ralph A., Ph.D., Sc.D.	Professor	SIO
Macdougall, J. D., Ph.D.	Assistant Professor	SIO
McGowan, John A., Ph.D.	Professor	SIO

Menard, H. William, Ph.D.	Professor	SIO
Mudie, John D., Ph.D.	Associate Professor	SIO
Mullin, Michael M., Ph.D.	Associate Professor	SIO
Munk, Walter H., Ph.D.	Professor	SIO
Nealson, Kenneth, Ph.D.	Assistant Professor	SIO
Newman, William A., Ph.D.	Professor	SIO
Nierenberg, William A., Ph.D.	Professor, Director of the Institution	Physics
Parker, Robert L., Ph.D.	Professor	SIO
Peterson, Melvin N. A., Ph.D.	Associate Professor	SIO
Phleger, Fred B Ph.D.	Professor	SIO
Raitt, Russell W., Ph.D.	Pofessor Emeritus	SIO
Rakestraw, Norris W., Ph.D.	Professor Emeritus	SIO
Reid, Joseph L., M.S.	Professor	SIO
Revelle, Roger R., Ph.D.	Professor, Recalled to Active Duty	
	Director Emeritus	SIO
Rosenblatt, Richard H., Ph.D.	Professor	SIO
Scholander, P. F., M. D., Ph.D.	Professor Emeritus	SIO
Shepard, Francis P., Ph.D.	Professor Emeritus	SIO
Shor, George G., Jr., Ph.D.	Professor	SIO
Somero, George N., Ph.D.	Assistant Professor	SIO
Spiess, Fred N., Ph.D.	Professor	SIO
Vacquier, Victor, M.A.	Professor Emeritus	SIO
Van Atta, Charles W., Ph.D.	Professor	AMES/SIO
Volcani, Benjamin E., Ph.,D.	Professor	SIO
Wheelock, Charles D., M.S.	Professor Emeritus	SIO
Winant, Clinton D., Ph.D.	Assistant Professor	SIO
Winterer, Edward L., Ph.D.	Professor	SIO
ZoBell, Claude E., Ph.D.	Professor Emeritus	SIO

University Professors

University Professor *Melvin Calvin,*
Director
Laboratory of Chemical Biodynamics
Lawrence Berkeley Laboratory
UC Berkeley
Berkeley, CA 94720

University Professor *Murray Krieger*
Department of English &
Comparative Literature
Humanities Office Building
UC Irvine
Irvine, CA 92664

University Professor *Josephine Miles*
Department of English
454 Wheeler Hall
UC Berkeley
Berkeley, CA 94720

University Professor *Glenn Seaborg*
Department of Chemistry
446 Latimer Hall
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Berkeley, CA 94720

University Professor *Neil Smelser*
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University Professor *Edward Teller*
501F Building 111; P.O. Box 808
Lawrence Livermore Laboratory
Livermore, CA 94550

University Professor
Charles Townes
Department of Physics
557 Birge Hall
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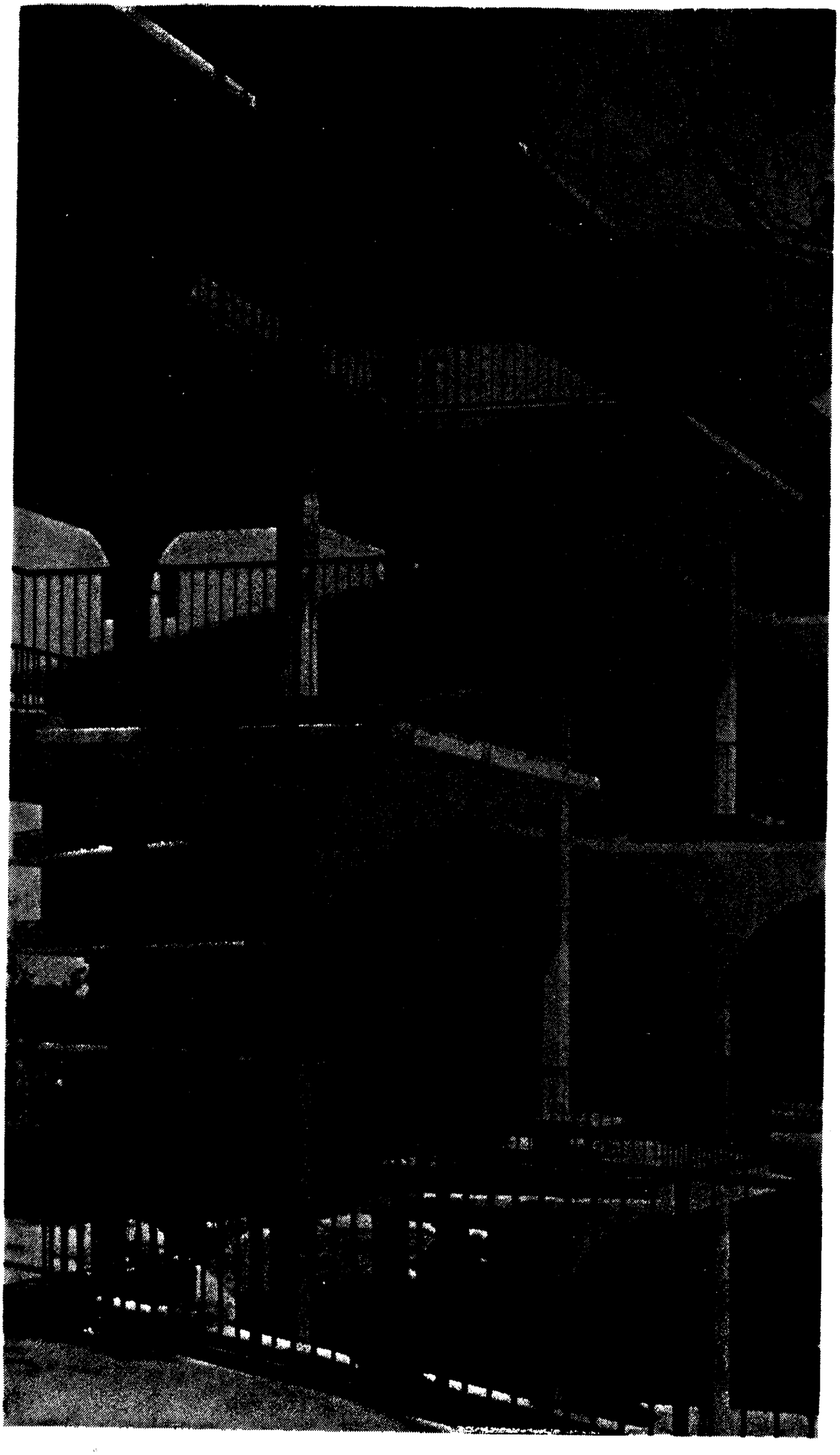
Berkeley, CA 94720

University Professor *Harold Urey*
Department of Chemistry
5314 Mayer Hall
UC San Diego
La Jolla, CA 92093

University Professor
Sherwood Washburn
Department of Anthropology
232 Kroeber Hall
UC Berkeley
Berkeley, CA 94720

University Professor *Lynn White Jr.*
Department of History
6345 Bunche Hall
UCLA
Los Angeles, CA 90024



Courses, Curricula, Programs of Instruction

Anthropology

OFFICE: 8012 Humanities and Social Sciences Building C-001

Professors:
F. G. Bailey, Ph.D.
Roy G. D'Andrade, Ph.D. *(Chairman)*
Robert I. Levy, M.D.
Gananath Obeyesekere, Ph.D.
Theodore Schwartz, Ph.D.
Melford E. Spiro, Ph.D.
Marc J. Swartz, Ph.D.

Associate Professors:
David K. Jordan, Ph.D.
Michael Meeker, Ph.D.

Assistant Professors:
Joyce E. Justus, Ph.D.
Julie M. Taylor, Ph.D.
Donald F. Tuzin, Ph.D.
Shirley C. Strum, Ph.D.

Associated Faculty:
Lola Romanucci-Ross, Ph.D. *Associate Professor, Community Medicine*

Anthropology, the "study of man", is a humanistic social science dedicated to understanding physical and cultural diversity in the species. With generally increased awareness of the importance of cultural factors in domestic and international relations, a bachelor's degree in anthropology has become accepted as a valuable preparation for careers in law, medicine, education, business, government and various areas of public service. At UC San Diego, the concentration is on cultural, social and psychological anthropology, with theoretical emphases on such topics as culture process and identity, social systems, politics, the family and — to an extent that is unusual among anthropology departments — cognitive and personality psychology. Specialties are also available in urban and applied studies, and in primatology and physical anthropology. Courses utilize a comparative perspective, drawing on materials from a wide variety of cultural settings, especially Sub-Saharan Africa, the Near East, Asia, Europe, the Caribbean, Latin America and the islands of the Pacific. The department offers an undergraduate major program, a senior honors program, and a graduate program leading to the doctoral degree.

Lower Division Lower-division offerings in anthropology are concentrated in a series of four courses, offered annually, and numbered AN 22, AN 23, AN 24, and AN 25. Collectively, the courses are designed to provide a comprehensive orientation to the ideas and methods of anthropological investigation and a familiarity with case materials from a number of different societies. Whereas any three of these fulfill the social science requirement for the various colleges, students who anticipate majoring in anthropology are particularly advised to take AN 22, which is the prerequisite for most upper-division courses offered by the department.

Effective fall quarter 1971, students who have already completed Anthropology 105, 106 and 107 may not receive academic credit for Anthropology 22, 23, or 24.

The Major To receive a B.A. degree with a major in anthropology, the student must meet the requirements of Revelle, Muir, Third or Fourth College, including the following requirements of the Department of Anthropology:

1. a minimum of 12 upper-division courses in the Department of Anthropology must be completed;
2. Anthropology 105, 106, and 107 must be completed (included as three of the 12 courses required under No. 1, above). All or some of the courses in this sequence are prerequisites for some other upper-division courses. This sequence consists of:
   105 Analysis of Social Systems
   106 Cultural Systems
   107 Personality Systems in Anthropological Theory;
3. effective April 1, 1975, Anthropology 112 must be completed (included as one of the 12 courses required under No. 1 above). (This does not apply to students who declared an anthropology major prior to April 1, 1975.) (The prerequisite to this series is Anthropology 22 or Introductory Anthropology at another university.);
4. beginning fall quarter, 1972, no courses taken in fulfillment of the above requirements may be taken on a pass/no pass (P/NP) basis. (An exception is made for some courses accepted from other schools and for one 199 course. However, this exception does not extend to Anthropology 105, 106, and 107, or to transfer credits accepted in lieu of them. These *must* be taken for a grade.);

5. not more than two Special Studies courses (198, 199) may be counted by any one student towards an anthropology major. This limitation does not apply to Special Studies courses taken during or before the fall quarter, 1973. Effective spring 1975, only one Independent Study course (199) may be counted towards an anthropology major.

6. for the B.A. degree, a minimum average of 2.0 (C) is required, both as an overall average in all anthropology courses and in the AN 105-106-107 sequence considered separately.

Department Honors Program Students are awarded departmental honors upon successful completion of a senior honors thesis, undertaken in addition to the regular major requirements. The thesis is prepared during three successive quarters of AN 196 (Honors Thesis Research) under supervision of a faculty committee. Students are admitted to the program by approval of the anthropology faculty. Under normal circumstances eligibility for the program requires that the student (1) complete eight upper-division anthropology courses by the end of the junior year, three of which must be the core sequence (AN 105, AN 106, AN 107), and (2) achieve Grade Point Averages of at least 3.60 (overall) and 3.80 (anthropology) by the end of the junior year. Interested students should apply to the department's undergraduate adviser by the end of the sixth week of the quarter prior to their advancement to senior standing.

The Graduate Program The Department of Anthropology offers training in social, cultural, and psychological anthropology. The aim of the graduate program is to give the student the theoretical background and methodological skills necessary for advanced research in the study of society and culture.

Doctoral Program For Ph.D. candidacy, the department requires successful completion of the following requirements:

1. The Systems Sequence
   205 Analysis of Social Systems
   206 Theory and Analysis of Cultural Systems
   207 Personality Systems in Anthropological Theory
2. The Research Practicum Sequence
   209 Research in Psychological Anthropology
   210 Ethnographic Field Methods
3. Intellectual History Sequence
   231 Seminar on Social Theory
   253 History of Anthropology
4. Six elective courses
5. Completion of Plan A or Plan B

Plan A and Plan B are designed to equip the student with intellectual skills of use to anthropologists. The two plans are alternatives to each other. A student is understood to elect Plan A until such time as approval is received for a project under Plan B, as described below.

Plan A consists of one quarter of linguistics*, and successful completion of examinations at a prescribed level in statistics and in a scholarly language. Students must have the prior approval of their departmental committees for the language on which they wish to be examined. Students submitting French, German, Russian, or Spanish for examination will take standardized Educational Testing Service administered several times a year through the Office of the Registrar. A passing score is 500. Students submitting other languages for examination will be examined by the Department of Linguistics, where personnel are available to administer the test. All tests are based on reading knowledge only.

* A number of options are provided each year in the Department of Linguistics. Consult the graduate adviser for details.

A student who elects Plan B will advise the departmental committee in writing of an intellectual skill which is needed for his or her research work together with plan for acquiring that skill, including the means by which the committee can evaluate the student's performance. This proposal, after approval by the departmental committee, will be presented to the faculty. Given faculty approval, the student may substitute successful completion of this plan for Plan A.

Progression to the Degree During the first two years of residence, students are required to take at least two courses in Anthropology each quarter (excluding Anthro 298 and Anthro 500). In the first year the student is expected to complete the Systems Sequence (Anthro 205, Anthro 206, Anthro 207); the Ethnographic Field Methods course (Anthro 210); and the Social Theory seminar (Anthro 231). During the

second year the student is expected to complete the Research Seminar in Psychological Anthropology (Anthro 209) and the History of Anthropology course (Anthro 253). In spring of the second year the student will normally select a departmental adviser.

Evaluation Each student is evaluated by the faculty during April of the first and second year to determine whether the student should continue in the program. As a minimum prerequisite to continue from the first year to the second year, a student must maintain a 3.0 GPA, and as a prerequisite for successful completion of the second year, the student must have a GPA or 3.5. The evaluation of the student will be based upon both grades and professional potential.

In consultation with the departmental adviser, the student will form a departmental committee consisting of three department members including the departmental adviser, and begin to prepare a dissertation research proposal. Typically during the third year of residence a student will present a dissertation research proposal to the departmental committee. The dissertation research proposal sets forth a specific plan of research, normally involving intensive field work. Upon approval of the research proposal, the student will stand for an oral qualifying exam. The oral qualifying exam is administered by the student's doctoral committee, which normally consists of the student's adviser as chairman, the members of the departmental committee, and two faculty members, one of whom must be tenured, from outside the department. This examination will cover general areas of anthropology related to the specific issues raised by the research proposal.

Upon completion of the research project, the student will write a dissertation. The student will then take the final dissertation orals. The examination may not be conducted earlier than three quarters from the date of advancement to candidacy. Revisions may be indicated, requiring this examination to be taken more than once.

Teaching In order to acquire adequate teaching experience, each student is required to participate in the teaching activities of the department one quarter during each of the student's first three years in residence as a graduate student in the department. Enrollment in Anthro 500 fulfills this requirement.

Master's Degree Program Typically, students will be accepted only for the Ph.D. Students in the doctoral program may, however, qualify for the M.A. The M.A. will be awarded at the end of the second year on the basis of the general faculty evaluation and a master's examination. Students entering with an M.A. in Anthropology will complete the same requirements as other students, but may not receive a second master's degree.

Courses

Lower Division

12. Chinese Society and Culture (4)
A description and interpretation of the major institutions and culture patterns of traditional China. (Not to be offered 1975-1976).

22. Introduction to the Study of Man (4)
An introduction to the anthropological approach to the understanding of human behavior, with an examination of data from a selection of societies and cultures.

23. Social Structure and Change (4)
Examination of the problem of the maintenance of and change in human societies and other groups: factionalism, acculturation, assimilation, social evolution, urbanization, religious movements, and economic development.

24. Religion, Symbolism, Ideology and Personality (4)
Examination of the roles of symbolism and ideology in human life with particular attention to religion and other organized systems of belief and practice.

25. Introduction to Human Evolution (4)
As an introduction to human evolution from the perspective of physical anthropology, this course considers evolutionary theory and time, evolution of the primates, evolution of the hominids. Emphasis placed on evidence from fossil remains and from behavioral studies of living primates.

Upper Division

100. Development of Primate Perspectives (4)
An approach to understanding human behavior through the investigation of the social behavior of living monkeys and apes. Historical review of primate studies with emphasis on changes in interpretation of social patterns. *Prerequisites: Anthropology 25 or 159; not open to students who have completed Anthropology 154.*

101. Models of Social Behavior in Animals and Man (4)
An overview of theories of animal social behavior with attention to new developments in primate behavior. Evaluation of current popular books on human behavior. *Prerequisite: Anthropology 100 or 154.*

102. Seminar in Applied Anthropology (4)
Survey of anthropological studies intended for application to policy, planning or evaluation of programs for sociocultural change. In addition to theory and method, special consideration will be given to social, political and ethical-moral problems in applied social science. *Prerequisites: Anthropology major, at least three anthro courses, and department approval.*

103. Problems in Chinese Ethnology (4)
Course will consider a different general area of the ethnology of China each year. May be taken for credit three times. *Prerequisite: permission of instructor.*

105. Analysis of Social Systems (4)
A systematic analysis of social systems and of the concepts and constructs required for cross-cultural and comparative study of human societies. *Prerequisite: Anthropology 22 or introductory anthropology at another university.*

106. Cultural Systems (4)
This course considers the nature of culture; its evolution, forms and processes; the variation and distribution of its content among the individuals of a society; the evaluation of cultures as adaptive and fulfilling systems. *Prerequisite: Anthropology 22 or 105 or introductory anthropology at another university or consent of instructor.*

107. Personality Systems in Anthropological Theory (4)
Consideration of inter-relationships of aspects of individual personality and various aspects of sociocultural systems. The relation of sociocultural contexts to motives, values, cognition, personal adjustment, stress and pathology, and to qualities of personal experience will be emphasized. *Prerequisites: Anthropology 22 or 105, and 106.*

110. Issues in Physical Anthropology (4)
This is a special seminar for students who wish to explore special topics in physical anthropology. The course focus will change from year to year. May be repeated one time for credit. *Prerequisites: Anthropology 25 or 100 and one other course in physical anthropology and instructor's permission.*

112. Quantitative Techniques in Anthropology (4)
An introduction to the use of descriptive statistics in the analysis of social and cultural data, including discussion of problems of measurement and application of non-parametric techniques. *Prerequisites: AN 22 or introductory anthropology at another university.*

115. The Nuclear Family (4)
Through lectures and readings students will be brought to examine the ways in which nuclear families function in a variety of different settings. Particular attention will be given to the cultural aspects of family life. *Prerequisite: Anthropology 22 or introductory anthropology at another university.*

116. Urban Anthropology (4)
The evolution, form, systemics and culture of the city as artifact and environment for its component individuals, groups, and communities, explored in terms of the methods and perspective of anthropology.

117. Religious Cults and Social Movements (4)
Religious cults and social movements will be studied particularly as they enter into rapid cultural and social change. Relations between cults and movements in form and process will be examined in a variety of specific cases. *Prerequisite: Anthropology 22 or introductory anthropology at another university.* (Not to be offered 1976-77).

118. Cognitive Anthropology (4)
Course will consider the relation between cultural behavior and cognitive processes. Selected topics from the fields of ethno-science, semantic and grammatical analysis, decision-making, and belief systems will be discussed. *Prerequisite: Anthropology 22 or introductory anthropology at another university.* (Not to be offered 1976-77).

119. Social and Cultural Change (4)
Theories of social evolution, diffusion, acculturation, pattern dynamics, innovation, revitalization and revolution, and modernization are examined, and illustrated with cross-cultural materials. *Prerequisites: Anthropology 22 or 23 and uppper-division standing.* (Not to be offered 1976-77).

120. Buddhism and Society (4)
Buddhism as an ideology and an institution in relationship to the society, cultural, and personality in which it is found. *Prerequisites: upper-division standing; major in social science or humanities.*

121. Women in Cross-Cultural Perspective (4)
A comparative and analytic study of the ways women function in a variety of settings. Particular attention will be given to the cultural aspects of women's roles. *Prerequisites: AN 22 or introductory anthropology at another university.*

124. Sex and Culture (4)
This course will deal with cultural and psychological factors in sexual behavior and sex-related roles both within and beyond the social context of the family. The course will have an evolutionary and cross-cultural perspective and will examine as well cultural trends in sexual behavior and sex roles in our own society. *Prerequisites: one lower-division course in anthropology and at least one upper-division course in anthropology.* (Not to be offered 1976-77).

125. Language and Culture (4)
This course explores language acquisition, idolects, social dialects, levels of linguistics usage, language and old-world view, the role of language in cultural interaction and social structure and planned language change, including language problems in new nations and at an international level.

127. Race, Culture and Identity (4)
Consideration of race, ethnicity, and culture as these are conceived and used by men in various societies to form the bases of individual and group identities. *Prerequisites: AN 22 or introductory anthropology at another university.* (Not to be offered 1976-77).

130. Economics and Anthropology (4)
This course will examine the basic assumptions of economic and sociocultural models of human behavior and compare the explanatory effectiveness of each. Applications of both types of models to historical and contemporary material will be presented. *Prerequisites: AN 22 or introductory anthropology at another university.* (Not to be offered 1976-77).

131 Social Theory (4)
The course will deal with the social theories of some major figures in social science: Marx Weber, Pareto, Simmel, Durkheim, G. H. Mead. Their relevance for current theory will be discussed in detail. *Prerequisites: Anthropology 22 or introductory anthropology at another university; Anthropology 105, 106, 107; major in anthropology; senior standing, and permission of instructor.* (Not to be offered 1976-77).

133. Politics and Society in Modern India (4)
Political activity and the growth of political institutions during the independence movement and subsequently, in relation to indigenous social systems. *Prerequisite: Anthropology 135.* (Not to be offered 1976-77).

135. Indian Society (4)
A study of the social structure of India, with particular reference to caste and political organization. *Prerequisite: upper-division standing.*

136. Caribbean Society and Culture (4)
A study of the comparative implications of migration, slavery, and colonialism and the contributions of various immigrant groups to the development of national cultures.

137. Societies and Cultures of Melanesia (4)
Consideration of the history and development of Melanesia and of selected societies within that area of the Pacific with particular reference to the cultures and social struc-

tures which have developed in that area. *Prerequisite: Anthropology 22 or introductory anthropology at another university.* (Not to be offered 1976-77).

141. Religion and Society (4)
A comparative study of religion as a cultural system. The analysis will focus on the relationship between religion and its social and psychological determinants, and its social and psychological functions. Materials are drawn from Western and non-Western, and primitive and high religions alike. *Prerequisites: AN 22 or introductory anthropology at another university.*

147. Ritual and Symbolism (4)
An examination of the place of symbols in the ritual systems of large-and small-scale societies, and a critical evaluation of theoretical models commonly applied to their analysis and interpretation. *Prerequisite: Anthropology 22 or introductory anthropology at another university.* (Not to be offered 1976-77).

149. Hinduism and Himalayan Buddhism (4)
The particular form of Buddhism found in the Himalayan area will be compared to Buddhism. The perspective will be one which looks at religious phenomena from both their social and their psychological aspects. *Prerequisite: Anthropology 22 or introductory anthropology at another university.*

153. History of Anthropology (4)
An overview of the development of anthropology with particular emphasis on developments centering around the concepts "culture," "society," and "personality." *Prerequisite: previous upper-division work in anthropology.*

156. Kinship and Descent (4)
This course reviews the approaches of British, French, and American anthropology to the subjects of kinship and descent, while also incorporating the relevant findings of behavioral biology and developmental psychology. *Prerequisite: Anthropology 22 (or equivalent).* (Not to be offered 1976-77).

158. Psychoanalytic Anthropology (4)
A critical examination of the anthropological works of Freud and of selected Freudian anthropologists and an assessment of their influence on anthropological theory. *Prerequisite: Anthropology major, anthropology 105, 106 and 107.* (Not to be offered 1976-77).

159. Biological Anthropology (4)
A discussion of the major areas of interest to physical anthropology. Emphasis is on the synthesis of evolutionary theory, primate and hominid fossils and primate behavior for an understanding of human evolution. *Prerequisite: Anthropology 22 or introductory anthropology at another university; not open to students who have completed 25.*

160. Ecstatic Religion (4)
This course deals with the analysis of such phenomena as spirit possession, shamanism, prophecy, trance and related topics. Emphasis will be on the relationship between the individual's motives and the cultural form in which they are expressed, The cultural and social contexts of ecstatic religion as well as the sociological factors underlying the transformation of one type of ecstatic religion into another will also be considered. *Prerequisite: permission of instructor.*

162. Ethnology of the Near East (4)
An introduction to the social and political traditions of the tribal and peasant peoples of the Near East. Some attention will be devoted to an interpretation of the oral literature of these peoples as a means for understanding these traditions. *Prerequisite: one course in anthropology here or elsewhere.*

163. Politics and Culture (4)
The problems of analyzing political events within a specific cultural context are explored. The readings include political ethnographies and political literature from the Mediterranean area, the Near East, Africa, Southeast Asia, and Mexico. *Prerequisite: one course in anthropology here or elsewhere.*

164. Political Myth in Latin America: 1) Fieldwork and Methodology (4)
Methods of recording and analyzing political myth and symbolism in urban society, emphasizing the role of mythic patterns in current politics. *Prerequisite: AN 22 or introductory anthropology at another university.*

165. Political Myth in Latin America: 2) Theoretical Framework (4)
Examination of political symbolism in contexts of ideology, history, myth, and political culture. Exploration of the relations of political myth with spheres considered "political" and "neo-political" in our culture. *Prerequisite: AN 22 or introductory anthropology at another university.*

166. Islam and Islamic Societies (4)
An introduction to the historical and sociological study of societies with Islamic traditions and a discussion of the social and political problems associated with such societies. *Prerequisite: AN 22 or introductory anthropology at another university.*

167. Anthropological Perspective on History (4)
Will consider relations between the two fields illustrated by contemporary Latin American popular versions of history and contrasting academic versions. Concentration on the relative "reality" of tradition, history, and myth. *Prerequisite: AN 22 or introductory anthropology at another university.*

196. Honors Thesis Research (4)
Independent preparation of a senior honors thesis under the supervision of a faculty committee. This course may be repeated twice in succession during the senior year. *Prerequisite: prior admission to the department's undergraduate honors program.*

198. Directed Group Study (2 or 4)
Directed group study on a topic or in a field not included in the regular departmental curriculum by special arrangement with a faculty member. *Prerequisites: consent of instructor and upper-division standing.*

199. Independent Study (2-4)
Independent study and research under the direction of a member of the staff. *Prerequisite: special permission of instructor.*

Graduate

201. Seminar in Theories of Aggression (3)
Current theories of aggression in the behavioral sciences, and their application to the comparative analysis of society. (Not to be offered 1976-77).

203. Cultural Analysis of Interpersonal Behavior (3)
A variety of approaches to the study of interpersonal behavior will be examined, with an emphasis on the way in which interpersonal behavior is perceived and understood. Video-tape and other recording techniques will be employed. *Prerequisite: graduate standing in anthropology or consent of instructor.* (Not to be offered 1976-77).

204. Applied Anthropology (3)
This seminar will deal concretely with the application of anthropological theory and method to issues of public policy and public concern. It will particularly deal with the role of the anthropologist in such settings and the ethical concerns of applied social science. *Prerequisite: Graduate standing.*

205. Analysis of Social Systems (6)
A systematic analysis of social systems, and of the concepts and constructs required for cross-cultural and comparative study of human societies. *Prerequisite: graduate standing in social science or humanities.*

206. Theory and Analysis of Cultural Systems (6)
The course will intensively survey theories of the nature of culture, its forms and transformations, and the analysis of culture in behavior. *Prerequisite: Anthropology 205.*

207. Personality Systems in Anthropological Theory (6)
Consideration of inter-relationships of aspects of individual personality and various aspects of sociocultural systems. The relation of sociocultural contexts to motives, values, cognition, personal adjustment, stress and pathology, and to qualities of personal experience will be emphasized. *Prerequisites: Anthropology 205 and 206.*

209. Research in Psychological Anthropology (1-6)
An introduction to a wide range of techniques including interview, observation, and testing leading to psychological inferences about groups and individuals in a cross-cultural context. *Prerequisite: graduate standing in anthropology.*

210. Ethnographic Field Methods (1-6)
This seminar provides graduate students with an opportunity to use and discuss the main field methods in social and cultural anthropology and to consider the problems associated with these methods. The genealogical method, various types of interviewing, and observational techniques will be among those discussed and employed by students in the practicum which is part of the course. *Prerequisite: graduate standing in anthropology.*

212. Topics in Formal Analysis (3)
Examination of selected problem areas with respect to the application of formal techniques of analysis. *Prerequisites: graduate standing in anthropology; a basic course in statistics and computer science or consent of instructor* (Not to be offered 1976-77).

213. Orientation in Culture Change (3)
This seminar studies the role of goals, means, expectations, morale and other cultural and psychological states and constructs orienting culture change. Religious cults, social and political movements will be examined as vehicles of oriented culture change. (Not to be offered 1976-77).

215. Affective Culture (3)
A research seminar considering studies of games, riddles, and other expressive activities as these occur in various societies. Attention will be given to the attractiveness of different sorts of expressive activities under different conditions of child socialization, social structure, and economic activity. *Prerequisite: limited to graduate students in anthropology.* (Not to be offered 1976-77).

216. Theory and Methods in Urban Anthropology (3)
The course will survey relevant theory, methods and research opportunities and needs in the comparative, systemic, or problem-related research in both Western and non-Western urban settlements. (Not to be offered 1976-77).

218. Cognitive Anthropology (3)
This course will consider the relation between cultural behavior and cognitive processes. Selected topics from the fields of ethnoscience, semantic and grammatical analysis, decision-making, and belief systems will be discussed. *Prerequisite: graduate standing in anthropology or psychology.* (Not to be offered 1976-77).

220. Buddhism and Society (3)
Buddhism as an ideology and an institution in relation to the society, culture and personality in which it is found. *Prerequisite: graduate standing in social science or humanities.*

224. Selected Research Topics in Culture and Cognition (3)
The course will allow students to participate in the analysis and interpretation of data on cognitive development and acculturation from a non-Western society, in the review of related cross-culture literature on cognition and in the collection, locally, of comparable data. *Prerequisites: advanced background in relevant disciplines and an interview with the instructor.* (Not to be offered 1976-77).

225. Aspects of Linguistic Anthropology (3)
Designed to follow an introduction to general linguistics, this course focuses on the use made of linguistic methods, theories, and data by anthropologists from about 1920 to date, with particular emphasis on contemporary studies of the social use of language. *Prerequisite: an introductory course in linguistics.* (Not to be offered 1976-77).

226. Research Seminar in Psychological Anthropology (3)
This is a seminar dealing concretely with the implementation of psychological research variables in cross-cultural or social structural contexts. It will particularly deal with problems of assessment, measurement, and analysis in sociocultural research relation to cognition, personality and psychopathology. *Prerequisite: interview with with the instructor.* (Not to be offered 1976-77).

227. Seminar in Methods and Psychosocial Theory (3)
This course deals with the relation between data-gathering and psychological perspective on social experience. *Prerequisite: graduate study in anthropology or social sciences. Permission of instructor required.*

228. The Nuclear Family in Cross-Cultural Perspective (3)
This course is a seminar which will deal with the ways family statuses work in different societies regarding the distribution of authority, the presence or absence of conflict in various areas of life, and how resources from outside the family are brought to bear on family problems by different members of the group. *Prerequisite: graduate standing in anthropology or permission of instructor.*

229. Seminar on Religion (3)
The seminar will examine in detail one or two major issues in the Anthropology of Religion, as for example a theoretical problem like secularization and social change or a more substantive one like Shamanism. Students will be notified in advance regarding the seminar topic. *Prerequisite: graduate standing.* (Not to be offered 1976-77)

231. Social Theory and Social Anthropology (3)
This seminar will discuss the impact of the major social theorists on social anthropological thinking. Emphasis will be on Marx, Weber, and Durkheim. Selected anthropological monographs showing the influence of these theories will also be discussed. *Prerequisite: graduate standing in anthropology or instructor's permission.*

235. Caste and Stratification (3)
An examination of theories which purport to explain the Indian caste system; their relations to theories of stratification in other societies; caste, race, and class.

236. The Myth of Kinship (3)
A criticism of the science of social relationships from a semeiological point of view. The origins and evolution of such a science are traced in the writings of Durkheim, Mauss, and Levi-Strauss.

238. Culture, Cognition and Intelligence (3)
This seminar will consider the now extensive literature on the effects of culture on cognition in their bearing on the controversial question of possible group differences in intelligence. *Prerequisites: AN 106, 107 or AN 206, 207 or permission of instructor.*

241. Religion and Society (3)
A structural-functional analysis of religious belief and ritual, with special emphasis on modes of explanation. Readings will stress the anthropological classics. *Prerequisites: graduate standing, major in social sciences or humanities.* (Not to be offered 1976-77).

242. Religion, Social Change and Secularization (3)
The seminar will critically examine a popular view in social science that certain conditions — the development of science, secular education and rationality — will result in the erosion of religion and the emergence of secular society. Alternative theoretical approaches to religious change will be discussed. *Prerequisite: graduate standing.*

245. Anthropological Perspectives on Symbolism and Ritual (3)
Through a critical review of prevailing anthropological perspectives, the seminar explores the nature of symbols — their social, cultural and psychological dimensions, and their incorporation into ritual performances. *Prerequisites: graduate standing in anthropology or consent of instructor.*

246. Special Topics in Primate Behavior (3)
Specialized topics of interest to students of human behavior will be considered in relationship to information on non-human primates. *Prerequisite: graduate standing in anthropology.*

247. History as Cultural Myth (3)
An anthropological approach to history in cross-cultural and diachronic comparative perspectives. Ideas such as historicism will be seen as basic cultural myths in our society. Relevance of these areas of study to fieldwork in historical complex societies will be considered. *Prerequisite: graduate standing.*

249. Major Religions of the Himalayas (3)
This course will lead students through advanced topics based on a comparison of Himalayan Hinduism, and Buddhism. The emphasis will be both psychological and sociological.

251. Conflict and Collusion: Some Themes in Political Anthropology (3)
An examination of political processes at the local level with emphasis on examining supports for various aspects of the processes considered (e.g., leadership, factionalism, etc.). Readings will stress case studies and theory. *Prerequisites: graduate standing, major in social science.* (Not to be offered 1976-77).

253. History of Anthropology (3)
A treatment of selected themes in the intellectual history of anthropology with a review of various approaches that have been used to analyse the emergence of man's modern ideas about himself. *Prerequisite: graduate standing in anthropology.*

255. The Anthropology of Modernization (3)
Theories of modernization with reference to particular case studies. Methodological considerations in the study of modernization from the perspective of anthropology. (Not to be offered 1976-77).

258. Psychoanalytic Anthropology (3)
A critical survey of the psychoanalytic approach to selected topics in anthropology, such as totemism, religion, social character, and so on. Readings will consist of the anthropological works of Freud and of Freudian anthropologists. *Prerequisite: graduate standing in anthropology.*

260. Ecstatic Religion (3)
This course deals with the analysis of such phenomena as spirit possession, shamanism, prophecy, trance and related topics. Emphasis will be on the relationship between the individual's motives and the cultural form in which they are expressed. The cultural and social contexts of ecstatic religion as well as the sociological factors underlying the transformation of one type of ecstatic religion into another will be considered. *Prerequisites; graduate standing in anthropology and permission of instructor.*

226. Dynamics of Culture (3)
A consideration of the conceptualization of man's primary means of adaptation. Various views of "culture" will be examined from the point of view of their ability to illuminate behavior in different societies.

270. Psychiatry and Anthropology (3)
Introduction to inerviewing and diagnostic techniques in psychiatry and their application to anthropological research. Content will vary from quarter to quarter and course may be repeated 3 times for credit. *Prerequisites: graduate standing in anthropology and consent of instructor.* (Not to be offered 1976-77).

271. Current Problems in Anthropological Theory (3)
This course is a seminar in which students will consider the theoretical issues receiving particular attention in current anthropological journals and monographs. *Prerequisite: graduate standing in anthropology.*

272. Current Problems in Cross-Cultural Studies (3)
This seminar will examine cross-cultural studies from the perspective of the theoretical and methodological issues each poses. *Prerequisite: graduate standing in anthropology.*

273. Current Problems in Ethnographic Studies (3)
This seminar will examine ethnographic studies from the perspective of the theoretical and methodological issues each poses. *Prerequisite: graduate standing in anthropology.*

296. Fieldwork Proposal Preparation (3)
The student will work in cooperation with his Departmental Committee to develop a research proposal for his doctoral research project. The course will normally be taken in the winter and/or spring quarters of the second year, and may not normally be taken more than twice. Satisfactory/Unsatisfactory grades only. *Prerequisites: graduate standing in anthropology; permission of instructor.*

297. Research Practicum (1-4)
Supervised advanced research studies with individual topics to be selected according to the student's special interests.

298. Independent Study (1-12)
(Satisfactory/Unsatisfactory grades permitted.)

299. Thesis Research (1-12)
Prerequisite: Ph.D. candidate. (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching (1-4)
The course, designed to meet the needs of graduate students who serve as TA's, includes analyses of texts and materials, discussion of teaching techniques, conducting discussion sections, formulation to topics and questions for papers and examinations, and grading papers and examinations under the supervision of the instructor assigned to the course. Participation in the undergraduate teaching program is required for the Ph.D. degree. The amount of teaching required is equivalent to the duties expected of a 0.50 teaching assistant for one quarter in each of the student's first three years as a graduate student in the department. Enrollment for 4 units in this course documents the requirement.

Applied Mechanics and Engineering Sciences (AMES)

OFFICE: 5202 Urey Hall

Professors:
H. Bradner, Ph.D.
A.T. Ellis, Ph.D
Y.C. Fung, Ph.D.
G.A. Hegemier, Ph.D.
P.A. Libby, Ph.D.
S.-C. Lin, Ph.D.
J.W. Miles, Ph.D.
W. Nachbar, Ph.D.
D.B. Olfe, Ph.D.
S.S. Penner, Ph.D.
E. Reissner, D. Eng., Ph.D.
R.E. Roberson, Ph.D. *(Chairman)*
A.M. Schneider, Sc.D.
C.W. Van Atta, Ph.D.
F.A. Williams, Ph.D.
B.W. Zweifach, Ph.D.

Associate Professors:
C.H. Gibson, Ph.D.
M. Intaglietta, Ph.D.
D.R. Miller, Ph.D.
S. Rand, Ph.D.
H.W. Sorenson, Ph.D.

Assistant Professors:
G.A. Frazier, Ph.D.
D.A. Gough, Ph.D.
J.E. Luco, Ph.D.

W.B. Bush, Ph.D., *Research Engineer and Lecturer (1976-present)*
F.H. Champagne, Ph.D., *Associate Research Engineer and Lecturer (1971-present)*
J.W. Covell, M.D., *Associate Professor of Medicine and Bioengineering*
D.L. Franklin, Ph.D., *Associate Adjunct Professor of Medicine and Bioengineering*
C.A. Friehe, Ph.D., *Assistant Research Engineer and Lecturer (1970-present)*
A. Fronek, M.D., Ph.D., *Professor of Surgery and Bioengineering*
K. Fronek, M.D., Ph.D., *Research Physiologist and Lecturer (1968-present)*
A.S. Gordon, Ph.D., *Adjunct Professor of Engineering Chemistry*
H.J. Granger, Ph.D., *Visiting Associate Professor of Bioengineering*
K.N. Helland, Ph.D., Assistant Research Engineer and Assistant Adjunct Professor
A.R. Hochstim, Ph.D., *Visiting Professor of Engineering Physics*
J.P. Howe, Ph.D., *Adjunct Professor of Nuclear Engineering*
J.C. LaRue, Ph.D., *Assistant Research Engineer and Assistant Adjunct Professor*
R.M. Peters, Ph.D., *Professor of Surgery and Bioengineering*
J.G. Pinto, Ph.D., *Assistant Research Engineer and Lecturer (Spring 1976)*
K.G.P. Sulzmann, Ph.,D., *Research Engineer*
C.P. Wang, Ph.D., *Associate Adjunct Professor*
J.B. West, M.D., Ph.D., *Professor of Medicine and Bioengineering*
S.L.-Y. Woo, *Associate Professor of Surgery and Bioengineering in Residence*
M.R.-T. Yen, *Assistant Research Bioengineer*

The current instructional and research programs emphasize bioengineering, gas dymanics, engineering physics, fluid mechanics, solid mechanics and structures, and systems science. The graduate program is characterized by strong interdisciplinary relationships with the Departments of Physics, Mathematics, Biology, Chemistry, and Applied Physics and Information Sciences, with the School of Medicine, and with associated campus institutes such as the Institute for Geophysics and Planetary Physics, the Institute for Pure and Applied Physical Sciences, and the Scripps Institution of Oceanography.

The Undergraduate Program (General)

The Department of Applied Mechanics and Engineering Sciences offers two separate undergraduate programs: one, an upper division major in applied science; the other, a four year program in engineering. Either Bachelor of Arts or Bachelor of Science degrees are awarded for each program depending on the student's collegiate affiliation. The details of these programs will be described separately later; here, we present general information for AMES undergraduates.

All AMES undergraduates with suitable academic standing are encouraged to plan their academic programs to provide for a fifth year of study leading to an M.S. degree. For students matriculating in the applied sciences program, the M.S. degree should be considered a first professional degree. In some cases, AMES students may be able to take several first-year graduate courses during their senior year. AMES faculty advisers will be able to advise students in this regard.

AMES faculty are assigned for each class of students and for each AMES program. These advisers, as far as possible in view of leaves of absence, remain with the same set of students during their undergraduate careers at UC San Diego. Students are urged to meet with their advisers regularly.

More flexible undergraduate programs can be arranged, but deviations from any program requirements listed below require a petition approved by the AMES faculty adviser and the AMES department chairman.

All students majoring in AMES are required to develop a basic competence in the use of the digital computer to solve scientific and technical problems. Several upper division AMES courses require programming ability. Students are strongly advised to demonstrate this competence by completing APIS 61; students not doing so are required to consult the chairman about other means for satisfying this requirement, e.g., by means of a Computer Center, noncredit programming course, computational experience in connection with a laboratory project, or self-study.

AMES students may fulfill part of their degree requirements by use of AMES 199, Independent Study for Undergraduates, under the guidance of an AMES faculty member. Students may propose to a faculty member a research or study topic or may avail themselves of the list of suitable topics issued by the department each Fall Quarter. After obtaining the faculty member's concurrence on the topic and scope of the study, the student must execute an authorization form available from the departmental office.

To fulfill the departmental scholastic requirement, the grade-point for each required course in the AMES undergraduate programs (minimum graduation requirements) must be at least 2.0 in addition to an overall grade-point average of at least 2.0.

Graduates of junior colleges may enter either the applied sciences or engineering program in their junior year. Transter students should be mindful when planning their program of the lower division course requirements for meeting their collegiate and major requirements.

AMES offers several minors for Fourth College students. In collaboration with the Department of Physics, a minor for nonscience students entitled Scientific Perspectives is offered. In addition, for students in the social sciences and in the pure and applied sciences, minors in applied mechanics and systems science are available.

Undergraduate students wishing to arrange a sequence of AMES courses to satisfy minor requirements or to meet particular academic interests are urged to consult the AMES chairman for referral to the relevant AMES faculty member.

The Undergraduate Program (Applied Sciences) The Department of AMES offers programs of study at the upper division level* in applied sciences. Normally, the degree of Bachelor of Arts (Applied Sciences) is awarded upon satisfactory completion of this program and of the student's collegiate requirements. However, students of Third and Fourth College may be awarded the degree of Bachelor of Science (Applied Sciences) upon such completion.

*While in lower division, properly qualified students may elect certain courses in upper division AMES programs and may be admitted to an AMES major upon approval by the AMES faculty adviser.

These programs emphasize engineering science and thus provide basic training for engineers in aerospace, civil and mechanical engineering, systems engineering, and bioengineering and for students intending to use undergraduate training in engineering as preparation for postgraduate professional training in business administration, law, and medicine.

There are three undergraduate programs. The applied mechanics program provides training in solid and fluid mechanics and in dynamics with application to the engineering fields based on mechanics, i.e., aerospace, and civil and mechanical engineering. The systems science program provides the student with the fundamental concepts and tools required for the analysis and/or optimal synthesis of complex and broad engineering, physical, and social systems. Such problems, often involving automatic control, arise in numerous industrial and public contexts. The bioengineering program prepares the stu-

dent either for the engineering aspects of medical care and research or for professional training in medical school.

All students who expect to major in one of the AMES programs are strongly advised to take Mathematics 2DA and 2EA in their sophomore year. Preparation for an AMES major is completion of the Revelle Natural Science sequence or Muir Science 3A-B and Science 4A-B-C. Students considering either the applied mechanics or the bioengineering programs are also advised to take Natural Science 2F or Science 3C in their sophomore year.

Third College students planning to take an AMES upper division major should consult with the AMES adviser in Third College as soon as possible after enrollment at UC San Diego. Such students must complete Mathematics 2DA and 2EA; other prerequisite courses are assigned on an individual basis by the AMES/Third College adviser.

Students not in the Third College but anticipating enrollment in the AMES upper division major and wishing to strengthen their preparation in the engineering sciences relevant for such a major, should take AMES 16A-B in their sophomore year.

As a minimum graduation requirement, a student qualifying for a major in AMES must pass 18 upper division courses. Normally, 15 of these courses must be in the AMES department (or in biology or chemistry, in the case of bioengineering). The requirement of 15 AMES courses is satisfied by the required courses in each regular AMES undergraduate program. Applied Mechanics majors may count AMES 12 as one required course. The remainder of these courses in these programs are to be chosen from electives that may be selected either from the list of approved technical electives, or in other areas selected in consultation with the AMES faculty adviser. Students with superior records are encouraged to take courses beyond the minimum number, including graduate courses, with special emphasis on the offerings of the Departments of Applied Physics and Information Science, Biology, Chemistry, Mathematics, Physics, and Economics. Advisers should be consulted on suitable courses.

Transfer students who have taken equivalent courses elsewhere may have transfer credit approved towards the minimum graduation requirement, but they must pass at least six upper division or graduate courses (each graduate course having three or more quarter units) in AMES. More than six AMES courses may be required of transfer students at the discretion of the AMES faculty adviser.

Applied Mechanics Program A student following the applied mechanics program is required to take a coordinated group of ten courses in fluid dynamics (AMES 101A-101B), solid mechanics and structures (AMES 130A-130B), particle and rigid-body dynamics (AMES 121A), thermodynamics (AMES 12), linear systems analysis (AMES 163A), and problem solving methodology in applied mechanics (AMES 105A-105B-105C). The applied mechanics program also requires five more advanced courses, AMES 150A, 175A-B, 101C, 130C, 132 or 121B.

Applied Mechanics

FALL	WINTER	SPRING
Junior Year†		
AMES 105A	AMES 105B	AMES 105C
AMES 130A	AMES 130B	AMES 12
AMES 163A	AMES 121A	AMES 121B*
**		
Senior Year		
AMES 101A	AMES 101B	AMES 101C* or
	AMES 150A	AMES 130C* or
AMES 175A	AMES 175B	AMES 132*
Technical Electives		
AMES 100	AMES 102	AMES 111
		AMES 132
	AMES 141A	AMES 141B
	AMES 142A	AMES 142B
AMES 149A	AMES 149B	AMES 149C
		AMES 150B
AMES 162A	AMES 162B	AMES 162C
	AMES 163B	AMES 163C
	AMES 171	
	AMES 173	AMES 172
		AMES 175C
AMES 180A	AMES 180B	AMES 180C
APIS 101A	APIS 101B	APIS 101C
	APIS 119A	APIS 119B
	APIS 120	
APIS 161A	APIS 161B	APIS 161C
Chem 130	Chem 131	Chem 132
		Chem 150
Math 131	Math 132A	Math 132B
Math 170A	Math 170B	Math 170C
Math 180A	Math 180B	Math 180C
	Math 181A	Math 181B
Phys. 100A	Phys. 100B	Phys. 100C
Phys. 116		
Phys. 130A	Phys. 130B	Phys. 130C

†While in lower division, properly qualified students may elect certain courses in upper divison AMES programs and may be admitted to an AMES major upon approval by the AMES faculty adviser.

*A student normally is required to take either AMES 101C or AMES 130C, AMES 132 (AMES 130C or AMES 132 may be taken in the spring quarter of either the junior

or senior year). However, a student may petition to replace any of AMES 101C, 121B, 130C and/or 132 by alternative courses with approval of the AMES faculty adviser.

**Mathematics 2DA if not completed in sophomore year; Mathematics 2EA is a recommended elective.

Bioengineering Program A student following the engineering program in bioengineering is required, during the junior year, to take a sequence in applied mathematics, AMES 105A-B, and a sequence in mechanics, with applications to biology and physiology, AMES 100, 172, 173. Students who anticipate using computer science as a serious tool should strengthen the departmental requirement for APIS 61 and should elect a course such as AMES 142A-B. A systematic overview of biology is essential and preferably should be taken during the junior year. This would then allow the student to take additional elective in biology, such as Mammalian Physiology 149A-B during the senior year. It is important that bioengineers have a working knowledge of electronic circuits, and AMES 163A-B-C is required during the senior year. AMES 175A, C is also required during the senior year. The elective course, AMES 180A-B-C, Principles of Bioengineering, includes the application of electronic and other techniques to biomedical measurements. Other listed electives are intended to provide some depth in biology, chemistry, or information science and should be selected in consultation with a faculty adviser. Students may petition to make certain substitutions for required courses.

The premedical program is intended primarily to meet the minimum requirements for a student planning to enter medical school. The curriculum is also suitable for a student planning to enter graduate school in bioengineering, physiology, or neurosciences.

Bioengineering: Engineering Major

FALL	WINTER	SPRING
Junior Year†		
AMES 100	AMES 173	AMES 172
AMES 105A	AMES 105B	Biol. 143 or Biol. 121 (W)
Biol. 129	AMES 121A	
	Biol. 121 or Biol. 143 (S)	
Senior Year		
AMES 163A	AMES 163B	AMES 163C
AMES 175A	Biol. 145 or Biol. 139	AMES 175C
Technical Electives		
AMES 101A	AMES 101B	AMES 101C
AMES 12	AMES 142A	AMES 142B
	AMES 150A	AMES 150B
AMES 180A	AMES 180B	AMES 180C
	AMES 271B	AMES 271C
Biol. 149A	Biol. 149B	Biol. 137
APIS 166 or Math 170A		
Chem. 130	Chem. 131	Chem. 132
Chem. 140A	Chem. 140B	

†While in lower division, properly qualified students may elect certain courses in upper-division AMES programs and may be admitted to an AMES major upon approval by the AMES faculty adviser.

Bioengineering: Premedical

FALL	WINTER	SPRING
Junior Year†		
AMES 105A*	AMES 105B	
Biol. 129	Biol. 145 or Biol. 139	
Chem. 140A**	Chem. 140B	
Chem. 143A(Lab)		
Senior Year		
AMES 100	AMES 173	AMES 172
AMES 175A		AMES 175C
Biol. 149A	Biol. 149B	Biol. 143 or Biol. 121 (W)
Technical Electives		
AMES 101A	AMES 101B	AMES 101C
		AMES 105C
AMES 180A	AMES 180B	AMES 180C
	AMES 142A	AMES 142B
Chem. 130	Chem. 131	Chem. 132
Phys. 100A	Phys. 100B	Phys. 100C
Phys. 171	Phys. 172	

†While in lower division, properly qualified students may elect certain courses in upper-division AMES programs and may be admitted to an AMES major upon approval by the AMES faculty adviser.

*Mathematics 2DA, if not completed in sophomore year.

**Natural Science 2F, 2FL

Systems-Science Program Students following the systems science program are required, in their junior year, to take a one-year sequence, AMES 163A-B-C, dealing with linear systems. They are also required to take a one-year sequence, AMES 105A-B-C to extend their knowledge of the mathematical tools utilized in AMES 163A-B-C. A third sequence is satisfied by AMES 100, 121A, and students are urged to take 121B as a technical elective. Students may petition to substitute for these sequences with the consent of the AMES faculty adviser.

In the senior year students complete their study of linear control systems with AMES 141A and undertake the study of nonlinear systems in AMES 141B. The study of sto-

chastic systems is provided in AMES 162A-B-C. The student learns experimental techniques in AMES 175A-B.

Because of the similarity of the two programs, an AMES/APIS double major in the systems science option is not permissible for AMES students. Any other AMES/APIS double majors require six additional AMES (or AMES/APIS) courses that are not offered in satisfaction of requirements for any non-AMES majors.

Systems Science

FALL	WINTER	SPRING
Junior Year+		
AMES 100	AMES 121A	AMES 121B***
AMES 105A	AMES 105B	AMES 105C†
AMES 163A	AMES 163B	AMES 163C
**		
Senior Year		
	AMES 141A	AMES 141B
AMES 162A*	AMES 162B*	AMES 162C*
AMES 175A	AMES 175B	
Technical Electives‡		
AMES 101A	AMES 101B	AMES 101C
		AMES 121B***
AMES 130A	AMES 130B	AMES 130C
		AMES 141C
	AMES 142A	AMES 142B
AMES 146A	AMES 146B	AMES 146C
	AMES 150A	AMES 150B
APIS 152A	APIS 152B	APIS 152C
APIS 154A	APIS 154B	APIS 154C
	APIS 159A	APIS 159B
APIS 160A	APIS 160B	
APIS 166		
Econ. 172A	Econ. 172B	Econ. 172C
Math. 131	Math. 171A	Math. 171B
Math. 170A	Math. 170B	Math. 170C

†While in lower division, properly qualified students may elect certain courses in upper-division AMES programs and may be admitted to an AMES major upon approval by the AMES faculty adviser.

*The course AMES 162A-B-C is equivalent to APIS 162A-B-C. Thus, the stated requirements for AMES 162A-B-C is met with satisfactory completion of APIS 162A-B-C.

**Mathematics 2DA and 2EA, if not completed in the sophomore year.

***AMES 121B is not required for the systems science program, but is a strongly recommended elective.

†Students may petition to replace AMES 105C by an alternative course with approval of the AMES faculty adviser.

‡No more than one of the sequences AMES 146A-B-C, Economics 172A-B-C and Mathematics 171A-B may be used as electives. Not both AMES 142A-B and Mathematics 170A-B-C may be used as electives, nor may APIS 166 be used in addition to either of these two sequences.

Undergraduate Program (Engineering) The department offers a four year program corresponding to a more traditional engineering curriculum. Students of the Third and Fourth Colleges are awarded the degree of Bachelor of Science in Engineering (Engineering Sciences). Students of Muir College may pursue the same curriculum and receive the degree of Bachelor of Arts in Engineering (Engineering Sciences). Finally, Revelle College students with sufficient advance standing to meet their lower division requirements may also pursue this curriculum and be awarded the aforementioned B.A. degree.

The engineering program involves three essential components: nine quarter courses are reserved for electives in the humanities and social sciences and should be used by students to fulfill their collegiate requirements. The second component involves a sequence of courses in the pure, applied, and engineering sciences and are termed the core courses. The final component consists of technical electives which may be selected from an extensive list of courses offered by AMES and other science departments. The purpose of this flexibility is to permit students to develop programs especially designed to meet perceived goals of their undergraduate engineering education. Thus, students may elect courses which prepare them for careers in either bioengineering, civil, mechanical, or systems engineering; they may develop a sequence of courses emerging from the current research interests of the faculty of AMES and other departments, e.g., sequences in the earth sciences, in transportation, and in energy related studies. Students intending to do postgraduate professional work in non-technical fields such as business administration, law, or medicine may develop an appropriate sequence of courses. Clearly, students should consult their advisers to develop a sound course of study to fulfill the requirements of this component of the program.

The Core Curriculum In the first two years the core curriculum provides the student with the basic courses in the pure sciences, with an introduction to the use of the computer in both technical and non-technical fields, and with introductory courses in materials, mechanics, and thermodynamics. In addition, six quarter courses are required in the humanities and arts and social sciences to be selected so as to permit the student to meet collegiate requirements.

In the upper division, the core curriculum provides for three additional quarter courses in the humanities and arts and social sciences, a course in linear systems, and sequences of courses in the application

of computing to engineering problems and in experimental techniques.

The core curriculum is as follows:

FALL	WINTER	SPRING
Freshman Year		
Phys. 3A	Phys. 3B	Phys. 3C (L)
Math 2A	Math 2B	Math 2C
APIS 61	APIS 62	AMES 10
HSS	HSS	HSS
Sophomore Year		
Phys. 3D (L)	NS 2D, 2DL	NS 2E
Math 2DA	Math 2EA	Math 80A
AMES 11	AMES 17	AMES 12
HSS	HSS	HSS
Junior Year		
AMES 163A	AMES 142A	AMES 142B
Senior Year		
AMES 175A	AMES 175B	AMES 175C or D*
HSS	HSS	HSS

*Students may substitute an appropriate individual project under AMES 199.

Additional Requirements. The curriculum which compliments the core curriculum is as follows:

FALL	WINTER	SPRING
Junior Year		
AMES 105A	AMES 105B	AMES 105C*
AMES 130A	AMES 130B	AMES 130C*
AMES 101A	AMES 101B	AMES 101C*
Senior Year		
TE	TE	TE
TE	TE	TE
Technical Electives*		
AMES 100		AMES 111
	AMES 121A	AMES 121B
		AMES 132
AMES 141A	AMES 141B	AMES 141C
AMES 149A	AMES 149B	AMES 149C
	AMES 150A	AMES 150B
AMES 162A	AMES 162B	AMES 162C
	AMES 163B	AMES 163C
	AMES 171	
	AMES 173	AMES 172
AMES 180A	AMES 180B	AMES 180C
APIS 101A	APIS 101B	APIS 101C
APIS 115A	APIS 115B	APIS 115C
	APIS 119A	APIS 119B
	APIS 120	
APIS 140A	APIS 140B	APIS 140C
APIS 141A	APIS 141B	APIS 141C
APIS 161A	APIS 161B	APIS 161C
Chem. 130	Chem. 131	Chem. 132
Math 131	Math 132A	Math 132B
Math 170A	Math 170B	Math 170C
	Math 180B	Math 180C
	Math 181A	Math 181B
Phys. 100A	Phys. 100B	Phys. 100C
Phys. 130A	Phys. 130B	Phys. 130C
		Phys. 152
		Phys. 180

*Other technical electives may be approved by petition.

The Graduate Program Admission in accordance with the general requirements of the graduate division. Candidates with bachelor's or master's degrees in mathematics, the physical sciences, or any branch of engineering are invited to apply. The department strongly recommends that all applicants submit scores from the Graduate Record Examination. This is essential if they seek financial aid.

While all students are welcomed to seek enrollment in AMES courses via UC Extension's concurrent registration program, an extension student's enrollment in an AMES graduate course must be approved by the department's Graduate Admissions Committee.

The Department of Applied Mechanics and Engineering Sciences offers graduate instruction leading to the M.S. and Ph.D. degrees in Engineering Sciences with specialization in each of aerospace engineering, applied mechanics, bioengineering, and engineering physics.

A number of AMES faculty participate in a program in applied ocean sciences conducted jointly with some faculty in the Scripps Institution of Oceanography and Department of Applied Physics and Information Sciences. AMES students in this program receive the Ph.D. with specialization in Engineering Physics upon completion of normal departmental requirements. Plans to formalize the program and to establish within AMES M.S. and Ph.D. degrees in Engineering Sciences (Applied Ocean Sciences) are now in progress. Students who contemplate work in applied ocean sciences are advised to take courses in physical science and mathematics and to seek admission into some of the Scripps core courses, such as 210A (Physical Oceanography), 240 (Marine Chemistry), and 270A (Biological Oceanography).

The instructional and research programs are characterized by strong interdisciplinary relationships with the Departments of Mathematics, Physics, and Chemistry, and with associated campus institutes such as The Institute for Pure and Applied Physical Sciences and the Institute of Geophysics and Planetary Physics, and Scripps Institution of Oceanography.

Master's Degree Program The department offers the M.S. degree under both the Thesis Plan I and the Comprehensive Examination Plan II (see "Graduate Studies: Master's Degree"). A strong effort is made to schedule M.S. level course offerings so

that students may obtain their M.S. degree in one year of full-time study or two years of part-time study.

Students with baccalaureate degrees may wish to round out their professional training by taking a fifth year of study and by considering the M.S. degree as terminal. Other students may obtain the M.S. degree on the way toward the doctorate.

Students who are admitted for a master's degree only and subsequently wish to continue towards a Ph.D., must be re-evaluated by the department's Graduate Admissions Committee before the departmental Ph.D. qualifying examination may be taken.

Course requirements are left flexible in order to permit students and their advisers to develop the most beneficial programs. The department accepts a maximum of four units of extension courses at the 100 level towards the M.S. degree provided that (a) approval of the Graduate Council and the student's adviser is obtained and (b) the courses have either an exact counterpart in AMES or else are approved by faculty members in AMES who have professional competence in the particular field. Specific departmental requirements for the M.S. degree are as follows:

1. A course of study must include 36 units of credit and must be approved by the student's adviser. Credit must be obtained for at least 12 quarter-units of AMES 200-level courses, not including AMES 206 and 299. Students studying under Plan I also must obtain credit for six units of AMES 299 (research). No more than six units of AMES 299 may be applied toward the 36-unit requirement under Plan I. Students studying under Plan II may not apply Ames 299 units toward the M.S. degree. No more than 12 units of upper-division, 100-level courses may be taken for the M.S. degree.
2. Students must have an average of B or higher in the courses taken to fulfill requirements for the M.S. degree.
3. The thesis under Plan I is reviewed by a thesis adviser and two other faculty members appointed by the Dean of Graduate Studies. The review is normally an oral defense of the thesis.
4. The comprehensive examination under Plan II is conducted by the adviser and at least two other faculty members appointed by the department chairman. The examination committee normally conducts an oral or written examination in the candidate's discipline of specialization. A student working toward the Ph.D. degree who has successfully passed one area of the department's Ph.D. examination need not take the comprehensive examination for the M.S. degree.

Successful candidates receive the M.S. degree in Engineering Sciences with a designated specialization in Aerospace Engineering, Applied Mechanics, Engineering Physics, or Bioengineering.

Doctoral Degree Program The AMES Ph.D. program is intended to prepare students for a variety of careers in research and teaching. Therefore, research is initiated as soon as possible, commensurate with the student's background and ability. There are no formal course requirements for the PH.D.; however, most students in consultation with their advisers, develop course programs that will prepare them for the AMES departmental examination and for their dissertation research.

A departmental examination is given to each Ph.D. candidate prior to his or her formal Ph.D. qualifying examination. This departmental examination normally is taken after the completion of three quarters of full-time graduate work and seeks to examine the student's academic and research ability. It is administered by a committee which includes at least four AMES faculty members, appointed by the department chairman on the basis of nominations made by the student's adviser. To insure breadth, each student must specify four areas of specialization, with each area defined as the subject material taught in a specified group of three or more related graduate courses. Proficiency in one area may be satisfied by grades of A or B in the courses. The departmental examination must include at least three areas, with at least two of the areas being defined by AMES graduate courses. The same AMES course cannot be used in the definition of more than one AMES area. Normally, subject material covered in AMES

296, 297, 298, or 299 courses is not considered acceptable for the satisfaction of the AMES area requirement.

After satisfactory completion of the departmental examination, a graduate student in AMES must pass the formal Ph.D. qualifying examination administered by the student's doctoral committee (see "Graduate Studies: The Ph.D.")

There is no formal foreign-language requirement for doctoral candidates. Students are expected to master whatever language is needed for the pursuit of their own research.

Departmental policy requires all Ph.D. students to spend a minimum of three consecutive quarters as a "full-time student" in AMES following completion of the departmental qualifying examination. Full-time employment outside the department is not consistent with the department's interpretation of full-time student. A Ph.D. thesis should represent research actually performed at UC San Diego and may not be acceptable if any significant portion has been printed or listed elsewhere as an industrial report. Further details on these policies may be obtained from the department.

Successful candidates are awarded the Ph.D. degree in Engineering Sciences, with one of the special fields — bioengineering, aerospace engineering, engineering physics, or applied mechanics — designated.

Candidate in Philosophy Degree

AMES Ph.D. students who have passed their Ph.D. qualifying examinations and have advanced to candidacy are awarded the Candidate in Philosophy Degree. (See "Graduate Studies: Candidate in Philosophy Degree".)

Courses

Lower Division

10. Introduction to Engineering Systems (4)
Application of computer techniques to the solution of engineering design problems and to the graphical display of the results in the form of curves, contours, etc. Models as tools for synthesis of engineering solution. *Prerequisites: APIS 61, APIS 62, Mathematics 2A-B or equivalent.*

11. Elements of Materials Science (4)
The structures of engineering materials and how these structures can be controlled to produce desired, useful properties. Environmental effects: corrosion and oxidation. *Prerequisites: Physics 3A-C and Mathematics 2A-C.*

12. Thermodynamics (4)
First and second laws and selected applications, e.g., thermochemistry, heat capacities and heats of reaction, engine cycles, etc. *Prerequisites: Natural Science 2D/2DL and Mathematics 2EA.*

16A. Introduction to Engineering Mechanics (4)
Statics of particles and rigid bodies, forces in beams and cables, friction, analysis of elastic truss structures, dynamics of particles in two and three dimensions, linear and angular momentum, energy, impulsive motion. Applications to engineering problems. *Prerequisites: Science and Technology 15A, or Physics 3A, or Science 4A, or equivalent. Mathematics 2DA (or concurrent registration), or Mathematics 2D and Mathematics 2E (concurrent registration with Mathematics 2E permitted).*

16B. Introduction to Circuit Analysis (4)
Steady-state and transient analysis of circuits composed of linear electrical elements; electromechanical analogy; acoustic and hydraulic elements. Applications to engineering problems. *Prerequisites: Science and Technology 15B, Physics 3B, or Science 4B, or equivalent. Mathematics 2EA (or concurrent registration), or Mathematics 2EA (or concurrent registration), or Mathematics 2D and Mathematics 2E.*

17. Engineering Mechanics (4)
Dynamic response of discrete systems with one or more degrees of freedom and of continuous systems. Elements of continuum mechanics with applications in elasticity and fluid mechanics. *Prerequisites: Physics 3D, Mathematics 2DA or equivalent.*

32. Computer Models of Complex Systems (4)
General properties of systems, including stocks and flows, mutual interactions or coupling, growth and decay, oscillation and overshoot, stability and instability. Languages for building computer models of systems. Examples of models in current use in science, health delivery, government, etc. Models as tools for decision-makers. Computer programs as scenario generators.

33. Management of the Air Environment (4)
Definition of problems involving man's alteration of the chemistry of the atmosphere, relative contributions of man and of natural inputs, health effects and research needed. Structure and uses of air-pollution models. Air-pollution control decision-making and the role of the citizen. (F)

34. Energy: Demands, Resources, Technology and Policy (4)
A survey course on energy stressing the following topics: the manner in which our energy demands are defined at the local, regional, national and international levels; the total (currently used and potential) resources available for satisfying energy demands; highlights of technological challenges concerning *new* energy production and utilization techniques; energy policy, with emphasis on potential environment and ecomonic impacts. (S)

35. Society and the Sea (4)
Selected topics including iving and non-living resources, seaports and sea travel, the frail sea, the wild sea, military oceanology, legal, economic and social aspects, coastal zone management, scientific research. The sea and weather.

90. Freshmen Seminar (0)
Freshmen seminars organized around the research interests of various faculty members. *Prerequisites: freshman standing and consent of instructor.* (F,W,S)

Upper Divison

100. Continuum Mechanics (4)
An introduction to continuum mechanics of both living and non-living bodies. The laws of motion and free-body diagrams. Stresses. Deformation. Compatibility conditions. Constitutive equations. Properties of common fluids and

solids. Derivation of field equations and boundary condition. Four hours' lecture. *Prerequisites: completion of the Natural Sciences Sequence or Science Sequence, coregistration of AMES 105A.* (F)

101A-B-C. Fluid Mechanics (4-4-4)
Hydrostatics with application to submerged surfaces and structure of atmospheres, Bernoulli equation, its extension and application. Elements of viscous, heat conducting flows. Integral momentum and energy theorems, similitude and dimensioned analysis. Potential flow, boundary layers, compressible flow including shock waves, generalized one-dimensional flow. Calculation of transport co-efficients for momentum, heat, and mass transfer, laminar and turbulent flow. *Prerequisites: AMES 105B or equivalent mathematics: AMES 12 or co-registration or equivalent thermodynamics..* (F-W-S)

102. Mechanical Behavior of Materials (4)
Mechanical tests, elasticity and anelasticity, dislocations and micro-plasticity of crystals, plastic deformation and creep, fracture and strengthening mechanisms, ceramics and other inorganic nonmetallics, polymers. Laboratory demonstrations of selected topics. *Prerequisites: one year of calculus and completion of a Natural Sciences sequence, or equivalent, in physics and chemistry, or consent of instructor.*

105A-B-C. Introduction to Mathematical Physics (4-4-4)
Fourier series, elementary partial differential equations, ordinary differential equations, complex variables, and integral transforms with applications to problems in particle and rigid-body dynamics, vibrations, wave motion, electric circuits, heat conduction and fluid dynamics. AMES 105A-B-C is equivalent to APIS 105A-B-C. *Prerequisites: Mathematics 2D; Natural Science 1D-E, or Natural Science 2A-B, or equivalent.* (F,W,S)

111. Thermodynamics II (4)
Extension of AMES 12, topics selected from chemical thermodynamics, adiabatic flame temperatures; engine performance evaluation; fuel cells and secondary power units; thermodynamic functions for ideal gases; low temperature thermodynamics; information theory; irreversible thermodynamics; metallurgical applications. Four hours' lecture. *Prerequisites: AMES 12, and prerequisite or co-registration in AMES 101A.* (W)

121A. Dynamics I (4)
Kinematics of particles and rigid bodies; acceleration in noninertial frames; particle dynamics, motion in central force fields, orbital mechanics; conservation laws for energy, linear and angular momentum; generalized coordinates and Lagrange's equations. Examples oriented towards engineering problems. Four hours' lecture; coordinated experiments and demonstration. *Prerequisite: Mathematics 2D.* (W)

121B. Dynamics II (4)
Introduction to rigid-body dynamics; planar motion of rigid bodies, three-dimensional motion of axially symmetric bodies, stability of motion; matrix analysis of small oscillations in multidegree-of-freedom systems, eigenvalue and eigenvector determination, forced oscillations, oscillations in continuous elastic systems. Four hours' lecture. *Prerequisites: AMES 121A, AMES 105A or Mathematics 110A; Mathematics 2E recommended.* (S)

130A. Solid Mechanics I (4)
Equilibrium of particles and rigid bodies. Statically determined trusses. Elasticity and strain in one-dimensional tension and compression. Statically indetermined problems. One-dimensional visco-elasticity and plasticity. Plastic limit design. Pressure vessels. Torsion of circular shafts. Stresses and deflections in beams. Limit design of beams. Four hours' lecture; coordinated experiments and demonstrations. (F)

130B. Solid Mechanics II (4)
Two-dimensional stress and strain. Transformation laws, field equations and constitutive relations. Exact solutions for simple beam problems. Polar coordinate problems. Extremum principles. St. Venant torsion theory. Three-dimensional stress and strain. Four hours lecture. *Prerequisite: AMES 130A.* (W)

130C. Solid Mechanics III (4)
Linear and non-linear one-dimensional theory of beams. Symmetric bending of circular plates and shells. Moderately large deflections of plates. Solutions for small deflections of rectangular plates. Four hours' lecture. *Prerequisite: AMES 130B.* (S)

132. Structural Analysis (4)
Principles of matrix analysis of elastic truss and frame structures, introductory treatment of finite element analysis of structures and use of general-purpose, finite-element, structural analysis computer programs. Four hours' lecture. *Prerequisites: Mathematices 2E, AMES 130A-B.*

141A. Linear Control System Theory (4)
Extension of AMES 163C. Routh criterion, Minimum- and non-minimum phase systems. Simulation of systems on analog computer. Automatic-digital plotting of Nyquist and Bode plots. Z-transforms for sampled-data systems. State-variable methods for analysis and design. *Prerequisite: AMES 163C.* (W)

141B. Nonlinear Methods in Systems Analysis (4)
Oscillations in quasilinear systems, phase plane methods, Liapunov stability theory, external excitation. Illustrations from automatic control and other electromechanical systems. *Prerequisites: AMES 163A-B-C..* (S)

141C. Introduction to Stochastic Control Systems (4)
Stochastic state modes, minimal variance control strategies, prediction and filtering theory, spectral factorization, stochastic linear regulator problem, separation theorem. *Prerequisites: AMES 162A, AMES 141A.*

142A. Computer Methods in Engineering Science (4)
Analysis of physical systems leading to matrix operations, simultaneous linear equations, eigenvalue problems and nonlinear equations. with their digital computer solutions. The physical context includes electromechanical networks, control systems, structures. *Prerequisites: AMES 105A-B and APIS 61, or consent of instructor.* (W)

142B. Computer Methods in Engineering Science (4)
Analysis of physical systems leading to ordinary and partial differential equations, with their digital-computer solutions. The physical context is the dynamics of discrete and continuous electrical and mechanical systems. *Prerequisite: AMES 105A-B and APIS 61, or consent of instructor.* (S)

146A-B-C. Introduction to Optimization Theory (4-4-4)
Introduction to optimization theory and its role in engineering and physical systems. Basic results of mathematical programming, calculus of variations and optimal control theory are developed and are discussed for a wide variety of application. *Prerequisites: Mathematics 2E, AMES 105A.* (F,W,S)

149A. Chemistry and the Air Environment (4)
Sources, control, chemistry, meteorology, dynamics and effects of air pollution. Legal and economic aspects. Relation to growth and energy usage. *Prerequisite: any introductory sequence in mathematics, chemistry and physics.* (S)

149B-C, Chemistry and the Air Environment (4-4)
Sources, components, chemistry, dynamics, and medical effects of air pollution. Laws, standards, control, and testing. The role of energy. Mass transit as a partial solution. Economic incentives as a control strategy. The decision-making process—the role of the citizen, government, industry. *Prerequisite: AMES 149A.*

150A. Topics in Applied Mechanics I (4)
Presentation of series of problems from various branches of applied mechanics illustrating methodology. Examples are: structural stability, aeroelastic response, non-linear oscillations, heat conduction and moving boundaries. Four hours' lecture. *Prerequisites: AMES 101A, AMES 105A-B-C, AMES 121B, AMES 130B.* (W)

150B. Topics in Applied Mechanics II (4)
Continuation of AMES 150A taking up additional examples. Four hours' lecture. *Prerequisites: AMES 101B, AMES 150A.* (S)

156. Rigid-Body Dynamics (4)
Three dimensional rigid-body dynamics. Representation of rotations; angular velocity and kinematical differential equations, Euler dynamical equations. Special cases of classical and modern problems with application to spacecraft and gyroscopic devices. Four hours' lecture. *Prerequisite: consent of instructor.*

157A. Transportation Systems (4)
Needs, functions, subsystems and modes of transport. Early developments, transport and social change, modern setting of transport systems. Viewpoints of user, operator, and society. Regulation. Intermodal systems. Problems and prospects of major modes. *Prerequisite: Junior standing or consent of instructor.*

162A-B-C. Statistical Communication Theory (4-4-4)
Review of probability theory: combinatorial analysis, generating functions, random variables, distributions, expectations, limit theorems. Stochastic processes: correlation functions, spectral densities, the Gaussian process, orthonormal expansions, meansquare filtering. Elements of information theory: entropy, mutual information, channel capacity, coding. *Prerequisite: AMES 163C.* (F,W,S)

163A-B-C. Linear Systems and Circuits (4-4-4)
Network analysis, Kirchhoff's laws, topological and state-space methods, linear systems, exponential transforms, convolution integrals, sinusoidal steady-state analysis, equivalent networks, time-discrete systems, applications. Introduction to feedback control. *Prerequisites: Mathematics 2D and 2E; AMES 105A-B-C or Mathematics 110A-B, 120 taken concurrently.* (F,W,S)

170. AMES Laboratory (0)
Introduction to apparatus design and fabrication. Instruction includes practical operation of machine tools and measuring instruments. Strength of materials and their machinability are considered. *Prerequisite: consent of instructor.* (F-S)

171. Advanced AMES Laboratory (4)
Principles of instrumentation. Mechanical, electrical, chemical and optical transducers. Analog and digital recording. on-line data processing. *Prerequisite: consent of instructor.*

172. Biomechanics (4)
Application of mechanics to biological systems. Basic mechanical properties of living tissues such as the blood, mucus, blood vessels, tendons, skin, muscles, bone cartilage. Mechanics of organs such as the heart, the lung, the arteries. Fluid and solid mechanics of flying, swimming and locomotion. *Prerequisite: AMES 100.* (S)

173. Bioengineering: Transport Phenomena (4)
Transport phenomena in biological systems treated from the viewpoint of statistical mechanics and fluid dynamics. Diffusion through biological structures. The mechanisms of membrane action. Non-equilibrium thermodynamics analysis of biological transport phenomena. Suitable for students in biology interested in engineering analysis of biological systems. Three hours' lecture. *Prerequisite: consent of instructor.* (W)

175A. Experimental Techniques I (4)
Principles and practice of measurement and control and of the design and conduct of experiments. Lectures relate to dimensional analysis, error analysis, signal-to-noise problems, filtering, data acquisition and data reduction, as well as background of experiments. Experiments relate to the use of electronic devices and sensors. *Prerequisite: AMES 163A.*

175B. Experimental Techniques II (4)
Continuation of AMES 175A; with lectures and additional experiments which relate to electronic devices and to a selection of experiments having direct application of such devices for measurements in applied mechanics, bioengineering, and systems science. *Prerequisite: AMES 175A.*

175C. Experimental Techniques III (4)
A course designed to demonstrate basic concepts of the bioengineering curriculum through experimental procedures. Experiments include: nerve action, electrocardiography, mechanics of muscle, membranes and noninvasive diagnostics in man. *Prerequisites: senior standing, AMES 175A.*

180A. Principles of Bioengineering (4)
Principles of biomedical instrumentation. Electrical properties of smooth, skeletal, and cardiac muscle cells. Nervous control. In vivo energy sources. Four hours lecture. *Prerequisites: upper-division standing, medical school student, or consent of instructor.*

180B. Principles of Bioengineering (4)
Production and properties of x-rays. Absorption of radiation. Radiation therapy. Diagnostic radiology. Radiological health, exposure limits, protection, survey and monitoring. Four hours' lecture. *Prerequisites: upper-division standing, medical school student or consent of instructor.*

180C. Principles of Bioengineering (4)
Ultrasound and its biomedical applications. Basic principles of artificial organs. Material compatibility. Special devices. Bio-telemetry. Four hours' lecture. *Prerequisites: upper-division standing, medical school student, or consent of instructor.*

195. Teaching (2 or 4)
Teaching and tutorial assistance in an AMES course under supervision of instructor. Not more than four units may be used to satisfy graduation requirements. (Pass/Not Pass grade only.) *Prerequisites: B average in major and permission of department chairman.*

198. Directed Group Study (2-4)
Directed group study on a topic or in a field not included in the regular department curriculum, by special arrangement with a faculty member. *Prerequisite: consent of instructor.* (F,W,S)

199. Independent Study for Undergraduates (4)
Independent reading or research on a problem by special arrangement with a faculty member. *Prerequisite: consent of instructor.* (F,W,S)

Graduate

205. Graduate Seminar (0)
Each graduate student in AMES is expected to attend a weekly seminar of his or her choice dealing with current topics in fluid mechanics, solid mechanics, bioengineering, systems science, applied ocean sciences, or energy. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

206. Physical Principles and Problems (1)
Principles of applied science illustrated by problems in mechanics, dynamics, electricity, optics, thermodynamics, etc. Presentation of individual research. Preparation of interdepartmental oral examination.

210A-B-C. Introductory Fluid Mechanics (3-3-3)
Physical properties of fluids; kinematics; potential flow; wing theory; surface waves; gas dynamics; shock waves; Navier - Stokes equations; boundary layers; turbulence. *Prerequisites: undergraduate fluid mechanics and thermodynamics, or consent of instructor.* (F,W,S)

211A. Propulsion: Air-breathing Engines (3)
Propulsion of aircraft, missiles, and boosters by air-breathing engines, including cycle analysis, characteristics of engine components, and matching of engine components to produce an efficient engine. *Prerequisites: undergraduate fluid mechanics and thermodynamics, or consent of instructor.*

211B. Propulsion: Chemical Rockets and Mission Analysis (3)
Solid- and liquid-propellant rocket engines, combustion processes, motor design and performance; rocket configurations; mission analyses; optimization calculations. *Prerequisite: AMES 211A.*

220A. Physical Gas Dynamics (3)
Kinetic theory of neutral gasses; transport properties; principles and applications of statistical mechanics. *Prerequisites: AMES 210A-B-C, AMES 105A-B-C, Physics 140, or consent of instructor.*

220B. Physical Gas Dynamics (3)
Principles of electrodynamics and quantum mechanics; theories of atomic and molecular structure; perturbation method in quantum mechanics; semiclassical treatment of radiation; scattering phenomena; transition probabilities; vibrational relaxation; dissociation; ionization, and recombination. *Prerequisites: AMES 220A, Physics 130A-B, or consent of instructor.*

220C. Physical Gas Dynamics (3)
Shock waves and detonation waves; explosions and hypersonic flow; experimental methods in high-temperature gases; shock tubes; atomic and molecular beams; selected topics such as chemical reactions and relaxation processes in turbulent flow, interaction of radiation with ionized gases and gas lasers. *Prerequisite 220B, or consent of instructor.*

221A. Opacity Calculations (3)
Basic laws for radiant-energy emission from gases, liquids, and solids; spectral absorption coefficients, line shapes, curves of growth; theoretical and experimental methods for estimating opacities of uniform and non-uniform gases. *Prerequisite: consent of instructor.*

221B. Radiative Transfer Theory (3)
Fundamental quantities and the equation of transfer; methods of solving radiative transfer problems for gray and non-gray gases; nonstationary problems. *Prerequisite: AMES 221A, or consent of instructor.*

222A-B-C. Advanced Fluid Mechanics (3-3-3)
Contemporary problems in broad areas of fluid mechanics, e.g., turbulent flows, hydrodynamic stability, geophysical fluid dynamics, transport phenomena, acoustics, boundary layers, etc. *Prerequisites: AMES 105A-B-C and AMES 210A-B-C or equivalents, or consent of instructor.*

224A-B-C. Reactive Gas Dynamics: Combustion (3-3-3)
This course covers fundamental aspects of flows of reactive gases, with emphasis on processes of combustion, including the relevant thermodynamics, chemical kinetics, fluid mechanics and transport processes. Topics include deflagrations, detonations, diffusion flames, ignition, extinction, and propellant combustion, among others. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisites: AMES 210A-B-C.*

226A. Laser Theory and Kinetics (3)
Introduction to laser physics. Principle of light amplification by stimulated emission of radiation. Methods of excitation and inversion generation in solid, liquid, and gaseous media. Oscillators and amplifiers. Optical cavities. Frequency selection and mode control. *Prerequisites: AMES 220A-B-C or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (F)

226B. Laser Theory and Kinetics (3)
Semiclassical treatment of coherent electromagnetic wave propagation in a laser-active medium. Line broadening and gain saturation. Kinetic processes in electrical discharges and in rapidly expanding gas flows. Review of current theories on electrical and gas dynamic lasers. *Prerequisites: AMES 220-A-B-C or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (W)

226C. Laser Theory and Kinetics (3)
Chemical kinetics in the gas phase. Vibrational inversion in rearrangement reactions. Chain initiation and chain branching. Premixed and un-premixed chemical systems. Review of current theories and practice on chemical lasers. *Prerequisites: AMES 220A-B-C or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (S)

231A. Foundations of Solid Mechanics (3)
Specification of stress and strain; infinitesimal and finite deformation; conservation equations; minimum potential energy principle. *Prerequisite: AMES 130B, or consent of instructor.*

231B. Elasticity (3)
Basic Field Equations. Typical boundary value problems of classical linear elasticity. Problems of plane stress and plane strain. Variational principles. *Prerequisites: AMES 231A, or consent of instructor.*

231C. Anelasticity (3)
Mechanical models of viscoelastic, plastic, and viscoplastic behavior in simple shear or uniaxial stress. Constitutive laws for three-dimensional states of stress and strain. Application to selected technological problems. *Prerequisite: AMES 231B, or consent of instructor.*

232. Finite-Element Methods in Solid Mechanics (3)
Review of matrix analysis and variational principles. Construction of finite elements for plates, shells and three-dimensional bodies. *Prerequisite: AMES 231B or consent of instructor.*

233A-B-C. Advanced Solid Mechanics (3-3-3)
Contemporary problem areas of research in solid mechanics. Fundamental aspects and recent developments. Examples include finite elasticity, finite plasticity, thermo-viscoplasticity, constitutive relations for ductile and brittle solids, static and dynamic fracture processes, contact problems, micropolar continua, mixture theories for composite materials and multiphase systems, asymptotic methods in the theory of plates and shells, complex variable methods in plane elasticity, applications of the calculus of variations to approximate solution techniques and structural optimization. *Prerequisites: AMES 231A-B-C, or consent of instructor.*

234. Experimental Stress Analysis (3)
Theory and technique of standard and newly developed methods; laboratory experience using modern instrumentation such as strain gauges, capacitive piezoelectric and piezoresistive devices, and surface coatings; application of photoelasticity, laser interferometry, and holography to problems in static and dynamic elasticity and plasticity. Ultra-high-speed measurements will be emphasized. *Prerequisite: consent of instructor.*

235A-B. Theory of Shells (3-3)
General mathematical formulation of the theory of thin elastic shells; linear membrane and bending theories; finite strain and rotation theories; shells of relution; shallow shells; selected static and dynamic problems; survey of recent advances. *Prerequisite: AMES 231B, or consent of instructor.*

236. Structural Stability (3)
Stability analysis of structural elements under steady, oscillatory, and impulsive loadings. Elastic and anelastic stability problems. *Prerequisite: AMES 235A, or consent of instructor.*

237. Structural Dynamics (3)
Matrix analysis of the free and forced vibrations of discrete linear systems; response to periodic and transient excitations. Frequency response and generalized normal mode methods. Dynamics of continuous systems. *Prerequisites: AMES 231A-B, or consent of instructor.*

238. Stress Waves in Solids (3)
Linear wave propagation; plane waves; reflection and refraction; dispersion induced by geometry and by material properties. Application of integral transform methods. Selected topics in non-linear elastic, anelastic and anisotropic wave propagation. *Prerequistes: AMES 231A-B-C, or consent of instructor.*

246A-B-C. Optimal Control Theory (3-3-3)
Optimization theory and application with emphasis on topics of optimal control. Mathematical programming, necessary and sufficient conditions for optimality, computational algorithms. Maximum principle for optimal control systems, state and control variable constraints, reachable sets. Computational techniques for solution of optimal control problems. *Prerequisite: AMES 146, or consent of instructor:* (F,W,S)

248A-B-C. Time Series Analysis (3-3-3)
Regression analysis, trends and smoothing, moving average and autoregressive processes. Stationary processes and spectral analysis, discrete Fourier transforms, digital filtering. Stochastic model building, spectral density and transfer function estimation, identification.*Prerequisites: AMES 162, 163, or consent of instructor.* (F,W,S)

250A. Astrodynamics and Rocket Navigation (3)
Practical application of celestial mechanics to vehicle analysis; elements of a two-body orbit; elliptical, parabolic, hyperbolic orbits. Coordinate systems; orbit transfer in single-force field and multiple-force field systems; optimal plane change; lunar flights; interplanetary flight; low-thrust vehicles. *Prerequisites: AMES 121A or equivalent and consent of instructor.*

251A. Guidance of Aerospace Vehicles (3)
Survey of guidance problems; definitions mission phases, guidance requirements, intercept (proportional navigation and homing), explicit and implicit guidance, rendezvous, methods of steering, steering control and stability, introduction to optimal steering laws. *Prerequisites: AMES 141A, AMES 250A, or equivalent and consent of instructor.*

251B. Gyrodynamics and Inertial Navigation Systems (3)
Behavior of gyros and accelerometers; inertial navigation systems equations for cruise and orbiting vehicles; Schuler tuning, error analysis. Alignment; gyrocompassing on fixed and moving vehicles; four-gimbal, three-gimbal, and strapdown systems. *Prerequisites: AMES 141A or equivalent and consent of instructor.*

253A. State-Space and Time-Domain Approach to Control Theory (3)
Utility of time-domain methods in control system analysis and design. Matrix polynomials, functions of matrices, matrix differential equations, transfer function matrices, the fundamental (state-transition) matrix, canonical representation of dynamic systems. Controllability, observability. Stability analysis. *Prerequisites: AMES 141A, Mathematices 2E.*

256A. Advanced Rotational Dynamics (3)
Topic chosen independently each year. Examples are classical and modern problems of rotation under specified excitation, stability of rotation and special equilibria, computer-oriented dynamical formalisms. Student may register for course more than once. *Prerequisites: AMES 156 and consent of instructor.*

256B. Spacecraft Attitude Control (3)
The space environment and its role in attitude control of aerospace vehicles. Torques, including gravitational and magnetic. Inertial and optical sensors. Actuators. Design considerations in passive and active control. *Prerequisites: AMES 156, and consent of instructor.*

256C. Gyroscopic Stabilization and Sensing (3)
Gyrostabilization of vehicles; ships, monorails, spacecraft; gyroscopic sensing of direction and vertical, with applications. *Prerequisites: AMES 156, and consent of instructor.*

264A-B. Filtering and Random Processes in Control (3-3-3)
Extensive treatment of random processes in linear feedback systems, including optimum design; estimation theory, Wiener and Kalman filtering. Extensive treatment of nonlinear systems in the presence of a random noise. *Prerequisites: feedback control theory and AMES 294A, or consent of instructor.*

271A. Structure and Function of Tissue (3)
A general survey will include examples of structure-function relationships at the cell and tissue level. Emphasis will be placed on components of the vascular system and related structures such as endothelium, erythrocytes, leucocytes, cardiac, smooth and skeletal muscle, connective tissue, basement membranes, and peripheral nerve cells. *Prerequisite: consent of instructor.* (F)

271B. Circulatory System (3)
Morphology and physical concepts of behavior of heart, large blood vessels, vascular beds in major organs and the microcirculation. Included will be the physical principles of blood flow, work of heart, electrophysioiogy of heart, pulse waves, discriptions of particular vascular beds and their biological and hemodynamic importance. Integration of separate components through nervous and humoral controls will be analyzed. *Prerequisite: consent of instructor.* (W)

271C. Respiration and Cardio-Pulmonary Reflexes (3)
General concepts and principles of morphology of lung and component structures, pulmonary gas exchange, cardio-pulmonary reflexes, and integrative action of nervous system on the pulmonary and respiratory system. *Prerequisite: consent of instructor* (S)

273. Transport Phenomena in Membranes (3)
Non-equilibrium thermodynamic analysis of transport phenomena. The osmotic effect. Diffusion and exchange in biological systems. *Prerequisite: consent of instructor.*

274. Advanced Cell Physiology (3)
An advanced course in selected areas of cell physiology for bioengineering, medical, and biology students. Discussion of several special types of cells; endothelium, smooth-muscle cells, lymphocytes, neutophiles, platelets, macrophages, etc. The ultrastructure and biochemical characteristics of these cell types will be considered. Emphasis will be placed on quantitative measurements and analyses based on mathematical and physical principles. *Prerequisite: consent of instructor.* (W)

275. Selected Topics in Bioengineering (3)
Discussion of research areas under current investigation in the bioengineering group. Visiting scientists will be invited to cover topics of current interest. *Prerequisite: consent of instructor.*

276. Laboratory Projects in Bioengineering (3)
Theory of statistical inference, analysis, and design of experiments; data handling by digital computers, video tape recording, etc. Theory and application of optical and electronic instrumentation. The course will consist of lectures, conferences, and demonstrations, as well as the student's own selected laboratory project for study in depth. *Prerequisite: consent of instructor.* (W)

277. Microcirculation in Health and Disease (2)
Structural and functional aspects of transport and blood-tissue exchange in key organs during states such as circulatory shock, bacterial toxemia, hypertension. Also physical and ultrastructural techniques used to analyze small vessel dynamics. *Prerequisite: consent of instructor.* (S)

278. Advanced Biomechanics (3)
Modern development of biomechanics at an advanced mathematical level. Treatment of problems of current interest in greater depth. Problems will be selected from circulation, micro-circulation, cardiac and pulmonary mechanics, muscle mechanics. *Prerequisites: AMES 172, and knowledge in applied mathematics and the mechanics of fluids and solids with a minimum at the level of AMES 100, 101A-B-C, 130A-B, 105A-B-C.* (S)

279. Selected Topics in Biophysics (3)
Selected topics in biophysics with emphasis on the structure and function of biological membrane, fluid and ion transport, excited states, wave propagation, muscle contraction. *Prerequisites: AMES 172, and knowledge in applied mathematics and the mechanics of fluids and solids with a minimum at the level of AMES 100, 101A-B-C, 130A-B, 105A-B-C.*

280. Techniques in Experimental Cardiovascular Physiology and Microcirculatory Research (2)
Basic cardiorespiratory experimental procedures; application of anesthesia, artificial respiration, dissection of the most frequently used arteries and veins, open-chest preparation, heart and large-vessel exposure, catheterization, long-term implantation, isolated organ perfusion, quantitative evaluation of microvascular phenomena. *Prerequisites: AMES 271A-B-C.* (Satisfactory/Unstafisfactory grade only.) (S)

281. Seminar in Bioengineering (1)
The course involves weekly seminars given by faculty, visitors, postdoctoral research fellows, and graduate students concerning research topics in bioengineering and related subjects. Students report their own research. May be repeated for credit. (Satisfactory/Unsatisfactory grades only) (F,W,S)

285. Special Topics in National Security for Science Students (3)
The course will consist of two parts; first, a presentation of what our National Security Policy is, and second, a discussion of how various current science and technology programs and policies relate to it. (Satisfactory/Unsatisfactory grades permitted.)

293. Noise and Random Processes (3)
Probability distribution functions, statistical independence, functions of random variables, characteristic functions, correlation functions, time averages, sampling, the central limit theorem, spectral analysis, the Gaussian random processes, narrow band processes, linear systems, random walks, the Fokker-Planck-Kolmogorov equations and Brownian motion. *Prerequisites: AMES 105A-B-C, or consent of instructor.*

294A-B-C. Methods in Applied Mechanics I, II, III (3-3-3)
Various methods of analysis are covered with emphasis on application. Topics range over the broad fields of complex analysis, ordinary and partial differential equations (linear and nonlinear), asymptotic analysis, integral equations and weighted residuals. Specifics include Dirichlet and Neumann problems. Cauchy concepts, Green functions, Riemann mapping, eigenfunctions, phase-plane analysis, steepest descents, multiple scales, WKB method, matched asymptotic expansions, transform techniques, Fredholm theory. Wiener-Hopf method, Galerkin method. *Prerequisites: AMES 105A-B-C.* (F,W,S)

296. Independent Study (3-3-3)
Prerequisite: consent of instructor. (F,W,S)

297. Research Techniques (1-6, 1-6, 1-6)
A course designed to present the techniques of research through organized lectures, special assignments, and instruction on the techniques of selected research projects. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

298. Directed Group Study (1-4)
Directed group study on a topic or in a field not included in regular department curriculum, by special arrangement with a faculty member. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

299. Graduate Research (1-12, 1-12, 1-12)
(Satisfactory/Unsatisfactory grades only.) (F,W,S)

Applied Physics and Information Science (APIS)

OFFICE: 3216 Applied Physics and Mathematics Building

Professors:
Hannes Alfvén, Ph.D.
Victor C. Anderson, Ph.D.
*Henry G. Booker, Ph.D.
Kenneth L. Bowles, Ph.D.
Jules A. Fejer, D.Sc.
Carl W. Helstrom, Ph.D. *(Chairman)*
T. C. Hu, Ph.D.
Manuel Rotenberg, Ph.D.
M. Lea Rudee, Ph.D. *(Provost, Fourth College)*
Victor H. Rumsey, D.Eng., D.Sci.

Associate Professors:
William A. Coles, Ph.D.
Michael L. Fredman, Ph.D.
Sing H. Lee, Ph.D.
George J. Lewak, Ph.D.
Robert Lugannani, Ph.D.
Huey-Lin Luo, Ph.D.
Elias Masry, Ph.D.
Barnaby J. Rickett, Ph.D.
**Walter J. Savitch, Ph.D.

Assistant Professors:
Walter A. Burkhard, Ph.D.
William E. Howden, Ph.D.

Acting Assistant Professor:
David L. Isaman

Adjunct Professor:
Andrew J. Viterbi, Ph.D.

Associate Faculty:
Gustaf O.S. Arrhenius, Ph.D., *Professor, Scripps Institution of Oceanography*
Seibert Q. Duntley, Sc.D., *Professor, Scripps Institution of Oceanography*

Lecturers:
James L. Harris, Sr., M.S.
Richard L. Sites, Ph.D.

*On leave spring, 1977
**On leave 1976-77

The Major Programs for Undergraduates

The department offers four-year programs in electrical engineering and computer engineering. Upon completion of one of them, students in Revelle and Muir Colleges receive the B.A. degree and students in Third and Fourth Colleges receive the B.S. degree. These programs prepare students for employment in the electrical, electronics, computer, or communications industries, and for graduate work in those fields. In addition, the department offers programs leading to the B.A. degree in applied physics, computer science, and information science. These are intended for students desiring more time for undergraduate studies outside their major subject. They prepare students for graduate study in their respective fields, as well as for certain types of employment.

The electrical engineering curriculum features three specializations: communication systems, electronics, and systems and control. The computer engineering and computer science programs treat compiler design, analysis of algorithms, computer architecture, operating systems, programming languages, and the application of computers to engineering, information retrieval, and scientific research. Applied Physics treats electromagnetism, electronics, optical information processing, and acoustical signal processing. Information Science concentrates on communication systems and the processing of information. The BA curricula allow individual programs that may involve a combination of the fields in which the department offers instruction.

APIS 61 is recommended for all APIS majors. All students intending to do experimental work after graduation, whether in industry or in graduate school, are advised to take APIS 50A-B-C, APIS 146A-B-C, and APIS 175B. A grade of C or higher is required in all courses included in the major program.

Students enrolled in the departmental programs who maintain a distinguished scholastic record through their junior year are encouraged to apply for the five-year B.S.-B.A./M.S. program. Applications for admission to the graduate program may be made in the spring quarter of the junior year. In their senior year such students may enroll in graduate courses and can complete the requirements for the master's degree within one year after receiving the bachelor's degree.

The Engineering Programs The department offers programs in computer engineering and electrical engineering. Third and Fourth College students who complete these programs receive the B.S. degree in Computer Engineering or Electrical Engineering; Revelle and Muir College students who complete these programs receive the B.A. degree in Computer Engineering or Electrical Engineering. Students are urged to discuss their curriculum with the appropriate APIS adviser no later than the spring quarter of their freshman year.

Graduates of junior colleges may enter the B.S. programs in the junior year. Transfer students should be mindful of the sophomore-year course requirements when planning their programs.

Computer Engineering The computer engineering program offers a strong emphasis on engineering mathematics and other basic engineering science as well as a firm grounding in computer science. Students should have sufficient background in high school mathematics so that they can take freshman calculus in their first quarter. Courses in high-school physics and computer programming, although helpful, are not required for admission to the program.

The required lower-division courses are:

Freshman Year
(a) Math 2A-B-C
(b) Physics 3A-B-C or Science 4A-B-C
(c) APIS 61

Sophomore Year
(a) Math 2DA-2EA or Math 2D-2E
(b) Physics 3D/Natural Science 2C, Natural Science 2D, Natural Science 2E/2F
(c) APIS 50A-B-C
(d) APIS 63, 64, 70
(e) Math 80A

The required upper-division courses are:

Junior Year
(a) APIS 160A-B
(b) APIS 161A-B-C
(c) APIS 173, 178, 179
(d) APIS 175A
(e) Technical Elective (3 quarters)

Senior Year
(a) APIS 170A-B
(b) APIS 171A-B
(c) APIS 165
(d) APIS 175B
(e) Technical Elective (3 quarters)

Electives

APIS 105A-B-C	APIS 198
APIS 131A-B-C	APIS 199
APIS 140A-B-C	AMES 141A-B-C
APIS 141A-B-C	AMES 142A-B-C
APIS 146A-B-C	MATH 102
APIS 152A-B-C	MATH 160A-B
APIS 154A-B-C	MATH 170A-B-C
APIS 156A-B-C	MATH 171A-B
APIS 177	MATH 180A-B-C
APIS 197	MATH 181A-B

Electrical Engineering The electrical engineering program comprises studies in communication systems, electronics, and systems and control; an option in any one of these fields may be selected by the student.

The required lower-division courses for all options are:

Freshman Year
(a) Math 2A-B-C
(b) Physics 3A-B-C or Science 4A-B-C-AL-BL-CL
(c) APIS 61

Sophomore Year
(a) Math 2DA-2EA
(b) Physics 3D or Nat Sci 2C, Nat Sci 2D, and Nat Sci 2E/2F
(c) APIS 50A-B-C
(d) APIS 64, APIS 70
(e) Math 80A-B

The upper-division course requirements depend on the option selected by the student.

Communication Systems Option
Junior Year
APIS 105A-B-C, APIS 152A-B-C
APIS 140A-B-C or APIS 161A-B-C, APIS 160A-B, APIS 175B

Senior Year
APIS 154A-B-C, APIS 146A-B-C
Technical Elective (3 quarters)

Electronics Option
Junior Year
APIS 105A-B-C, APIS 152A-B-C
APIS 140A-B-C, APIS 131A-B-C or Physics 100A-B-C

Senior Year
APIS 146A-B-C
Courses totaling 24 units from sequences marked thus † in the list of electives below.

Systems and Control Option
Junior Year
APIS 105A-B-C, APIS 152A-B-C
APIS 161A-B-C, APIS 160A-B, APIS 175B

Senior Year
AMES 141A-B-C, AMES 146A-B-C
Technical Elective (3 quarters)

Electives for all options

APIS 131A-B-C	APIS 159A-B-C
†APIS 141A-B-C	AMES 141A-B-C
†APIS 142AL-BL-CL	AMES 142A-B-C
APIS 146A-B-C	AMES 146A-B-C
†APIS 146AL-BL-CL	†Physics 130A-B
†APIS 148A-B-C	APIS 135
†APIS 154A-B-C	†APIS 175B

Program in Applied Physics The required lower-division courses are Math 2A-B-C-DA-EA, APIS 50A-B-C and one of the following.

(a) Science 4A-B-C, 4AL-BL-CL, Natural Science 2C, or
(b) Natural Science 2A-B-C-D-DL, Science 4CL, or
(c) Physics 3A-B-C-D, Science 4CL

APIS 50A-B-C is recommended.

A total of 18 upper-division courses, approved as a coherent program by the adviser, must be passed with a grade "C" or better in order to satisfy the requirements of the major program. Of those 18 the following are required of all applied physics majors:

(a) APIS 105A-B-C
(b) At least two sequences from the following:
APIS 131A-B-C
APIS 140A-B-C
APIS 146A-B-C
Physics 130A-B and APIS 135
APIS 148A-B-C
(c) At least eight units of undergraduate laboratory courses selected from the following:
APIS 130
APIS 141A-B-C
APIS 142AL-BL-CL
APIS 146AL-BL-CL
APIS 175B
Physics 120A-B-C

By making a careful choice of courses, a student may find that it is possible to satisfy many of the APIS graduate requirements in the senior year; and if the student's eventual aim is to take a Ph.D., he or she will be able to begin research work earlier and spend a shorter time in completing the degree. It is recommended that the choice of electives be discussed with the student's adviser.

Components of four typical major programs are listed. They should be supplemented with courses from the electives list. The choice of electives should include at least one three-course sequence.

Acoustics
APIS 105A-B-C, 130, 140A-B-C, 142AL-BL-CL
Electronics
APIS 105A-B-C, 131A-B-C, 146A-B-C-AL-BL, 175B
Optics
APIS 105A-B-C, 130, 140A-B-C, 141A-B-C
Solid State
APIS 105A-B-C, 131A-B-C, 133, 146A-B-C, Physics 130A-B and APIS 135

Electives: Any of the courses listed above plus
APIS 133, 162A-B-C
AMES 101A-B-C, 121A-B,130A-B-C, 180A-B-C
Physics 110A-B, 140A-B, 152

Program in Computer Science

The required lower-division courses are:

(a) Mathematics: 2A-B-C-D-E
(b) Science: 3 courses in physics, chemistry, biology, economics or psychology
(c) APIS 61, 70

A total of 15 upper-division courses must be completed in order to satisfy the major requirements. The following 11 courses are required: APIS 160A-B, 161A-B-C, 165, 170A, 171A, 175A-B, 179.

Four electives may be chosen from the following list: APIS 105A-B-C, 146A-B-C, 159A-B, 162A-B-C, 163A-B-C, 166, 170B, 171B, 173, 177, 198, 199.

Program in Information Science

This program is less intensive than the programs in electrical engineering listed above. The required lower-division courses are:

(a) Math 2A-B-C-DA-EA
(b) Science 4A-B-C-CL and Natural Science 2C; or Natural Science 2A-B-C-D-DL; or Physics 3A-B-C-D
(c) APIS 50A-B-C
(d) APIS 61

A total of 15 upper-division courses must be passed in order to complete the major program. As early as possible, preferably before the beginning of the junior year, the student must discuss the curriculum with the information science faculty adviser. Options in communication systems, electronics, and systems and control are available. See the electrical engineering program for suggested courses in these options.

Minor Programs

The following sets of six courses represent a variety of minor programs in the three main areas of applied physics, computer science, and information science. All course numbers refer to APIS courses except as otherwise noted. The prerequisites for these minors do not involve any other upper-division courses. They do require certain lower-division prerequisites which must therefore be anticipated in the student's lower-division program. Revelle students should consult their provost's office concerning their non-contiguous minor.

Acoustics
140A-B-C and 142AL-BL-CL
Computer Science
61, 63 or 64, 160A and 161A-B-C
Diffraction Informatics
105A-B-C and 140A-B-C, or 50A-B-C and 140A-B-C
Electromagnetics
50A-B-C and 131A-B-C
Electromagnetic waves
131A-B-C and 140A-B-C

Electronics
50A-B-C and 146A-B-C
Optics
140A-B-C and 141A-B-C
Solid State
Physics 140A-B and APIS 135, 146A-B-C

Computing for Students in the Humanities and Social Sciences An introduction to the structure and use of automatic digital computers is provided in APIS 61, Introduction to Computer Science and APIS 63, Digital Computers: Non-Numeric Applications.

The Graduate Programs

There are four main divisions of study:

1. Applied Physics

This division includes the following areas of study:

(a) *Radio Astronomy and Space Physics* The theoretical and experimental investigation of physical processes relating to the structure of the sun and planetary bodies. Current studies related to planetary atmospheres, ionospheres, magnetospheres, the nature of the solar wind and solar corona, comets, asteroids, interplanetary dust, and condensation of matter in space.

The department has available the facilities of several radio astronomical observatories. In addition a large local radio observatory has been established to observe the structure of the solar wind by means of radio-star scintillations.

(b) *Materials Science, particularly Applied Solid State Physics* This field includes material analysis (X-ray techniques, optical and electron microscopy, metallography), and when fully developed will also comprise material purification, crystal growth and the study of metals, semiconductors, dielectrics, and ceramics. Areas of current research interest include the study of superconductors and the physics of metals and alloys.

(c) *Applied Optics* This field includes laser development and applications. Current studies concern tunable lasers of high output power and good spectral and spatial properties, nonlinear optical materials and threshold devices, fast modulators, integrated optical circuits and fiber optics.

The department has available a number of lasers (e.g. argon, krypton, dye, helium-neon and gallium arsenide lasers), a considerable amount of high quality optics, several optical benches, and vibration isolated tables. There is also an optical shop for the fabrication of specialized optics.

2. Computer Science

This program accepts both beginning and advanced graduate students for study and research leading to the degree of Doctor of Philosophy; the program also offers a Master of Science degree. The program is concerned with fundamental properties of digital information processing systems. Emphasis is placed on the design of computer systems, especially compilers, architecture, programming languages, operating systems, and the analysis of algorithms. The M.S. degree (Plan II - Comprehensive Examination) is designed to serve as a terminal master's degree for students who wish to seek immediate employment in the computer field. Although it is specifically designed to serve as a terminal program, students who complete the program are in an excellent position to go on to study for the Ph.D. degree. Students with a good undergraduate background can complete the M.S. program in one year of full-time study. Special provisions are made to integrate this program into a five-year combined bachelor's-master's program.

3. Information Science

Information science in APIS involves the detection of signals and the transmission and processing of information in the acoustic, radio, and optical domains, the prediction and filtering of random processes, communication theory, and the propagation of acoustic and electromagnetic waves. Applications are made to such fields as communications, radar, sonar, oceanography, holography, image processing, and visibility in air and water. Information processing is carried out by electronic, acoustic, and optical filtering, photographically, and by digital computers. Both theoretical and practical aspects of information processing are studied.

4. Interdepartmental Curriculum in Applied Ocean Science
The Graduate Department of the Scripps Institution of Oceanography and the Department of Applied Physics and Information Science offer an interdepartmental program in applied science related to the oceans. All aspects of man's purposeful and useful intervention into the sea are included. Students who enroll will receive the degree of Ph.D. upon completion of normal departmental requirements and certain others stipulated by an interdepartmental faculty committee.

Preparation Applications will be considered from students who have taken undergraduate majors in one of the following disciplines: applied mathematics, applied physics, computer science, electrical engineering, engineering physics, engineering science, mathematics, and physics. Applications will also be considered from students who wish to take interdisciplinary programs.

Master's Degree Programs

The general requirements for the degree of Master of Science are stated in the Graduate Studies section of the catalog. Normally, no financial support is offered to students enrolled in the M.S. program.

A. Applied Physics The M.S. program in applied physics is a flexible program that allows the students to deepen their understanding in the field of their choice.

Course Requirements

Math 210A-B-C or AMES 294A-B-C and any two sequences from the following:

APIS 231A-B-C
APIS 232A-B-C
APIS 241A-B-C
APIS 242A-B-C

B. Computer Science In order to receive the M.S. degree in computer science, a student must complete the course requirements listed below and pass a comprehensive examination. The comprehensive examination is given in two parts: a preliminary written examination and a final oral examination. The written examination is given yearly at the end of the winter quarter. The oral examination may be scheduled at any time agreed on by the student and the examining committee. The written examination can normally be passed with a very thorough knowledge of the topics covered in an undergraduate computer science-major. The oral examination covers more advanced graduate topics.

Course Requirements

(a) APIS 264A-B-C
(b) APIS 269 (3 units)
(c) Two of the following three sequences
  (i) APIS 270A-B
  (ii) APIS 165, 268A-B
  (iii) APIS 265A-B-C

All courses except APIS 269 or 501 must be completed with a grade of A or B. APIS 269 and 501 may be completed with an S grade. Students who take APIS 265A may omit APIS 165 and satisfy this sequence by taking only APIS 268A-B. Note: APIS 298 and 299 may not be counted toward the M.S. degree.

Additional graduate courses to complete a total of 36 units may be taken in APIS, mathematics, psychology, linguistics, and economics. A list of acceptable courses is available in the department office.

C. Information Science The M.S. program in information science stresses the mathematical principles and the analysis and design of modern communication systems. To complete the program, a student must satisfy the course requirements and pass a comprehensive examination. The comprehensive examination, which is held once a year late in the Spring Quarter, consists of a written part and an oral part. Students with a good undergraduate background can complete the program in one year of full-time study.

Course Requirements

Math 210A-B-C,
APIS 250A-B-C or APIS 256A-B-C,
and APIS 254A-B-C
or APIS 258A-B-C

In addition, three quarters of elective courses must be taken. Any APIS, AMES, or mathematics graduate course or upper-division course is acceptable, subject to the consent of the graduate adviser.

The Doctoral Programs

The Department of APIS has established a set of requirements applying to the first two years of the Ph.D. program as described below.

1. Core Courses: Ph.D. students are required to take the following courses in their respective majors:

a. Applied Physics: AMES 294A-B-C or Math 210A-B-C, APIS 232A-B-C, and one of the following course sequences: APIS 231A-B-C, APIS 242A-B-C, APIS 241A-B-C, Physics 200A, 212A, 212B.
b. Computer Science: APIS 264A-B-C, APIS 265A-B-C, and three quarter-courses chosen from: APIS 268A-B, APIS 270A-B, APIS 250A-B, APIS 252, Math 210A-B-C, Math 260A-B-C, and Math 270A-B-C.
c. Information Science: Mathematics 210A-B-C; APIS 250A-B-C or APIS 256A-B-C; and APIS 254A-B-C or APIS 258A-B-C.
d. Applied Ocean Science students will have the SIO core courses substituted for one sequence of the APIS departmental core courses.

2. Written and Oral Examinations: Students majoring in applied physics are required to take written and oral examinations after completing one year of graduate study at UC San Diego. The examinations are based on the student's first year graduate courses. They are offered twice a year, at the beginning of the fall and the spring quarters and last for two days, four hours per day. The examinations may be repeated once.

3. Paper Examination: Students majoring in computer science, information science, and applied ocean science are required to pass this examination. It is held once a year in the spring quarter, and all second-year Ph.D. students are required to take it. The examination consists of a presentation by the student on one of two topics before a committee of three faculty members. The topics, together with a list of references, will be given to the students approximately two weeks before the examination.

4. Thesis Examination: All Ph.D. students are required to devote at least half their time to research during their second year. They are expected to present the results of their research before a committee of three faculty members. The thesis examination is held once a year in the spring quarter.

5. Criteria for a Satisfactory Performance: Ph.D. students are expected to maintain, on an annual basis, a 3.4 grade-point average for the core courses. They are expected to pass both the paper and thesis examinations. Ph.D. students entering with a master's degree may be exempted from certain of the core-course requirements.

A detailed description of the requirements for the Ph.D. program can be obtained from the department office.

Students who have satisfied these departmental graduate requirements may register for any APIS course on a satisfactory/unsatisfactory basis.

Dissertation In order to be admitted to the university qualifying examination, a student must have satisfied the departmental graduate requirements and have been accepted by a faculty member as a Ph.D. thesis candidate. A candidate for the Ph.D. will write a dissertation and defend it in a final oral examination conducted by the doctoral committee.

Financial Aids Financial support is available to qualified graduate students in the form of fellowships, traineeships, loans, and assistantships. Stipends for half time assistantships are about $415 per month, with the possibility of full-time employment during the summer months. Requests for application forms for admission and financial support should be directed to the Department of Applied Physics & Information Science.

Courses

The numbering of APIS courses was changed last year. Students may not take the same course again under a different number.

All courses marked with an asterisk (*) are not offered in 1976-77. They are listed to help students plan for later years.

Lower Division

The Department of Applied Physics & Information Science teaches and administers the Science 4 and 4L sequences. (See course listings: "Science").

***30A. The Physics of Motion from Aristotle to Einstein (4)**
Studies leading to the laws of motion as they emerged historically from ancient times through Newton to Einstein, including the study of light, electricity, and magnetism. These laws of motion are basic to physics from atoms to galaxies. Three hours lecture, one hour recitation. (Formerly 20A). (F)

***30B. The Nature of Matter (4)**
The properties of matter related to atoms and molecules. Kinetic theory of heat. Atomic structure. Chemical bonds, molecules, giant organic molecules. The nucleus, fusion,

fission, elementary particles. Photon theory of light, wave theory of matter. Three hours lecture, one hour recitation. *Prerequisite: APIS 30A or consent of instructor.* (Formerly 20B) (W)

***30C. The Nature of the Universe (4)**
A descriptive introduction to modern astronomy. Properties and evolution of solar system, stars, galaxies, and cosmology. Emphasis will be on the observed radio, optical, x-ray radiation, from which the laws of physics lead us to an understanding of the universe. Three hours lecture, one hour recitation. *Prerequisite: APIS 30B or consent of the instructor.* (Formerly 20C) (S)

35. The Nature of the Earth (4)
Descriptive introduction to earth science. Emergence of our present knowledge of the earth's interior, mantle, crust, oceans, and atmosphere through the study of gravity, seismology, magnetism, radioactive dating, heat flow, dynamics, and chemistry. Relation to environment and to space exploration. Three hours lecture, one hour recitation. (Formerly 23) (F)

50A-B-C. Linear System and Circuit Analysis (4-4-4)
Network analysis, Kirchhoff's laws, transients and the steady-state, step and impulse response, convolution integral. Sinusoidal steady-state analysis, complex network impedance, Thevenin and Norton theorems. Concept of state, Fourier series, Fourier and Laplace transforms, applications. Three hours lecture, three hours laboratory. *Prerequisite: Sci 4C or Physics 3C, and for APIS 50C, Math 2E is required.*

61. Introduction to Computer Science (4)
Introduction to problem solving by means of algorithmic processes; their implementation on digital computers. Topics include algorithms, transforming problem statements into algorithmic procedure, flowcharts; principles of programming languages and computing machines; principles of good programming, structured programming; data structures; PASCAL. Three hours lecture, one hour recitation. (A student who has taken APIS 10, 10A, or 13A may not take APIS 61 for credit.) (F,W,S)

62. Introduction to Numerical Algorithms (4)
Introduction to elementary numerical analysis with emphasis upon computer applications. Solutions of nonlinear equations and sets of linear equations. Matrix operation, interpolation, extrapolation, polynomial fits to data, numerical differentiation and integration, and solution of elementary differential equations. Three hours lecture, one hour recitation. *Prerequisite: APIS 61.* (A student who has taken APIS 12 or APIS 13B may not take APIS 62 for credit). (S)

63. Non-Numeric Applications of Computers (4)
Study of the use of computers for non-mathematical applications such as the accessing and processing of files and data bases. Areas of study include text processing, business data processing, graphics and communications. Students interested in business applications will have the option of learning to program in and of completing homework problems using COBOL. Students interested in other areas of non-numeric processing will use PASCAL. Three hours lectures, two hours recitation. *Prerequisites: APIS 61 or equivalent course emphasizing structured programming approved by the instructor.* (A student who has taken APIS 10B or APIS 11 may not take APIS 63 for credit). (W)

64. Scientific Applications of Computers (4)
The use of FORTRAN as a programming language for solving scientific calculation problems. The limitations and advantages of FORTRAN. Emphasis is on the programming of numerical analysis algorithms for solving linear systems of equations, finding roots and carrying out numerical differentiation and integration. Three hours lectures, two hours recitation. *Prerequisites: APIS 61, Math 2A-2B-2C (2C may be taken concurrently) or consent of instructor.* (A student who has taken APIS 12 or APIS 13B may not take APIS 64 for credit). (S)

70. Introduction to Programming Systems (4)
The principal kinds of system software. Topics include assemblers, pseudo-operations, macros; loaders, relocatable programs, subroutines; programming languages, compilers, storage allocation, recursion, extensible languages; operating systems, interrupts, batch processing, time sharing. Introduction to lexical analysis, parsing, and code generation. Three hours lecture. *Prerequisite: APIS 61 or consent of instructor.* (Formerly 15) (S)

Upper Division

105A-B-C. Introduction to Mathematical Physics (4-4-4)
Fourier series, elementary partial differential equations, ordinary differential equations, complex variables, and integral transforms with applications to problems in particle and rigid-body dynamics, vibrations, wave motion, electric circuits, heat conduction, and fluid dynamics. Four hours lecture. *Prerequisite: Science 4A-B-C or equivalent and Math 2A-B-C-DA-DE or equivalent.*

130. Applied Physics Laboratory (4)
Individual and small group laboratory projects in various areas of applied physics. Projects may be chosen in electronics, radio physics, materials science, acoustics, or optics. Students will use existing apparatus and construct new apparatus. One hour lecture, four hours laboratory. *Prerequisite: consent of instructor.* (S)

131A. Electromagnetism (4)
(E,D) fields, Gauss's law, electrostatic potential. Divergence, curl. (B,H) fields, Ampère's law. Similarities and differences between electric and magnetic fields. Biot-Savart law. Displacement current. Electromotance, Faraday's law. Maxwell's equations. Scalar, vector, and Hertzian potentials. Current elements as dipoles. Radiation. Three hours lecture, one hour recitation. *Prerequisite: Natural Science 2B or Science 4C and Math 2C or consent of instructor.* (Formerly 101A). (F)

131B. Electromagnetism (4)
Electromagnetic equations in materials. Boundary conditions. Conductivity, electric and magnetic susceptibility. Real and complex dielectric constants and refractive indices. Refraction and reflection of plane waves at a plane interface. Evanescent waves. Models of dielectric, magnetic and conducting materials, including plasma. Three hours lecture, one hour recitation. *Prerequisite: APIS 131A.* (Formerly 101B). (W)

131C. Electromagnetism (4)
Electromagnetic energy, energy density. Poynting's vector and theorem. Storage and flow of energy in oscillatory circuits and oscillatory electromagnetic fields. Resistive, reactive and complex power, complex Poynting vector. Circuit and field impedance. The Lorentz transformation. Electromagnetic fields in moving materials. Three hours lecture, one hour recitation. *Prerequisite: APIS 131B.* (Formerly 101C). (S)

133. Structure of Solids (4)
Atomic structure, properties and growth of ordered and disordered solids. Laboratory work includes generation of x-ray spectra, symmetry determination by Laue-technique, structure determination by single crystal and powder techniques, electron diffraction and radial distribution analysis. Four hours lecture. *Prerequisite: consent of instructor.* (Formerly 120) (W)

***135. Quantum and Semiconductor Physics (4)**
Quantum statistics, quantum theory of electrons in periodic lattices. Theory of semiconductors. Three hours lecture. *Prerequisite: Science 4C, APIS 105A-B-C, and Physics 130B.* (S)

137. Solid State Devices (4)
A laboratory course covering principles and usage of semiconductor and superconductor devices. Quantum electronics. Four hours laboratory. *Prerequisites: Chemistry 150, Physics 125, and elements of electronics (such as Physics 120A or Science 4CL).* (Part of Materials Science Program, which see.) (S)

140A. Diffraction Informatics
Acoustic and electromagnetic waves in one dimension. Reflection and transmission at a boundary. Multiple boundaries and design of impedance transformers. Reciprocity. Waves in three dimensions. Resonances of rectangular cavities. Transmission along rectangular waveguides. Dispersion of electromagnetic, acoustic and other waves. Three hours lecture, two hours recitation. *Prerequisites: Math 2D and APIS 50C.* (Concurrent registration in APIS 105A recommended.

140B. Diffraction Informatics (4)
Fraunhofer patterns of arrays of point sources. Diffraction patterns as Fourier transforms and Huygens' Principle. Design of interferometers, telescopes, microscopes, antennas and acoustic radiators. Lenses as Fourier transformers. Fresnel diffraction and occultation. Three hours lecture, two hours recitation. *Prerequisites: APIS 140A or consent of instructor. Concurrent registration in APIS 105B recommended.*

140C. Diffraction Informatics (4)
Fourier transforms and the angular spectrum of plane waves. Fresnel transforms and spherical waves. Elements of information processing using coherent and incoherent diffraction patterns. Images: Information stored in X-ray, optical, radio and acoustic diffraction patterns. Holography. Three hours lecture, two hours recitation. *Prerequisites: APIS 140B or consent of instructor.* Concurrent registration in APIS 105C recommended.

141A. Optics I (4)
Imaging and Fourier transforming properties of lenses, the impulse responses and the transfer functions of optical systems, information processing with coherent and incoherent light, spatial filtering, image enhancement, image restoration, detection of optical signals. Three hours lecture, two hours laboratory. *Prerequisite: APIS 140C or consent of instructor.*

141B. Optics II (4)
Lensless holography, computer-generated holograms, color holography. Television transmission of holograms, holographic memory for computers, imaging through fog with holography, holographic microscopy, nondestructive testing with holography. Three hours lecture, two hours laboratory. *Prerequisite: APIS 141A or consent of instructor.*

141C. Optics III (4)
Fundamentals of laser physics, laser active media, laser resonator modes and structures, electro-optical and acousto-optical light modulators, nonlinear optics, optical detection. Three hours lecture, two hours laboratory. *Prerequisite: APIS 141B or consent of instructor.*

142AL-142BL-142CL. Acoustics Laboratory (4-4-4)
Experiments in acoustics. Vibrations and waves in strings and bars. Response of electro-mechanical systems. Transducer calibrations. Propagation, reflection, refraction, and scattering of underwater sound waves. Three hours laboratory, three hours recitation. *Prerequisite: concurrent registration in APIS 140A-B-C or consent of instructor.*

146A-B-C. Electronic Systems and Circuits (4-4-4)
Elementary band theory of semiconductors. Theory of junction and field effect transistors. Ebers-Moll and the hybrid-π models as examples of modelling. Applications of transistors in circuits. Feedback, operational amplifiers. Circuit synthesis and analysis. Three hours lecture, two hours laboratory. *Prerequisite: APIS 50A-B-C or equivalent, APIS 105A-B-C or equivalent, Sci. 4C or Physics 3D or equivalent.* (Formerly 164A-B-C).

146AL-BL-CL. Electronics Circuits Laboratory (2-2-2)
Laboratory projects on material covered in APIS 146A-B-C. Three hours laboratory. *Prerequisite: concurrent registration in APIS 146A-B-C or consent of instructor.*

***148A-B-C. Electromagnetic Waves (4-4-4)**
Solutions of Maxwell's equations in cylindrical and spherical coordinates. Continuity conditions and the impedance concept. Reciprocity. Application to design of resonant cavities, waveguides, antennas, and microwave networks. Three hours lecture, two hours laboratory. *Prerequisites: APIS 131A-B-C, APIS 140A-B-C, APIS 105A-B-C or equivalent.*

152A-B-C. Signal Analysis (4-4-4)
Fourier series and integral, sampling representation, linear systems, filters. Digital systems and z-transforms. Feedback systems. Combinatorial analysis, random variables, probability distributions, expectations, limit theorems. Correlation functions and spectral densities of stochastic processes, the Gaussian process. Linear systems and random noise. Three hours lecture. *Prerequisite: APIS 50A-B-C.*

***154A-B-C. Communications Systems (4-4-4)**
Review of probability and random processes. Optimum filtering, prediction, and signal detection. Analog modulation and demodulation, AM, FM, PM, signal-to-noise ratio, performance analysis. Digital communication systems, sampling, quantizing, PAM, PCM, PSK, probability of error, quantizing errors, intersymbol interference. Three hours lecture, one hour recitation. *Prerequisite: APIS 152A-B-C.*

159A-B. Queuing Systems (4-4)
Analysis of queuing systems; queue length, waiting time and busy period. Bulk queues and priority disciplines. Equilibrium and transient solutions. Cost models and optimization. Introduction to inventory systems. Applications. Three hours lecture. *Prerequisite: APIS 162A or equivalent, or consent of instructor.*

160A-B. Foundations of Computer Science (4-4)
Permutations and combinations; generating functions, recurrence relations; introduction to graph theory; introduction to rings and fields; Polyá's theory of counting; predicate calculus; applications to topics in computer science including the design and analysis of algorithms. Three hours lecture. *Prerequisite: consent of instructor.* (Formerly 151A-B). (F,W)

161A-B-C. Digital System Software (4-4-4)
Principles of software design. Assemblers, macro processors, input-output; information structures, linear structures, sequential and linked allocations, searching techniques, scatter storage, trees, traversals, AVL trees, Huffman trees; sorting; compilers, lexical analysis, symbol tables, context-free grammars, parsing, syntax-directed translation, code optimization. Three hours lecture, two hours recitation. *Prerequisite: APIS 61, APIS 70, APIS 160A (may be taken concurrently).*

M162A-B-C. Statistical Communication Theory (4-4-4)
Review of probability theory: combinatorial analysis, generating functions, random variables, distributions, expectations, limit theorems. Stochastic processes: correlation functions, spectral densities, the Gaussian process, or-

thonormal expansions, mean-square filtering. Elements of information theory: entropy, mutual information, channel capacity, coding. Four hours lecture. *Prerequisite: APIS 163C.*

M163A-B-C. Linear Systems and Circuits (4-4-4)
Network analysis, Kirchhoff's laws, topological and state-space methods, linear systems, exponential transforms, convolution integrals, sinusoidal steady-state analysis, equivalent networks, time-discrete systems, applications. Introduction to feedback control. Three hours lecture. *Prerequisite: Math 2E; APIS 105A-B-C taken concurrently.*

165. Algorithms, Automata and Formal Languages (4)
Introduction to the notions of formal computations: Turing machines, register machines, recursive functions, the halting problem, minimal instruction sets which realize a universal computer, introduction to Turing machine time and tape hierarchies. Three hours lecture. *Prerequisite: APIS 160A or Math 160A or consent of instructor.* (W)

***166. Numerical Algorithms (4)**
Computational error, Taylor series, interpolation, solution of equations, numerical integrations, systems of equations, eigenvalue problems, some applications to numerical solution of ordinary differential equations, introduction to partial differential equations; practice in programming applications of these topics. Three hours lecture. *Prerequisite: APIS 61, Math 2C-2D-2E.* (Formerly 151C). (S)

170A-B. Principles of Computer System Design (4-4)
Logical design, high-speed memory buffer and register circuits, bulk storage devices, computer terminals, sequential machines, computational schemata, synchronous and asynchronous control networks, microprogramming. Three hours lecture. *Prerequisite: APIS 175A or consent of instructor.* (F,W)

171A-B. Principles of Computer Operating Systems (4-4)
Batch systems, multiprogramming, procedure implementation, processes, parallelism, critical sections, deadlocks, communication, multiprocessing, multi-level memory management, binding, name management, file systems, protection, resource allocation, scheduling. Three hours lecture. *Prerequisite: APIS 170A.* (W,S)

173. Comparative Study of Programming Languages (4)
Introduction to and use of several high-level programming languages. Features of high-level languages appropriate to particular problem areas. Course will involve a substantial programming project for each language studied. (e.g. COBOL, PLI and GPPS). Three hours lecture. *Prerequisite: APIS 61 and APIS 70 or consent of instructor.* (F)

175A. Computer Science Laboratory (4)
Direct manipulation of a small computer in a laboratory environment. Assembly language programming. One hour lecture, three hours laboratory. *Prerequisite: APIS 161A.* (W)

175B. Digital Hardware Laboratory (4)
Students will design, build, and test various digital subsystems using small and medium-scale integrated circuits. Experiments include registers, counters, display drivers, RAM's, arithmetic circuits, and analog-digital conversion. One hour lecture, three hours laboratory. *Prerequisite: consent of instructor.* (S)

***177. Interactive Graphics and Man-Machine Communication (4)**
Man-machine interface. Displays, generation of points, vectors, and complex structures. Interactive versus passive graphics. Pattern recognition, syntax tables, random nets. Data structures, graphics software. Mathematics of three-dimensions, projections, and the hidden-line problem. Graphical programs. Computer-aided design and instruction, animated movies. Four hours lecture. *Prerequisite: APIS 161C.* (Formerly 166). (F)

***178. Artificial Intelligence (4)**
Steps toward intelligent machine behavior: General problem-solving heuristics, tree-searching algorithms, theorem-proving programs, game-playing programs. Appropriate programming languages. Three hours lecture. *Prerequisite: APIS 160A or both APIS 61 and Math 160A.* (Formerly 186).

179. Analysis of Algorithms (4)
Methods for designing measures of computational cost, for computing the cost of algorithms and for computing the intrinsic costs of common computational tasks. Tasks considered include sorting, tree searching, matrix manipulations and polynomial evaluation. Three hours lecture. *Prerequisites: APIS 160A-B and 161A-B*

195. Teaching (4)
Teaching and tutorial activities associated with courses and seminars. Not more than 4 units of APIS 195 may be used for satisfying graduation requirements. Pass/Fail permitted. Three hours lecture. *Prerequisite: permission of department chairman.*

197. Field study in Applied Physics & Information Science
Directed study and research at laboratories and observatories away from the campus. *Prerequisites: consent of the instructor and approval of the department.*

198. Directed Group Study (2 or 4)
Topics in applied physics or information science whose study involves reading and discussion by a small group of students under direction of a faculty member. *Prerequisite: consent of instructor.*

199. Independent Study for Undergraduates (2 or 4)
Independent reading or research by special arrangement with a faculty member. *Prerequisite: consent of instructor.*

Graduate

231-A-B-C. Space Plasmas and Planetary Atmospheres (3-3-3)
Waves in cold and hot magnetoplasmas. Fluctuations, kinetic equation and high frequency conductivity. Non-linear theories of plasma instabilities. Transport equations and transport coefficients. Atmospheric and ionospheric dynamics of the earth and other planets. Microscopic and macroscopic instabilities in space plasmas. *Prerequisites: consent of instructor.*

232A-B-C. Applied Electromagnetic Theory (3-3-3)
General solution of Maxwell's equations and the transmission and reception of electromagnetic waves via antennas, waveguides and representative homogeneous and inhomogeneous media, at radio and optical wavelengths. Propagation via the atmosphere, ionosphere, troposphere, and magnetosphere and the interplanetary and interstellar media. Reciprocity and equivalence theorems. *Prerequisites: APIS 148A-B-C or equivalent.*

233. Structures of Solids (3)
Atomic structure, properties and growth of ordered and disordered solids. Laboratory work includes generation of x-ray spectra, symmetry determination by Laue-technique, structure determination by single crystal and powder techniques, electron diffraction and radial distribution analysis. Term paper required. *Prerequisite: consent of instructor.* (Formerly 230). (W)

***234. Quantum Electronics (3)**
Approximation methods for time-dependent problems. Absorption and emission of radiation. Application to masers and lasers. *Prerequisite: Physics 212B or equivalent.* (Formerly 206).

***235A. Advanced Plasma Physics I (3)**
The Liouville equation, the BBGKY hierarchy, kinetic equations; Vlasov, Boltzmann, Fokker-Planck, Balescu-Lenard. Applications: Plasma equilibrium solutions, transport properties, instabilities. *Prerequisite: consent of instructor.* (Formerly 212B).

***235B. Advanced Plasma Physics II (3)**
Weakly non-linear wave-wave interaction: The decay instability, many wave interaction in the random phase approximation. Wave-particle interaction: quasi-linear theory, electron plasma oscillation turbulence. *Prerequisite: consent of instructor.* (Formerly 212C).

236. Space Research and the New Astrophysics (3)
Survey of new approach to astrophysics based on results of space research. Relations between laboratory physics and astrophysics. Electric and magnetic fields; magnetosphere; jet streams of solid bodies in space; asteroids, comets, meteoroids. Evolution of solar system. Galactic plasmas. Cosmology. (Formerly 228). (W)

241A. Optics I (3)
Propagation of waves and rays in various media: homogeneous, inhomogeneous (e.g. media with gradient index or lens-like media), anisotropic, nonlinear media. Optical dielectric waveguides, fiber optics, electro-optics, nonlinear optics, acousto-optics. Optical resonators and mode stability criteria. *Prerequisite: APIS 140C or consent of instructor.* (Formerly 205A). (F)

241B. Optics II (3)
Diffraction and interference, imaging and Fourier transforming with lenses, point-spread and transfer function concepts, space-bandwidth product, super-resolution, partial coherence, image processing with coherent and incoherent lights, processing with feedback, nonlinear processing, real-time processing, optical computing and other applications. *Prerequisite: APIS 241A or consent of instructor.* (Formerly 205B). (W)

241C. Optics III (3)
Laser and spatial light modulators for optical processing and holography. Computer holography, color holography and real-time holography. Television transmission of holograms, holographic computer memory, imaging through fog with holograhy, holographic microscopy, nondestructive testing with holography. *Prerequisite: APIS 241B or consent of instructor.* (Formerly 205C). (S)

242A. Advanced Acoustics I (3)
Boundary value problems in vibrating systems, wave propagation in strings, bars, and plates. Fundamentals of acoustical transducers. *Prerequisite: concurrent registration in 242AL recommended.* (Formerly 204A).

242B. Advanced Acoustics II (3)
Theory of radiation, transmission and scattering of sound with special application to ocean acoustics. *Prerequisite: concurrent registration in 242BL recommended. APIS 242A or consent of instructor.* (Formerly 204B).

242C. Advanced Acoustics III (3)
Signal processing in underwater acoustics. Theory and hardware embodiments. *Prerequisite: concurrent registration in 242CL recommended. APIS 242B or consent of instructor.* (Formerly 204C).

242AL-BL-CL. Advanced Acoustics Laboratory (2-2-2)
Experiments in acoustics complementing the APIS 242A-B-C lecture series. *Prerequisite: Concurrent registration in APIS 242A-B-C or consent of instructor.* (Formerly 204AL-BL-CL).

243A-B. Optical Systems (3-3)
Fundamentals of optical systems which provide visual information, including photographic and electronic imagery. Geometrical, physical, and physiological optics; radiometry, photometry, colorimetry, atmospheric optics, visibility; coherence, spatial frequency analysis, transfer functions, resolution, image evaluation, image reconstruction. Ultimate capabilities of optical systems. *Prerequisite: consent of instructor.* (Formerly 203A-B).(W,S)

244. Introduction to Radio Astronomy (3)
Radio telescopes. Antennas for measurement of celestial brightness distribution. receivers for detection of stochastic signals. Effects of aperture size, bandwidth and integration time. Radio continuum and line spectra. Partial coherence and Stokes's polarization parameters. Interferometric methods and synthesis of sky maps. *Prerequisite: consent of instructor.* (Given in alternate years). (Formerly 224).

245. Signal Processing (3)
Time-series analysis, sampling, spectral analysis, covariance and cross-covariance estimation. Digital filtering, optimal filters, signal detection, parameter estimation. Measurement of random fields, angular spectra, detector arrays, synthetic apertures. *Prerequisite: consent of instructor. (APIS 162 and APIS 244 desirable).* (Given in alternate years). (Formerly 225). (W)

246. Wave Propagation through Random Media (3)
Theory of scintillations due to refractive-index fluctuations at radio wavelengths in the solar wind, the ionosphere, and the interplanetary medium, and at optical wavelengths in the earth's atmosphere. Connection between the refractive index spectrum, the angular spectrum, and the intensity spectrum. (Given in alternate years). (Formerly 226)

***248A-B. Electromagnetic Propagation in Stratified Atmospheric Layers (3)**
Propagation in a plane-stratified ionosphere without and with the Earth's magnetic field. Real and complex ray theory. The WKB approximation. The mode theory of propagation between the Earth and the ionosphere. Refraction and diffraction in the troposphere. Scattering. *Prerequisite: APIS 238 or consent of instructor.* (Formerly 215)

250A-B-C Mathematical Models for Random Processes (3-3-3)
Study of random processes emphasizing their relationship to the models that generate them. Characterization of probability laws, filtering, estimation, limit theorems. Brownian motion, Poisson processes, shot noise. Markov processes, counting processes, and linear processes. *Prerequisite: APIS 162C or equivalent or consent of instructor.* (Given in alternate years). (F,W,S)

254A-B-C. Detection Theory (3-3-3)
Hypothesis testing; detection of signals in white and colored Gaussian noise; Karhunen-Loève expansion; estimation of signal parameters, maximum-likelihood detection; resolution of signals; detection and estimation of stochastic signals; applications to radar, communications, and optics. *Prerequisite: APIS 162C.* (Given in alternate years). (Formerly 262A-B-C).

***256A-B-C. Time Series Theory and Applications (3-3-3)**
Second order random processes; processes with orthogonal increments, spectral representation, series expansion. Time series analysis; covariance and spectral estimation. Mean-square recursive and nonrecursive filtering; Wiener-Hopf and Kalman-Bucy filters. *Prerequisite: APIS 152A-B-C and Math 210A-B-C. (Math 210 may be taken concurrently).* (Given in alternate years). (Formerly 260A-B-C).

***258A-B-C. Communication Systems (3-3-3)**
Principles of modern communication systems, mathematical description of analog and digital modulation techniques, performance measure and distortion analysis, noise and its effect on signal transmission, modulation

with stochastic signals. *Prerequisite: APIS 154A-B-C or equivalent or consent of instructor.* (Given in alternate years.)

264A-B-C. Digital System Software (3-3-3)
Organization of computers and information-handling systems; resource allocation; aspects of switching and automata theory; computational models, algorithms, data structures; algebraic and symbolic programming languages; assemblers, macros, compilers, translator writing systems. *Prerequisites: APIS 161C, 170A, and 171A.*

265A-B-C. Automata, Formal Languages, and Complexity Theory (3-3-3)
Finite-state machines; context-free languages, pushdown automata, parsing theory; Turing and register type machines, halting problem, time and tape complexity; Blum axioms; analysis of the computational cost of specific tasks such as sorting, matrix manipulation and polynomial evaluation. *Prerequisite: consent of instructor.*

***267. Applications of Graph Theory (3)**
Applications of the theory of graphs to information theory, game theory, and computers. Also source encoding, graph theoretic error correcting codes, communication networks, two-person zero-sum games, information retrieval and other topics. *Prerequisite: consent of instructor.* (Formerly 266).

268A-B. Combinatorial Algorithms (3-3)
Describes combinatorial algorithms and their computer implementation. Topics covered include network flow problems such as the analysis and synthesis of multiterminal network flows, decomposition algorithms for shortest paths, optimum binary search trees, optimum linear ordering, and other current problems. *Prerequisites: consent of instructor.*

269. Special Project in Computer Science (1-6*)
The student will conceive, design, and execute a project in computer science under the direction of a faculty member. The project will typically include a large programming or hardware design task but other types of projects are possible. *1-6; units may be repeated to a total of 9 units. *Prerequisite: admission to the M.S. program in Computer Science.*

***270A-B. Concepts in Computer Architecture (3-3)**
Computer arithmetic, instruction look-ahead, and pipelining, paging and segmentation, cache memories and associative memories, I/O controllers, graphic displays, multi-processors and distributed processors, stack and high-level-language machines, array and parallel processing. *Prerequisite: APIS 170A or consent of instructor.*

280. Special Studies in Computer Science (1-3*)
Topics of special interest in computer science to be presented by staff members and graduate students under faculty direction. Subject matter to be announced before each quarter. *May be repeated for credit. *Prerequisite: consent of instructor.*

281. Special Topics in Computer Science. (1-6*)
A course to be given at the discretion of the faculty at which topics of current interest in computer science will be presented by visiting or resident faculty members. *May be repeated for credit. *Prerequisite: consent of instructor.*

M285. Special Topics in National Security for Science Students (3)
The seminar will consist of two parts: First, a presentation of what our National Security policy is, and second, a discussion of how various current science and technology programs and policies relate to it. York

287A-B-C. Special Studies in Information Science (1-3)
Topics of special interest in information science to be presented by staff members and graduate students under faculty direction. Subject matter to be announced before each quarter. One to three hours lecture. *Prerequisite. consent of instructor.*

288. Special Topics in Applied Physics (1-6)
A course to be given at the discretion of the faculty at which topics of current interest in applied physics will be presented by visiting or resident faculty members. *Prerequisite: consent of instructor.*

289. Special Topics in Information Science (1-6)
A course to be given at the discretion of the faculty at which topics of current interest in information theory, computer science, or signal processing will be presented by visiting or resident faculty members. *Prerequisite: consent of instructor.*

290. Observatory Field Course (1-12)
Methods of measurement, observation and data processing used at radio, radar and optical observatories in astronomy and solar system physics; establishment and use of equipment for a current research investigation at an observatory; analysis and interpretation of result with a report. *Prerequisite: consent of instructor.*

291. Graduate Seminar in Applied Physics (1-1-1)
Weekly discussion of current research literature.

292. Graduate Seminar in Solar System and Space Physics (1-1-1)
Research topics in radio astronomy and solar system physics. (Satisfactory/Unsatisfactory grades only).

293. Graduate Seminar in Information and Computer Science (1)
Research topics in information and computer science.

294. Graduate Seminar in Applied Solid State Physics (1)
Research topics in applied solid state physics and quantum electronics.

295. Graduate Seminar on Space Research and the New Astrophysics (1)
A survey is given of the new approach to astrophysics that is based on the results of space research.

296. Graduate Seminar in Optical Signal Processing (1)
Research topics of current interest in holography.

297. Seminar in Applied Ocean Science (1)
Topics in applied ocean science. (Satisfactory/Unsatisfactory grades).

298. Independent Study (1)
Open to properly qualified graduate students who wish to pursue a problem through advanced study under the direction of a member of the staff. (Satisfactory/-Unsatisfactory grades permitted). *Prerequisite: consent of instructor.*

299. Research (1-12)

501. Teaching (1-4)
Teaching and tutorial activities associated with courses and seminars. Not required for candidates for the Ph.D. degree. Number of units for credit depends on number of hours devoted to class or section assistance. *Prerequisite: consent of department chairman.*

See also "Science".

*Not offered in 1976-77. Listed to help students plan for later years.

Biochemistry

Professors:

Andrew A. Benson, Ph.D., *(Marine Biology)*
Warren L. Butler, Ph.D. *(Biology)*

Russell F. Doolittle, Ph.D. *(Chemistry)*
Richard W. Dutton, Ph.D. *(Biology)*
Morris E. Friedkin, Ph.D. *(Biology)*
E. Peter Geiduschek, Ph.D. *(Biology)*
Murray Goodman, Ph.D. *(Chemistry)*
Mehran Goulian, M.D. *(Medicine)*
Francis T. Haxo, Ph.D. *(Marine Biology)*
Masaki Hayashi, Ph.D. *(Biology)*
Donald R. Helinski, Ph.D. *(Biology)*
John J. Holland, Ph.D. *(Biology)*
Harvey Itano, M.D., Ph.D. *(Pathology)*
Nathan O. Kaplan, Ph.D. *(Chemistry)*
Joseph Kraut, Ph.D. *(Chemistry)*
Steven E. Mayer, Ph.D. *(Medicine)*
William D. McElroy, Ph.D. *(Biology)*
Stanley L. Miller, Ph.D. *(Chemistry)*
Stanley E. Mills, Ph.D. *(Biology)*
William L. Nyhan, M.D., Ph.D. *(Pediatrics)*
John O'Brien, M.D. *(Neurosciences)*
Paul D. Saltman, Ph.D. *(Biology)*
Gordon Sato, Ph.D. *(Biology)*
Gerhard N. Schrauzer, Ph.D. *(Chemistry)*
J. Edwin Seegmiller, M.D. *(Medicine)*
S. Jonathan Singer, Ph.D. *(Biology)*
Daniel Steinberg, M.D., Ph.D. *(Medicine)*
Herbert Stern, Ph.D. *(Biology)*
Teddy G. Traylor, Ph.D. *(Chemistry)*
Silvio S. Varon, M.D. *(Biology)*
Benjamin Volcani, Ph.D. *(Marine Microbiology)*
Bruno H. Zimm, Ph.D. *(Chemistry)*

Associate Professors:
John Abelson, Ph.D. *(Chemistry)*
Willliam S. Allison, Ph.D. *(Chemistry)*
Stuart Brody, Ph.D. *(Biology)*
Maarten J. Chrispeels, Ph.D. *(Biology)*
Marlene A. DeLuca, Ph.D. *(Chemistry)*
Edward A. Dennis, Ph.D. *(Chemistry)*
Robert Fahey, Ph.D. *(Chemistry)*
D. John Faulkner, Ph.D. *(Marine Chemistry)*
Melvin H. Green, Ph.D. *(Biology)*
Elvin Harper, Ph.D. *(Chemistry)*
Oliver W. Jones, M.D. *(Medicine, Pediatrics)*
William F. Loomis, Jr., Ph.D. *(Biology)*
Percy J. Russell, Ph.D. *(Biology)*
Melvin I. Simon, Ph.D. *(Biology)*
Nguyen-Huu Xuong, Ph.D. *(Biology)*

Assistant Professors:
Willie C. Brown, Ph.D. *(Biology)*
John Elovson, Ph.D. *(Biology)*
Stephen H. Howell, Ph.D. *(Biology)*
John Leong, Ph.D. *(Chemistry)*
Ramon Piñon, Ph.D. *(Biology)*
Paul A. Price, Ph.D. *(Biology)*
Immo Scheffler, Ph.D. *(Biology)*
Douglas W. Smith, Ph.D. *(Biology)*
Susan S. Taylor, Ph.D. *(Chemistry)*

* * *

Lemuel Bowie, Ph.D., *Assistant Adjunct Professor of Chemistry*
Melvin Cohn, Ph.D., *Adjunct Professor of Biology*
Walter Eckhart, Ph.D., *Associate AAEAACT Professor of Biology*
Nathan Gochman, Ph.D., *Associate Adjunct Professor of Chemistry*
Robert Holley, Ph.D., *Adjunct Professor of Chemistry*
Yasuo Hotta, Ph.D. *Research Biologist*
Frank M. Huennekens, Ph.D., *Adjunct Professor of Biology*
G. David Novelli, Ph.D., *Adjunct Professor of Chemistry*
Leslie E. Orgel, Ph.D., *Adjunct Professor of Chemistry*
John Spizizen, Ph.D., *Adjunct Professor of Biology*

* * *

The Undergraduate Program The Departments of Biology and Chemistry both offer undergraduate courses in biochemistry. The specialization in biochemistry for biology majors and the recommended courses are discussed in the biology section of this catalog. The Department of Chemistry offers a major in chemistry with a concentration in biochemistry described below. This program is designed for those wishing to major in chemistry but with an emphasis on biochemistry. With the options indicated, it is suitable for premedical students. The core biochemistry offering is a five quarter sequence starting in the winter of the junior year consisting of Chemistry 113, 114, 115, 116, 118.

Major Program in Chemistry For Premedical* and Biochemistry Concentrators

FALL	WINTER	SPRING
Junior Year		
(Org) Chem 141A ••	Chem 141B•	Chem 141C•
	(Phy) Chem 131	Chem 132—
	(Bio) Chem 114	(Bio) Chem 115
(Org L) Chem 143A	Chem 143B	(Bio L) Chem 112—
	(Phy L) Chem 105A—	
Senior Year		
(Bio) Chem 118	(Bio) Chem 116	(Bio) Chem 113 ••
(Inorg) Chem 120A		

*Premedical students are advised to take 3 upper division biology courses. These may be counted as electives and should include Biology 101 (Genetics) fall of the junior year.

**Electives from among the following courses: Chemistry 117, 119, 120B, 130, 145, or Biology 101, 110B, 111, 114, 117. Chemistry 199 may not be substituted for required or elective courses. Students are encouraged to take Chemistry 199 in the senior year.

*Students who have had Chemistry 140A, 140B or equivalent need not take 141B, 141C, but should take 141A.

**Chemistry 130 may be substituted for those who took it prior to or during 1974-75.

***Chemistry 105B or 143C may be substituted.

****May be taken Senior year.

Students following this program need not consult an adviser for approval of course choices. Students with questions should contact the Department of Chemistry Student Affairs Office.

* * *

The Graduate Program The Departments of Biology and Chemistry offer an integrated program of research training, courses, and seminars leading to the Ph.D. degree in either biology or chemistry with emphasis on biochemistry. Each student selects a graduate research problem in the field of interest of a member of the faculty listed below. Normally, a student will select a faculty member in his or her department, but may, with permission of the departmental person, choose an adviser from another department.

Scripps Institution of Oceanography and the School of Medicine are integral parts of the University, and several of their faculty are active participants in the biochemistry program. In addition, the University is close to the Salk Institute for Biological Studies and the Scripps Clinic and Research Foundation. Several members of these institutions are adjunct professors at the University and are involved in the teaching aspects of the graduate program. Fully equipped, modern research facilities and libraries permit study in all major fields in biochemistry.

A student must meet the degree requirements of the department to which he or she is admitted; these are discussed separately by the Departments of Biology and Chemistry. A program of integrated biology/chemistry course offerings is described herein; other courses in biochemistry and related fields are listed in the course offerings of the Departments of Biology and Chemistry.

Interested students may obtain application forms and further information from the Interdepartmental Committee on Biochemistry (Departments of Biology or Chemistry) University of California, San Diego, La Jolla, California, 92093. If possible, the students should indicate a preference for either the Department of Biology or of Chemistry in applying for this program.

Courses

The following courses in biochemistry and related fields are listed in the course offerings of either the Departments of Biology or Chemistry.

Undergraduate

102. Biochemical Techniques (4)
A laboratory-lecture course in the application of biochemical methods to biological problems. Ten hours laboratory, one hour lecture and one hour recitation. *Prerequisite: Biology 106 (may be taken concurrently).* (F)

106. Metabolism and Biochemistry (4)
General biochemistry. *Prerequisite: organic chemistry (Science 140A-B or equivalent).* (S)

110A. Biochemistry (4)
General biochemistry. *Prerequisite: organic chemistry (Science 140A-B or equivalent).* (F)

110D. Physical Biochemistry (4)
Physical chemical properties of biological molecules and their reactions. Equilibrium and irreversible thermodynamics, reaction kinetics, characterization of biopolymers. Required core course for Muir biology majors. Three hours lecture. *Prerequisite: organic chemistry.* (F)

112. Molecular Biochemistry Laboratory (4)
The applicaton of techniques including electrophoresis, peptide mapping and sequencing, affinity chromatography, amino-acid analysis, gas liquid chromatography, and enzyme kinetics to the study of the chemistry of protein structure and function and the chemistry of lipids, carbohydrates, and nucleic acids. *Prerequisites: Chemistry 114, 141A-B-C, 143A-B, 130, 131, 105A, 115, any of which may be taken concurrently.* (S)

113. Chemistry of Biological Macromolecules (4)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisites: organic chemistry, biochemistry and at least two quarters of upper-division physical chemistry).* (S)

114. Biochemical Structure and Function (4)
Introduction to biochemistry from a structural and functional viewpoint. *Prerequisites: elementary organic and physical chemistry (which may be taken concurrently).* (W)

115. Biochemical Energetics and Metabolism (4)
This course is an introduction to the metabolic reactions in the cell which produce and utilize energy. The course material will include: energy-producing pathways: glycolysis, Krebs cycle, oxidative phosphorylation, fatty-acid oxidation. Biosynthesis — amino acids, lipids, carbohydrate purines, pyrimidines, proteins, nucleic acids. *Prerequisite: Chemistry 114* (S)

116. Chemistry of Enzyme Catalyzed Reactions (4)
A discussion of the chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mecha-

nisms and coenzyme chemistry are emphasized. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (W)

117. Biochemistry of Human Disease (4)
An advanced course in biochemistry which will deal primarily with the molecular basis of human disorders. *Prerequisite: elementary biochemistry.* (S)

118. Advanced Biochemistry (4)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matter of elementary courses. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (F)

119. Biochemical Evolution (4)
The course emphasizes the chemical aspects of evolution, including the origin of living systems on Earth, primitive energy acquisition devices, the coupling of information storage and replication catalysis, protein evolution, and the biochemical unity and diversity of extant organisms. *Prerequisites: Organic Chemistry, Introductory Biochemistry.*

199. Independent Study in Biology or Chemistry (2-4)
Independent literature or laboratory research by arrangement with, and under the direction of, a member of the Biology or Chemistry faculty. *Prerequisites: permission of instructor and department.* Pass/Not Pass grades only. (F, W, S)

Graduate

The integrated course offerings of the Departments of Biology and Chemistry are listed below:

210. Seminar in Biochemistry (1, 1, 1)
Seminars presented by advanced graduate students which will explore topics in specialized areas of biochemistry and provide opportunities for students to gain experience in the organization, critical evaluation, and oral presentation of information from the literature. Each quarter a different topic is discussed; recent topics have included: Lipids, Membranes, Oxidative Phosphorylation, Nucleic Acid Structure, Function, and Synthesis, Protein Structure and Function, History of Biochemistry. *Prerequisite: one year of graduate study.* (F, W, S)

211. Introductory Biochemistry (3)
A comprehensive course in introductory biochemistry. The course is intended for entering graduate students, including those who have not previously had a formal course in biochemistry. *Prerequisite: physical and organic chemistry.* (F)

213. Chemistry of Biological Macromolecules (3)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisite: physical chemistry.* (S)

214. History of Biochemistry (2)
A summary of the contributions which led to the major concepts in the field of biochemistry. Emphasis will be placed on the research approach taken by eminent individuals. *Prerequisite: Chemistry 211 or consent of instructor.*

215. Metabolic Control Mechanisms (2)
A discussion of control mechanisms at different levels of cell function, which influence the activity of representative enzymes and metabolic pathways. *Prerequisite: Chemistry 211 or equivalent.*

216. Chemistry of Enzyme Catalyzed Reactions (3)
The chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mechanisms and coenzyme chemistry are emphasized. *Prerequisite: organic chemistry.* (W)

217. Human Biochemistry (2)
An advanced course in biochemistry dealing primarily with the molecular basis of human disorders. *Prerequisite: Chemistry 211 or equivalent, which may be taken concurrently.* (F)

218. Advanced Biochemistry (3)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matters of elementary courses. *Prerequisites: physical and organic chemistry and Chemistry 211 or equivalent.* (F)

219. Special Topics in Biochemistry (3, 3, 3)
Recent topics have included: Techniques in Experimental Biochemical Dynamics, Topics in Biophysics.

295. Biochemistry Seminar (2)

299. Research in Biology or Chemistry (1-12, 1-12, 1-12)

Biology

OFFICE: 2130 Bonner Hall

Professors:
Warren L. Butler, Ph.D. *(Chairman)*
Richard W. Dutton, Ph.D.
Morris E. Friedkin, Ph.D.
E. Peter Geiduschek, Ph.D.
Clifford Grobstein, Ph.D. *(Vice Chancellor-University Relations)*
Masaki Hayashi, Ph.D.,
Donald R. Helinski, Ph.D.
John J. Holland, Ph.D.
Harvey Itano, Ph.D.
Dan L. Lindsley, Ph.D.
William D. McElroy, Ph.D. *(Chancellor)*
Stanley E. Mills, Ph.D.
Paul D. Saltman, Ph.D. *(Vice Chancellor-Academic Affairs)*
Gordon H. Sato, Ph.D.
S. Jonathan Singer, Ph.D.
Herbert Stern, Ph.D.
Silvio S. Varon, M.D.

Associate Professors:
Stuart Brody, Ph.D.
Maarten J. Chrispeels, Ph.D.
Melvin H. Green, Ph.D.
William F. Loomis, Jr., Ph.D.
Muriel N. Nesbitt, Ph.D.
Paul A. Price, Ph.D.
Percy J. Russell, Ph.D.
Allen I. Selverston, Ph.D.
Melvin I. Simon, Ph.D.
Michael E. Soule, Ph.D.
Christopher Wills, Ph.D.
Nguyen-Huu Xuong, Ph.D.
Juan Yguerabide, Ph.D.

Assistant Professors:
Bruce S. Baker, Ph.D.
Darwin K. Berg, Ph.D.
Jack W. Bradbury, Ph.D.
Willie C. Brown, Ph.D.
Adelaide T.C. Carpenter, Ph.D.
Richard A. Firtel, Ph.D.
P.A.G. Fortes, M.D., Ph.D.
Hannah Friedman, Ph.D.
Michael E. Gilpin, Ph.D.
Daniel K. Hartline, Ph.D.
Stephen H. Howell, Ph.D.
William B. Kristan, Jr., Ph.D.
Ramon Pinon, Ph.D.
Milton H. Saier, Ph.D.
Immo E. Scheffler, Ph.D.
Douglas W. Smith, Ph.D.
Nicholas Spitzer, Ph.D.

Lecturer:
Meredith G. Somero, Ph.D., *Assistant Research Biologist*
Sandra L. Vehrencamp, Ph.D.

* * *

Yasuo Hotta, Ph.D., *Research Biologist*
Kiyoteru Tokuyasu, Ph.D., *Research Biologist*
Melvin Cohn, Ph.D., *Adjunct Professor*
Walter Eckhart, Ph.D., *Associate Adjunct Professor*
Frank M. Huennekens, Ph.D., *Adjunct Professor*
William O. Weigle, Ph.D., *Adjunct Professor*

* * *

Major Programs

Several types of undergraduate programs leading to a Bachelor of Arts degree in biology are offered on the campus. The biology major program in each of the colleges has a core of its own. In addition, as an extension of the regular biology major within each college, the department offers *concentration* areas in various fields of biology. Currently, these areas are: cell biology, genetics, human biology, physiology, population biology, microbiology and biochemistry. Each of these new programs forms a coordinated group of courses which is designed to help the student achieve a fuller understanding of a particular area among the major biological disciplines. Students wishing to elect a particular concentration area should first consult with the adviser for that area, then submit a petition to the departmental secretary for student affairs for their college. The degree received will be a degree in biology "with a concentration in . . ." A joint biology-chemistry concentration area in biochemistry is also available (see Biochemistry). Students in some colleges may not find it practical to elect certain concentration areas, due to heavy core requirements.

A student who prefers to maintain a more flexible curriculum without added specialization will of course pursue one of the regular major programs offered in the colleges. A minimum of 12 upper-division courses in biology and related disciplines is required for the biology major, regardless of college affiliation. Generally, three hours of preparation per week is required for each undergraduate unit of credit in the lecture courses listed.

Majors who enroll in either a 198 or 199 course (see catalog descriptions) may do so on a pass/not pass basis only, regardless of the department in which the particular course is given.

Revelle College

The Revelle biology major is intended for those who have a strong interest in cellular and molecular biology. In order to fulfill this objective, biology majors are required to take a substantial part of the course work which is required for chemistry majors. The program is suitable for pre-medical students and provides a basis for pursuing a variety of careers in cellular and molecular biology.

Lower division requirements
Students who have completed either the Natural Sciences 1 or 2 sequence are qualified for the major program. In addition, biology majors are strongly advised to take Natural Sciences 2D, 2DL, 2F and 2FL. Mathematics 2D should be taken as an elective by students who have completed Mathematics 2C.

Upper division requirements Revelle biology majors are required to take the courses listed in the recommended schedule for the upper-division years. The following lab courses may be substituted for the Physical Chemistry Lab (Chemistry 105A) requirement: Biology 107L, 112, 119, 143L, 149AL, 149BL, 152, 177.

Science 140A, 140B and 140BL may be substituted for the corresponding organic chemistry requirements.

Honors Program for Revelle Biology Majors

Description The program covers the senior year of undergraduate study and

primarily involves 12 units of senior thesis research (Biology 196). Research is conducted under the supervision of a faculty member of the Department of Biology in concert with a committee consisting of the adviser plus two other members of the faculty of the Department of Biology. One member must be from the Revelle faculty. The research will culminate in a senior thesis prepared in conformity with rigorous standards and an oral report to an audience which includes the student's senior thesis committee. Students who complete the program satisfactorily will have "Distinction in Biology" recorded on their transcript. Students who fail to make satisfactory progress will be advised to withdraw from the program and, if eligible, will receive credit for 4 units/quarter of Biology 199. Students may also withdraw voluntarily from the program and, if eligible, receive appropriate credit for Biology 199.

Eligibility Students must have a GPA of 3.7 in the following upper division science courses at the end of the junior year: Chemistry 140A, 140B, 143A, 131, 132, and Biology 101R and 105R. Credit for Biology 102 is also recommended.

Procedure for entry into program Potential candidates will be notified during the spring quarter of the junior year. Students interested in the program who are eligible at the end of the spring quarter must find a faculty member willing to act in the capacity of thesis adviser. After an adviser is selected, a petition should be sent to the Revelle biology faculty. The petition should contain the research proposal as defined in consultation with the adviser and a GPA certificate, which may be obtained from Mrs. Macpherson in Room 2246, Bonner Hall. Approval may be obtained at the beginning of the summer session by students wishing to start the program during the summer preceding the senior year.

Recommended Schedule:

FALL	WINTER	SPRING
Junior Year		
Biology 101R	Biology 173	Biology 102
Chemistry 140A	Chemistry 140B	Biology 105R
Chemistry 143A	Chemistry 131	Chemistry 132
(½ course)		Chemistry 105A
		(½course)
Senior Year		
Biology 111R	Biology 114R	Biology 117

Other considerations All Revelle biology majors must have their study-cards approved and signed by a faculty major adviser, who will be assigned by the department secretary of student affairs. In addition to the courses listed, a student is encouraged to elect other courses offered by the biology and chemistry departments to broaden his or her knowledge in the natural sciences, or to pursue an area of special interest. Additional information on the Revelle biology program can be obtained from the Revelle biology office, Bonner Hall, Room 2130.

Non-Majors: Noncontiguous Minor Biology Students majoring in a field outside the natural sciences may complete a noncontiguous minor in biology by taking some such combination as: Natural Sciences 2F or 2FL, Biology 101, 117, 121, 129 and 173. Additional upper-division biology courses will be available, and any six biology courses will complete the minor.

Muir College

The Muir biology major offers a variety of options. Students selecting this major get their basic chemistry preparation, including organic chemistry, during the lower-division years. In the upper-division years, the core program may be combined with one of a number of concentration areas.

Lower division requirements Prerequisites for the junior year biology course in Muir College are Science 3C, Organic Chemistry 140A-B, 140BL, Mathematics 2A-B-C or Mathematics 1A-B-C. All of these prerequisites should be taken in the first two years. (Science 4A-B-C, is required but can be taken at any time before graduation.)

Upper division biology requirements All students must take 12 upper division biology courses. These courses can be taken in the biology department or in other departments. Courses taken in other departments must be clearly biological in content. A list of approved courses not given by biology faculty members can be obtained from the Muir biology office.

All students must take a course in genetics and a course in biochemistry.

All students must choose at least one course in each of three of the following four subjects.

1. Molecular Biology
2. Cellular Biology

3. Population Biology
4. Organismic Biology

This requirement can be satisfied in the following way:

Molecular Biology - Biology 111M or 111R Molecular Biology
Cellular Biology - Biology 114M or 114R Cell Biology
Population Biology - Biology 122 or Biology 173
Organismic Biology - Biology 10 and Biology 11
or Biology 136
or Biology 139
or Biology 141
or Biology 151
or Biology 149A
or Biology 149B

All students must take one course in which biological problems are dealt with in a mathematical way. The two recommended courses are Physical Biochemistry (Biology 110D) and Systems Biology (Biology 167). Other alternatives are available.

Students must take an upper-division lab course in biology. The following laboratories are acceptable.

Biology 102 - Biochemical Techniques
Biology 112 - Cell Biology
Biology 143L - Neurobiology
Biology 152 - Microbial Genetics
Biology 149AL - Physiology
Biology 149BL - Physiology
Biology 107L - Microbiology
Biology 119 - Genetics

Recommended Schedule: †

FALL	WINTER	SPRING
Sophomore Year		
		Genetics
Junior Year		
Biochemistry	Molecular Biology*	Cell Biology*
	Population Biology*	
Senior Year		
Physical Biochemistry*	Systems Biology*	

*See above for alternate courses.

†Courses classified as organismic biology can be taken anytime in the junior or senior year.

Other considerations Biology majors should seriously consider taking Biology 10 and/or 11, particularly in their sophomore year. These courses provide material about the biology of plants and animals which are not necessarily covered in the upper-division courses. In addition, these two courses are useful introductory courses. In their senior year, Muir biology majors may choose any combination of upper-division courses appropriate to their educational and career goals, or they may take one of the concentration areas currently offered. More extensive information about electives, course substitutions, and courses not allowed as biology electives can be obtained from the Muir biology office, Muir Biology building, Room 1218.

Third College

The Third College biology programs are designed for students interested in medical school or medically related areas. After a thorough exposure to the basic sciences, subjects essential to the study of medicine are presented. Students receive much of their basic physics, chemistry, mathematics and biology preparation in the lower division. In the upper division, the student first takes a sequence of "core" courses which are necessary to understand medical subjects from a modern perspective. To complete the major, the student may choose any one of these concentration areas: human biology, physiology or microbiology, or the student may decide to complete a general biology major. The latter is a combination of upper-division courses, chosen with the assistance of an adviser, appropriate to his or her educational or career goals.

Lower division requirements Prerequisites for entering the major biology programs in Third College are: Science and Technology 12A, 12AL, 12B, 12C, 15A, 15B, 15C, 11A, or equivalent, Math 1A-B¢C or 2A-B-C, Biology 15 and 21. All of these prerequisites should be taken in the first two years so that the student can enter the major program in his or her junior year.

Upper division requirements Third College biology majors are required to take the courses listed in the recommended schedule in the upper-division years. Under certain circumstances, students may substitute equivalent courses from Revelle, Muir or Fourth Colleges. These substitutions must have the approval of the faculty adviser.

Recommended schedule:

FALL	WINTER	SPRING
Junior Year		
Biology 134	Biology 101T	Biology 102
Chemistry 140A	Biology 105T	Biology 138
Chemistry 143A	Chemistry 140B	

Senior Year

Students may complete the curriculum for a biology major either by electing a particular concentration area or by fulfilling the requirements for a general biology major.

1. For the general biology major students should take enough upper division courses so that they will have completed a total of 12 upper division courses in biology by the end of their senior year. (The five core courses in biology count toward that minimum.)

2. The concentration areas of human biology, physiology, and microbiology are well suited for completion of the Third College biology major. Details are provided under "Concentration Areas".

Other considerations Additional information about the Third College program can be obtained from the Third College biology office, Muir Biology Building, Room 1208.

Fourth College

The Fourth College biology major offers a broadly based and flexible curriculum with an emphasis on whole-organism biology. The disciplines of physiology and population biology, with their focus on quantitative thinking, will build on the quantitative courses required in the lower division. The core requirements will nevertheless be sufficiently broad to allow a student to concentrate in most biological disciplines.

Lower division requirements

Mathematics up to differential equations (e.g. Math 1A, 1B, 1C or Math 2A-B-C).

Two quarters of physics (Science 4A and 4B or C).

Two quarters of inorganic chemistry (Chemistry 4ABC and Science 3AL, 3B and 3BL or equivalent).

At least one lower division biology course (Biology 4, 10 or 11; Natural Science 1C or 2E).

Organic chemistry in the sophomore year (Chemistry 140A-B and laboratory, or Chemistry 141A-B-C and one laboratory or equivalent).

Upper division requirements

Junior Year:

Biochemistry I 105R, 105T, or 105M
Genetics 101R, 101M or 101T
Molecular Biology 111R, 111M or 138

Senior Year:

Physiology 139 or 149
Population Biology 172 or 173
One upper-division laboratory course is required.

Other considerations Additional information on the Fourth biology program can be obtained from the Fourth biology office, Muir Biology Building, Room 1202.

Cell Biology concentration area

Adviser: Milton Saier
(Muir Biology Building, Room 4216)
Program: Any core, but including cell biology (Biology 110C, 114 or 138) plus at least four courses from among:

FALL	WINTER	SPRING
Biology 151	Biology 127	Biology 112
Biology 156	Biology 145	Biology 117
	Biology 147	Biology 125
		Biology 142

Genetics concentration area

Adviser: Dan L. Lindsley
(Bonner Hall, Room 2230)
Program: Any core, but including cell biology (Biology 110C, 114 or 138) plus Biology 172 or 173, plus five courses, including one laboratory (designated by*) from among:

FALL	WINTER	SPRING
Biology 133	Biology 119*	Biology 117
Biology 137	Biology 127	Biology 125
	Biology 227 (P)	Biology 142
		Biology 152*

Math 80A-B is also recommended.

Microbiology Concentration Area

Adviser: Willie C. Brown
(Bonner Hall, Room 3330)
Program:Any core plus:

FALL	WINTER	SPRING
Biology 157	Biology 107L	
	Biology 158	
Plus at least two courses from the following list:		
SIO 287A(P)	Biology 127	Biology 126
	Biology 147	Biology 152
	SIO 278B(P)	SIO 287C(P)
		SIO 291(P)

Population Biology Concentration Area

Adviser: Christopher J. Wills
(Muir Biology Building, Room 3268)
Program: Any core plus:
Biology 173 plus:

FALL	WINTER	SPRING
Junior Year		
APIS 61	Math 80A	Math 80B
Biology 122		
Senior Year		
SIO 280 (P)	Biology 139	Biology 174
Plus at least one course from among:		
Biology 133	Biology 136	Biology 155
Chemistry 117	Biology 167	Biology 172
Biology 163	SIO 275(P)	Biology 175
		Biology 260
		SIO 275 (P)

Physiology Concentration Area

Adviser: Allen I. Selverston
(Bonner Hall, Room 2309)
Program I: Any core, but including one quarter of thermochemistry or physical chemistry, plus:

FALL	WINTER	SPRING
Junior Year		
Biology 129		Biology 166†

Senior Year		
Biology 149A	Biology 149B	Biology 143†
Biology 149AL*	Biology 149BL*	Biology 143L*
Biology 169†		

* One of three required
† Two of three required.

Program II: Third College core equivalent, plus:

FALL	WINTER	SPRING
Junior Year		
Biology 129		Biology 134
Biology 134		Biology 166
Senior Year		
Biology 149A	Biology 149B	Biology 143
Biology 149AL	Biology 149BL	

Human Biology Concentration Area

Adviser: Juan Yguerabide (Muir Biology Building, Room 5214)
Program: Third College core, or equivalent, plus:

FALL	WINTER	SPRING
Senior Year		
Biology 149A	Biology 149B	Biology 146
	Biology 141	
	Plus three courses from among:	
Biology 129	Biology 145	
Biology 149AL	Biology 147	Biology 152
	Biology 149BL	Biology 153
		Biology 166
		Biology 172
		Biology 175

Some of these electives may be taken during the junior year.

Biochemistry Concentration Area

Adviser: Paul A. Price
(Bonner Hall, Room 4430)
Program: Any core, but including Cell Biology and Biology 102 plus, two quarters of Physical Chemistry (Chemistry 131 and 132) plus, two courses from among:

FALL	WINTER	SPRING
Biology 110	Biology 116	Biology 113
Biology 118		

(P) indicates course requires instructor's permission.

The Graduate Program Graduate studies for a Ph.D. degree in the Department of Biology are oriented mainly toward the development of the capacity for independent research and for teaching in the biological sciences.

There are no inflexible requirements for entrance to graduate study in the Department of Biology, but a strong background in mathematics, chemistry, and physics is recommended.

Formal course work and opportunities for dissertation research include most basic areas of biology with emphasis in the general areas of molecular and cell biology, genetics and regulation, developmental biology, neurobiology, population biology, and immunology.

Doctoral Degree Program During the first year of graduate study, each student undertakes a research project in the laboratory of each of five different faculty members; he or she is expected to spend a major portion of his or her academic time on this project. The laboratories are selected by the student in consultation with the graduate committee to provide a broad view of the research interests of the department. The student is also expected to enroll in the first year graduate biology sequence which includes advanced material in biochemistry, genetics and cellular and molecular biology. The only other course requirement is four units of Biology 500 (Apprentice Teaching in Biology) for every year of graduate study after completion of the rotation program. A program of further study, including seminars and courses that are appropriate to a student's background and interests, will be arranged, through consultation between the student and the faculty. Much reliance is placed on informal instruction through early and close association of the student with the faculty and research staff, and through regular seminars. After becoming familiar with the research activities of the faculty through the laboratory rotation program, the student will begin work on a thesis research problem of his or her choice, no later than the end of the first year. By the end of the third year, the student will be required to complete a two-part oral examination in order to be admitted to candidacy for the Ph.D. degree. The purpose of these examinations is for the student to demonstrate competence in the field of his or her major interest and in related fields of biology. The major remaining requirement for the Ph.D. degree will be the satisfactory completion of a dissertation consisting of original research carried out under the guidance of a faculty member.

Close collaboration with members of the Department of Chemistry and the School of Medicine is a vital and stimulating aspect of the biology program. Additional strength and breadth in biology is gained by collaboration with the Department of Marine Biology of the Scripps Institution of Oceanography, with the Scripps Clinic and Research Foundation and with the Salk Institute for Biological Studies. Students may carry out their dissertation research in collaboration with members of these groups.

Graduate Program in Biochemistry
Please refer to "Biochemistry" in the course listings.

Courses in Marine Biology The following courses given at the Scripps Institution of Oceanography are highly recommended for qualified upper-division undergraduate biology majors and graduate students:

273A-B	Animal Behavior
275	Community Ecology
280	Marine Communities/Environments
281	Environmental Physiology and Biochemistry of Marine Organisms
289	Marine Plants
292	Developmental Biology of Marine Organisms
292L	Laboratory in Developmental Biology
293A	Advanced Invertebrate Zoology
294A	Biology of Fishes

A description of the courses can be found under Scripps Institution of Oceanography listings. Interested students should consult with the instructors well in advance of the first day of classes. In all cases ***permission of the instructors must be secured prior to enrollment.*** Each of the courses can accommodate only a limited number of students. An advisory program is available to undergraduates interested in marine biology: contact Daniel K. Hartline, Bonner Hall, Room 2325.

Courses

Lower Division

The Department of Biology cooperates in the teaching and administration of the Natural Sciences sequences for Revelle College students and the Science Sequence for Muir College students and the Science and Technology sequence for Third College students. (See course listings: "Natural Sciences" or "Science" or "Science and Technology.")

4. Introductory Biology (4)
General introduction to the structure and function of animals, plants and microorganisms, with emphasis upon common cellular, biochemical and genetic mechanisms. This is an introductory course for biology majors. *Not open to non-majors. Prerequisite: Sophomore standing.* (S)

5. The Green Revolution (4)
Biological principles of human nutrition, plant growth and agricultural food production necessary to understand the possibilities and the limitations of agriculture to feed the rapidly growing world population. Three hours lecture. *No prerequisites. Not open to biology majors.* Chrispeels (W)

7. Fundamentals in Human Biology (4)
Course introduces elements of human physiology. Topics include human evolution, nutrition, disease and environmental adaption. Not open to biology majors. (F)

8. General Microbiology (4)
General principles of microbiology for non-scientists, with emphasis on the cell biology of microorganisms and of the cells with which they interact in causing diseases of man and animals. The microbiology of infection by bacteria, fungi and viruses, and host responses to infection. Three hour lecture. Not open to biology majors. (S)

10. Introductory Plant Biology (4)
Principles of plant anatomy, morphology, physiology, growth and development. *Prerequisite: freshman chemistry.* (F)

11. Introduction to Animal Biology (4)
Diversity in form and function in animals and the fundamentals of genetics, development and evolution. Three hours lecture. *No prerequisites.* (W)

12. Preview of Biology (2)
A general preview of areas of experimental biology important to current research interests of Muir biology faculty. Background, questions under study and methods of investigation are discussed. Limited to biology majors. Pass/Fail grades recommended. *Prerequisites: one year calculus, Science 3A, 3B, 3C; Organic Chemistry 140A; Organic Chemistry 140B; prior to or concurrently with Biology 12.*

14. Biology of Cancer (4)
An introduction to molecular, cellular and immunological aspects of cancer and a consideration of the sociological and psychological impact of cancer on the individual and general society. Each lecture-discussion period will be given by an invited lecturer who is prominent in cancer research. Three hours lecture. Pass/Not Pass grades recommended. *Prerequisites: lower division general biology.* Saltzstein/Staff (F)

15. Vertebrate Zoology II (4)
Continuation of Vertebrate Zoology I (Science/Tech 11A). An introduction to the vertebrate way of life through the examination of selected topics in anatomy, physiology, environmental adaptation and evolution. Three hours lecture, three hours laboratory and one hour recitation. *Prerequisites: Science and Technology 11A.* (W)

16A. Topics in Biology I (4)
For non-biology majors, an introduction to elementary chemistry, genetics, and evolution. Not open for course credit to biology majors. Three hours lecture. Mills/Staff (F)

16B. The Biology of Reproduction (4)
A discussion of the modes of asexual and sexual reproduction among plants and animals with special emphasis on humans. *Not open for course credit to biology majors.* Three hours lecture. *Prerequisite: Biology 16A.* Stern (W)

17. Biology of Behavior (4)
Behavior of animals, including man, analyzed according to the principles of ethology and neurophysiology. Topics covered will include instinct; learning; releasing mechanisms; motivation; social, aggressive, and reproductive behavior; sensory, motor, and central integrative neurophysiology. Three hours lecture and one hour recitation. *Not open to biology majors.* Hartline (S)

22. Introductory Neurobiology (4)
(Formerly Biology 121)
Introduction to the organization and functions of the nervous system. Topics will include molecular, cellular, developmental, systems, and behavioral neurobiology. Three hours lecture and one hour recitation. *Prerequisite: general biology.* (W)

90. Freshman Seminar (0)
Freshman seminars organized around the research interests of various faculty members. One hour lecture. *Prerequisites: freshman standing and consent of the instructor.* Staff (F,W,S)

Upper Division

R-M-T designate courses designed to fit the schedules of Revelle, Muir and Third biology majors. Biology majors in Fourth College may choose any one of the above in accordance with their schedules.

101R-101M-101T. Genetics (4)
(Formerly Biology 101, 110X and 132)
An introduction to the principles of heredity, primarily in diploid organisms, including chromosome behavior in cell division, Mendelian inheritance, population genetics, linkage, sex determination, and behavior of chromosome aberrations. Three hours lecture and one hour recitation. *Prerequisite: General biology or equivalent.* (F,W,S)

102. Biochemical Techniques (4)
A laboratory-lecture course in the application of biochemical methods to biological problems. Preferential registration will be given to Revelle students in the fall and spring. Muir students in the winter and Third College students in the spring. One hour lecture and ten hours laboratory. *Prerequisite: biochemistry lecture (may be taken concurrently).* Staff (F,W,S)

104. Introduction to Human Genetics (4)
The principles of genetics as they apply to human beings. Normal and abnormal human chromosomes; Mendelian inheritance in man; human biochemical genetics; genetics of human population. *Not open to biology majors.* A student can not receive credit for both this course and 101. Three hours lecture and one hour recitation. *Prerequisites: General biology and consent of the instructor.* (F)

105R-105M-105T. Biochemistry I (4)
(Formerly Biology 106, 110A, and 144)
The metabolism of organisms with respect to energetics, biosynthesis and nutrition. Three hours lecture and one hour recitation. *Prerequisite: Two quarters of organic chemistry. Revelle majors also required to take organic chemistry laboratory.* (F,W,S)

106. Biochemistry II (4)
Continuation of Biochemistry I. Topics will include the metabolism of amino acids and nucleotides; protein purification and characterization; photosynthetic electron transport; lipids, membranes, and active transport; biochemistry of muscle, hormones, and vitamins. Three hours lecture and one hour recitation. *Prerequisite: one quarter of introductory biochemistry.* (W)

107L. Laboratory in Microbiology (4)
Fundamental properties of microorganisms will be emphasized such as comparative morphology, pure culture techniques, bacteriophage infection, replication and release. The life cycle of a fungus, neurospora will be analyzed with emphasis on spore dormancy and germination. One hour demonstration and seven hours laboratory. *Prerequisites: Biology 157 and consent of the instructors.* (W)

110. Physical Biochemistry (4)
Physical chemical properties of biological molecules and their reactions. Equilibrium and irreversible thermodynamics, reaction kinetics, characterization of biopolymers. Required core course for Muir biology majors. Three hours lecture. *Prerequisite: organic chemistry.* (S)

111R-111M. Molecular Biology (4)
(Formerly Biology 106 and 110B)
Molecular analyses of biological phenomena with special emphasis on genetics and metabolic regulation. Three hours lecture and one hour recitation. *Prerequisites: Biology 101 and 105.* (F,W)

112. Molecular and Cell Biology Laboratory (4)
A laboratory course in the application of cellular techniques to biological problems. Ten hours laboratory. *Prerequisite: cell biology. Biochemistry recommended.* (S)

113. Chemistry of Biological Macromolecules (4)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisites: organic chemistry, biochemistry, and at least two quarters of upper-division physical chemistry.* (S)

114R-114M. Cell Biology (4)
(Formerly 114 and 110C)
The structure and function of cells. Cellular control mechanisms, cell division, cell differentiation and specialization. Three hours lecture and one hour recitation. *Prerequisite: Biology 111.* (W,S)

116. The Chemistry of Enzyme Catalyzed Reactions (4)
A discussion of the chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mechanisms and coenzyme chemistry are emphasized. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (W)

117. Developmental Physiology (4)
A discussion of the development of organisms covering the morphology, physiology, and molecular biology of differentiation. The course will cover oogenesis, fertilization, cleavage, and early differentiation. Some time will be spent discussing differentiation of specific organ systems as models for more complex developmental patterns. Three hours lecture and one hour recitation. *Prerequisite: Biology 114 (may be taken concurrently).* Firtel (S)

118. Advanced Biochemistry (4)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matter of elementary courses. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (F)

119. Cytology and Genetics Laboratory (4)
This course emphasizes the principles of Mendelian inheritance and will require the student to apply the principles of cytology and genetics to the solution of problems of transmission genetics. One hour lecture and nine hours laboratory. *Prerequisite: Biology 101 (may be taken concurrently).* Lindsley (W)

122. Population Ecology (4)
The growth and interaction of populations in ecosystems. Emphasis is placed on the evolution of such interactions and the development and unity of ecosystems. Game-theory thinking is stressed. Analytical and computer mathematics are used. *Prerequisite: Calculus or equivalent.* (F)

125. Chromosome Organization (4)
A review of the principles of chromosome structure and behavior. Emphasis will be placed on the analysis of published research papers on chromosome biology. *Prerequisite: Biology 101.* (S)

126. Special Topics in Microbiology (4)
Recent developments in procaryotic and eucaryotic microbial research. Topics will vary from year to year, but will include plasmid and chromosome replication, cell surface biogenesis, cellular differentiation, viral development, biorhythms, energy interconversions, solute transport, motility and taxis, metabolic regulation, microbial ecology. *Prerequisite: open to seniors with consent of instructor.* (F)

127. Virology (4)
Molecular aspects of viral structure and development. Three hours lecture. *Prerequisite: Biology 111.* (W)

129. Structure and Function of Tissues (4)
Introduction to physiological systems with emphasis on structure of major tissues and organs. Examples of gross and microscopic makeup of components of the blood, cardiovascular, muscular, autonomic nervous, and gastrointestinal systems will be used to establish the basic principles underlying different functional activities of the body. Three hours lecture. *Prerequisite: consent of the instructor.* Zweifach (F)

131. Marine Biology (4)
An introduction to life in the sea with emphasis on ecology and phylogenetic relationships. Five hours laboratory. *Prerequisite: Biology 11 or permission of instructor.* (S)

133. Computer Programming in Biology (4)
Use of computer programming in the analysis and presentation of biological data. (Computation of best value and standard deviation, histogram, least squares fitting procedure, simulation of genetic experiment, etc.) Students will program in FORTRAN and will learn to use a cal/comp plotter to present their results. *Prerequisites: APIS 10 or Introduction to FORTRAN offered by the Computer Center or knowledge of FORTRAN or ALGOL language.* One hour lecture, two hours computer laboratory and about ten hours homework per week; limited enrollment.

134. Physical Chemistry of Biological Systems (4)
Elementary principles of thermodynamics and chemical kinetics and their application to equilibria, reaction mechanisms and other aspects of biological systems. Three hours lecture. *Prerequisites: calculus and organic chemistry (may be taken concurrently).* (F)

135. Special Topics in Biology (4)
A lecture-discussion course designed by the graduate students under faculty supervision on ten biological topics covering issues of social importance. The student will select five of these for his or her particular program. Each topic will be developed under the guidance of a graduate student. Since the topics will vary from year to year, interested students are advised to contact the Biology Office for the list of topics currently offered. Credit in this course cannot be counted to fulfill the requirement in the major. *Prerequisite: open to any upper-division student. Course limited to 50 Lower-division students may be admitted by obtaining instructor's permission.* (S)

136. Invertebrate Zoology (4)
Introduction to the functional morphology, anatomy and embryology of the invertebrates. Theories of invertebrate phylogeny. Three hours lecture and three hours laboratory optional. *Prerequisite: lower division biology.* (W)

137. Human Genetics (4)
A detailed examination of a particular topic within the realm of human genetics, with readings of original research papers. The topic may change from year to year. Past examples: 1) structure and organization of the human chromosomes, 2) X chromosome inactivation and mosaicism. Students are expected to evaluate assigned readings and to participate in class discussions. (F)

138. Cell and Molecular Biology (4)
Detailed study of the mechanisms of synthesis of DNA, RNA and proteins. *Prerequisites: biochemistry and physical chemistry.* (S)

139. Comparative Physiology (4)
Structure and function of invertebrate and vertebrate physiological systems. Three hours lecture. *Prerequisite: general biology or consent of instructor.* (W)

141. Human Development (4)
An analysis of human reproductive physiology and development. Other vertebrates are considered where appropriate. Topics include: gametogenesis, fertilization, implantation, morphogenesis, differentiation, environmental and genetic influences, fetal-maternal interactions. Three hours lecture and three hours laboratory. *Prerequisites: biochemistry and physical chemistry or consent of the instructor.* (W)

142. Regulation in Higher Organisms (4)
A discussion of the molecular basis or control mechanisms in the development and function of higher organisms. *Prerequisite: Biology 111 or equivalent.* (S)

143. Systems Neurophysiology (4)
Integration of sensory and motor mechanisms related to perception and behavior. Emphasis will be given to those studies of simple and complex nerve cell assemblies for which functional models can be constructed and tested. Three hours lecture. *Prerequisite: Lower division math, physics, chemistry.* (S)

143L. Laboratory in Neurobiology (4)
Current electrophysiological techniques used to study nervous systems will be taught through exercises and individual projects. One hour lecture, ten hours laboratory. *Students must be interviewed by instructors before registering in this course. Prerequisites: Biology 166 and 143 (concurrently.)* (S)

145. Endocrinology (4)
This course will cover the endocrine physiology of mammals with emphasis on human endocrinology. Topics covered will be neuroendocrinology, reproductive physiology and mechanism of hormone action. Three hours lecture. *Prerequisite: approval of instructor.* (S)

146. Pathology (4)
A review of the principles of cell biology with a view to defining disease at the cellular level. Also includes a description of disorders of the major body systems. Three hours lecture. *Prerequisites: biochemistry, cell and molecular (e.g. Biology 138) or permission of the instructor.* (W)

147. Immunology (4)
The course will deal with antibody structures, antigens, antigen-antibody interactions, immune response, immunological unresponsiveness, *in vivo* and *in vitro* consequences of antigen-antibody interactions, delayed hypersensitivity, control of the immune response and transplantation immunities. *Prerequisite: biochemistry.* (W)

148. Introduction to Drug Action and Pharmacology (4)
An introductory study of the actions of drugs and chemicals in animals (including humans) in modifying the physiological responses of tissues in isolation and *in situ.* This course is particularly appropriate for students interested in human biology. *Prerequisite: biochemistry.* (F)

149A. Mammalian Physiology (4)
Lecture course covering the respiratory, cardiovascular and renal systems and ionic and water balance in tissues. Three hours lecture. *Prerequisites: physical chemistry, biochemistry.* (F)

149AL. Physiology Laboratory (4)
Mechanisms of ion transport and energetics of membranes will be studied using red blood cells, mitochondria, and synthetic membranes. Topics covered will include osmotic pressure, membrane transport, electrochemical potentials, and oxidative phosphorylation. Nerve-muscle systems will be used for studying excitability and conduction. One hour lecture and ten hours laboratory. *Prerequisites: physical chemistry, biochemistry, and Biology 149A concurrently.* (F)

149B. Mammalian Physiology (4)
A study of the ways in which organ systems — cardiovascular, respiratory, renal, gastrointestinal, endocrine, skeleto-muscular, and nervous — function and interact to regulate the internal environment of the mammalian body. Three hours lecture. *Prerequisite: Biology 149A, or consent of the instructor.* (W)

149BL. Physiology Laboratory (4)
Experiments using mammalian organ systems. Physiological observations of humans, such as the analysis of heart function by electrocardiography, will be included. One hour lecture and ten hours laboratory. *Prerequisite: Biology 149B, taken previously or concurrently.* (W)

151. Plant Physiology (4)
Various aspects of the physiology and biochemistry of lower and higher plants will be discussed. Photosynthesis, the role of hormones in plant growth, the effect of light on plant growth and the biochemistry of seed germination will be emphasiized. Three hours lecture. *Prerequisite: biochemistry.* (F)

152. Microbial Genetics Laboratory (4)
A laboratory-lecture course emphasizing the genetics of bacteria, bacterial viruses, and microbial eucaryotes. One hour lecture, one hour discussion, ten hours laboratory. Optional laboratory for Third College biology majors and for those students electing the microbiology concentration area. *Prerequisite: genetics, biology 157 and/or 107L are recommended.* (S)

153. Nutrition (3)
Emphasis is on the biochemical aspects of nutrition. The known functions of vitamins, minerals, fats, carbohydrates and proteins will be discussed in terms of experiments in nutrition and an evaluation of the relationship of the knowledge to nutrition in man. Three hours lecture, *Prerequisite: biochemistry.* (S)

155. Plant Ecology (4)
Interactions of plants with their physical and biotic environments are reflected in patterns of physiological ecology, reproduction, and community structure. In this course, principles and generalizations governing these patterns will be examined in light of case studies selected from the current literature. Three hours lecture and one hour recitation. *Prerequisite: Biology 10.* (S)

156. Membrane Biology (4)
Examines biogenic and functional aspects of biological membranes in procaryotic and eucaryotic cells: biosynthesis and assembly of membrane constituents, mechanisms of bulk transport including phagocytosis, secretion, molecular basis of solute transport, energy coupling in electron transport, biochemical basis of membrane electrical potentials, regulation of membrane enzymes and transport systems, cellular motility and chemotaxis, cellular recognition, adhesion and fusion. *Prerequisite: seniors with consent of instructor.* (F)

157. Microbiology of Procaryotes (4)
A discussion of the structure, growth and physiology of procaryotic microorganisms with emphasis on the diverse activities of bacteria and on the interaction of various bacterial species with their environment. Three hours lecture and one hour recitation. *Prerequisite: biochemistry (may be taken concurrently).* (F)

158. Microbiology of Eucaryotes (4)
A discussion of the structure, growth and physiology of eucaryotic microoorganisms with emphasis on the activities and environmental interactions of algae, fungi, slime molds and protozoa and an introduction to the structure and biological properties of animal viruses. Three hours lecture and one hour recitation. *Prerequisite: biochemistry (may be taken concurrently).* (W)

163. Sociobiology (4)
A survey of the patterns of social behavior in invertebrates and vertebrates, including man, and a discussion of the ecological principles underlying the evolution of animal societies. Three hours lecture and one hour recitation. *Prerequisite: biology 173.* (F)

164. Poisons - Natural and Man-made - and their Mechanisms of Action (4)
An introduction to the effects of environmental agents on biologic systems, particularly emphasizing effects on humans. Emphasis will be placed on the biochemical mechanisms by which toxic agents affect organisms, and these mechanisms will be correlated with physiologic changes. Three hours lecture, one hour discussion. *Prerequisite: biochemistry.* (S)

165. Immunochemistry (4)
Discussion of antibodies, antigens complement and their interactions. Three hours lecture. *Prerequisite: biochemistry.*

166. Membrane Physiology (4)
Biophysical and biochemical properties of Membranes. Membrane structure and dynamics, kinetics, equilibria, and mechanisms of solute permeability. Active and passive transport. Topics will include model systems, red cells, epithelial, excitable and energy-transducing membranes. Three hours lecture. *Prerequisites: physical chemistry; organic chemistry; biochemistry I (concurrently).* (S)

167. Systems Biology (4)
Introduction to the mathematical analysis of control and communication in biological systems. Models of genetic, neurophysiological, developmental and ecological systems will be constructed and simulated. Statistical tests and regression analysis will be treated. Pass/Not Pass grades permitted. Three hours lecture. (W)

168. Photobiology (4)
Basic principles of photobiology and photochemistry. Photochemical mechanisms in photosynthesis. Photoreceptor pigment systems and photobiological control mechanisms in living organisms. *Prerequisites: physical chemistry and biochemistry.* (S)

169. Cellular Neurobiology (4)
An examination of the molecular and cellular events underlying nerve function and synaptic transmission. Synaptic neurochemistry. Neuronal development and synapse formation *in vivo* and *in vitro.* Three hours lecture. *Prerequisites: biochemistry; cell biology recommended.* (F)

172. Evolution (4)
Evolutionary processes are discussed in the genetic and ecological contexts. Emphasis on recent literature. Modern field and museum techniques are practiced. Three hours lecture and two hours seminar (field projects and field trips). *Prerequisite: genetics.* (S)

173. Population Biology and Evolution (4)
Evolution will be dealt with at the organismal, chromosomal and molecular levels, with particular emphasis on modes of adaptation and the behavior of genes in populations. Three hours lecture and one hour recitation. *Prerequisite: genetics.* (W)

174. Ethology (4)
The biological basis of animal behavior, invertebrate, vertebrate and including man. Principles of ethology and their relation to neurophysiology and behavioral physiology. Stimulus filtering, releasers, motivation, development, feeding, communication, aggression, territoriality, reproductive behavior. Three hours lecture and four hours laboratory optional. *Prerequisites: lower-division biology, physics and chemistry; Biology 121 desirable.* (S)

175. Human Evolution (4)
Course will consider the nature of evidence for evolution by natural selection, then focus on origins of mammals, primates and humans, emphasizing our current understanding of the factors that have influenced the course of human evolution. Three hours lecture, three hours outside

preparation. *Prerequisite: genetics, development, or physiology, or consent of the instructor. (this course will not be offered 1976-77 only)* (S)

177. Problems in Marine Biology (15)
An intensive course at Bodega Marine Lab. Students will choose research problems, design experiments, and do them under the guidance of instructors from Berkeley and other UC campuses. Ten hours lecture and fifteen hours laboratory. *Prerequisites: consent of instructor (application forms must be filed with instructor by January 10). Desirable preparation: Biology 11, 131, S10 275, 280, and/or 289.* (S)

195. Introduction to Teaching in Biology (4)
Introduction to the teaching of the basic course in biology. A student under the direction of the instructor of the course will be assigned one class section and will meet one time per week with the section. A student will also be required to attend the lecture in the course and to meet at least one time per week with the instructor of the course. Limited to senior students who have a B average or better in the upper-division biology courses. Three hours lecture, *Prerequisite: consent of the instructor.* (F,W,S)

196. Honors Thesis Research for Revelle Biology Majors (4)
Senior thesis research for those students who are accepted for the Honors Program for Biology majors in Revelle College. *Prerequisites: prior selection for the program by the Revelle biology faculty.*

198. Directed Group Study (2 or 4)
This course will cover a variety of directed group studies in areas not covered by formal departmental courses. This course will be pass/not pass only. *Prerequisite: upper division standing.* (F,W,S)

199. Independent Study for Undergraduates (4)
Independent reading or research on a problem by special arrangement with a faculty member. pass/not pass only. *Prerequisite: consent of instructor.* (F,W,S)

Graduate

203A-B-C. Laboratory Projects in Biology (3-12,3-12,3-12)
An introduction to contemporary laboratory techniques and research interests through independent, original projects under the direction of individual faculty members. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

210. Seminar in Biochemistry (7)
Seminars presented by advanced graduate students which will explore topics in specialized areas of biochemistry and provide opportunities for students to gain experience on the organization, critical evaluation and oral presentation of information from the literature. Each quarter a different topic is discussed; recent topics have included lipids, membranes, oxidative phosphorylation, nucleic acid structure, function and synthesis, protein structure and function, history of biochemistry. *Prerequisite: one year of graduate study.* (Satisfactory/Unsatisfactory grades permitted. (F,W,S)

211. Introductory Biochemistry (3)
A comprehensive course in introductory biochemistry taught by members of the Departments of Chemistry, Biology and Medicine. The course is intended for entering graduate students, including those who have not previously had a formal course in biochemistry. Same as Chemistry 211. *Prerequisite: physical and organic chemistry.* (Satisfactory/Unsatisfactory grades permitted.) (S)

213. The Chemistry of Macromolecules (3)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. Same as Chemistry 213. *Prerequisite: elementary physical and organic chemistry.* (Satisfactory/Unsatisfactory grades permitted.) (S)

215. Metabolic Control Mechanisms (2)
A discussion of control mechanisms at different levels of cell function, which influence the activity of representative enzymes and metabolic pathways. *Prerequisite: Biology 211 or its equivalent.* (Satisfactory/Unsatisfactory grades permitted.)

216. Chemistry of Enzyme Catalyzed Reactions (3)
A discussion of the chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mechanisms and coenzyme chemistry are emphasized. *Prerequisite: organic chemistry.* (Satisfactory/Unsatisfactory grades permitted (W)

217. Human Biochemistry (2)
An advanced course in biochemistry, which will primarily deal with the molecular basis of human disorders. *Prerequisite: Biology 211 or its equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (F)

218. Advanced Biochemistry (3)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matter of elementary courses. *Prerequisites: physical and organic chemistry and Chemistry 211 or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (F)

219. Special Topics in Biochemistry (3)
Recent topics have included techniques in experimental prochemical dynamics, topics in biophysics. (Satisfactory/Unsatisfactory grades permitted.((F,W,S)

220. Special Topics in Genetics (2)
Different restricted aspects of genetics will be discussed in detail each quarter; students will participate in the presentation of material, student presentations being prepared in consultation with the responsible faculty member. (Satisfactory/Unsatisfactory grades permitted.)*Prerequisites: consent of the instructor.* (F,W,S)

225. Assembly and Function of Cellular Components (3)
A critical analysis of structural-functional relationships and self-assembly properties of selected organelles and subcellular particles. (This course will be offered every 3rd year only.) Satisfactory/Unsatisfactory grades permitted. *Prerequisites: senior standing and consent of instructor.* (W)

226. Special Topics in Microbiology (3)
Recent developments in procaryotic and eucaryotic microbial research. Topics will vary from year to year, but will include plasmid and chromosome replication, cell surface biogenesis, cellular differentiation, viral development, biorhythms, energy interconversions, solute transport, motility and taxis, metabolic regulation, microbial ecology. (Satisfactory/Unsatisfactory grades permitted.)

227. Advanced Genetics. (6)
A comprehensive course covering genetics of both eukaryotic and prokaryotic organisms with special emphasis on current research in the field. This course is primarily intended for first year graduate students who have had at least one previous course in genetics. *Prerequisites: Biology 101, 110X, 132 or the equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (W)

228. Virology (3)
Molecular aspects of viral structure and development. Three hours lecture. *Prerequisites: Biology 111 or the equivalent.* (Satisfactory/Unsatisfactory grades only.) (W)

230. Seminar in Developmental Biology (1)
Seminars presented by graduate students which will explore topics in specialized areas of developmental biology and provide opportunities for students to gain experience on the organization, critical evaluation and oral presenta-

tion of information for the literature. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

231. Regulation in Higher Organisms (3)
A discussion of the molecular basis of control mechanisms in the function of specialized tissues of higher organisms. *Prerequisite: Biology 111 or equivalent.* (Satisfactory/-Unsatisfactory grades permitted.) (S)

232. Cellular Aspects of Development (3)
The behavior of cells in developing systems with special emphasis on mechanisms of regulation at the subcellular and molecular level. (Satisfactory/Unsatisfactory grades permitted.) (W)

236. Advanced Molecular Aspects of Cell Biology (6)
A comprehensive course covering molecular aspects of eukaryotic and prokaryotic cell biology. The course is intended for first and second year graduate students with a basic knowledge of molecular biology. *No prerequisites.* (Satisfactory/Unsatisfactory grades permitted.) (S)

237. Human Genetics (3)
A detailed examination of a particular topic within the realm of human genetics, with readings of original research papers. The topic may change from year to year. Past examples: 1) Structure and organization of the human chromosomes, 2) X chromosome inactivation and mosaicism. Students are expected to evaluate assigned readings and to participate in class discussions. Satisfactory/ Unsatisfactory grades permitted. *Prerequisite: Biology 101 or permission of the instructor.* (F)

241. Chromosome Organization (3)
A review of the principles of chromosome structure and behavior. Emphasis will be placed on the analysis of published research papers on chromosome biology. Graduate students are required to submit a paper on one of the topics discussed in the course. Satisfactory/Unsatisfactory grades permitted. *Prerequisites: Biology 101.* (S)

242. Immunology (3)
The course will deal with antibody structure, antigens, antigen-antibody interractions, immune response, immunological unresponsiveness, *in vivo* and *in vitro* consequences of antigen-antibody interractions, delayed hypersensitivity, control of the immune response and transplantation immunities. *Prerequisite: Biology 173.* (Satisfactory/Unsatisfactory grades permitted.)

243. Systems Neurophysiology (3)
Integration of sensory and motor mechanisms related to perception and behavior. Emphasis will be given to those studies of simple and complex nerve cell assemblies for which functional models can be constructed and tested. Satisfactory/Unsatisfactory grades permitted. *Prerequisites: lower division math, physics, chemistry.* (S)

243L. Laboratory in Neurobiology (2)
Current electrophysiological techniques used to study nervous systems will be taught through exercises and individual projects. One hour lecture, ten hours laboratory. *Students must be interviewed by instructors before registering in this course. Prerequisites: Biology 166 and 243 (may be taken concurrently.)* (No Satisfactory/Unsatisfactory grades permitted.) (S)

248. Introduction to Drug Action and Pharmacology (3)
An introductory study of the actions of drugs and chemicals in animals (including humans) in modifying the physiological response of tissues in isolation and *in situ.* The course is similar to Biology 148, but in addition it requires a written report by each student on a specific problem in drug action. (Satisfactory/Unsatisfactory grades permitted.) (F)

250. Seminar in Immunology (1)
The course involves weekly seminars given by faculty, postdoctoral research fellows, advanced graduate students, concerning current research in immunology and immunochemistry. One hour lecture. *Prerequisite: approval of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (S)

251. Combined Human Immunology (3)
A multiple-discipline course in human immunology is planned with review of basic immunologic principles and immunopathologic mechanisms correlated to human disease. Lectures, demonstrations and case presentations will be used. Faculty will consist of basic scientists and clinicians from five departments, who will relate their specialty to the problems of human immunobiology and disease. (Satisfactory/Unsatisfactory grades permitted.) (S)

252. Development in Lower and Higher Plants (3)
An analysis of those aspects of development in lower and higher plants which can be understood in molecular or cellular terms. *Prerequisites: biochemistry, molecular and cell biology.* (Satisfactory/Unsatisfactory grades permitted. (W)

253. Molecular Biology (3)
Explores topics in specialized areas of molecular biology: structure and organization of DNA, replication of DNA, recombination of DNA, repair of DNA, mutations and mutagenesis, gene transfer, transcription, protein synthesis and the code, viruses. *This course overlaps parts of Biology 228 but the treatment is somewhat more cursory and less research oriented. Prerequisite: biochemistry.* (Satisfactory/Unsatisfactory grades only.) (F)

254. Basic and Human Genetics (3)
Genetic properties with application to human polymorphisms and genetic diseases. Topics covered will be chromosome aberrations, linkage and cell hybridization, mutations and evolution of common proteins such as hemoglobin, blood groups and other human polymorphs from the standpoint of immunology and population genetics, and finally some recent approaches to genetic counseling. *Prerequisites: students must have already completed all undergraduate requirements as biology majors and must obtain consent of the instructor.* (Satisfactory/Unsatisfactory grades only.) (F)

255. Immunochemistry and Cellular Immunology (3)
Graduate students will explore topics in specialized areas of immunochemistry and cellular immunology; antigenic and molecular structure of immunoglobulin molecules, antigen-antibody interractions, cellular events in the humoral and cellular immune response, transplantation immunology. *Prerequisites: students must have already completed all undergraduate requirements as biology majors and must obtain consent of instructor.* (Satisfactory/Unsatisfactory grades only). (F)

256. Membrane Biology (3)
Examines biogenic and functional aspects of biological membranes in procaryotic and eucaryotic cells: biosynthesis and assembly of membrane constituents, mechanisms of bulk transport including phagocytosis, secretion, molecular basis of solute transport, energy coupling in electron transport, biochemical basis of membrane electrical potentials, regulation of membrane enzymes and transport systems, cellular motility and chemotaxis, cellular recognition, adhesion and fusion. *Prerequisite: consent of instructors.* (Satisfactory/ Unsatisfactory grades permitted.) (S)

257. Cellular Immunology (3)
The course will cover the cellular events and interactions of the humoral and cellular responses to antigen. The course will be a graduate course not open to undergraduates. *Prerequisites: 137/242 or equivalent advisable.* (S)

258. Neurons, Glia and their Interactions (3)
Neural cell types and systemic relationships. Developmental concepts and survey of selected parts of the nervous system. Determination versus expression of neuronal characteristics. Extrinsic cues from cellular and humoral environments, culture approaches. Bioelectric and biochemical properties of neurons and glia. Axonal growth and formation of synapses. Neuron-glia interactions. *Prerequisites: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)(F)

260. Seminar in Population Ecology (1)
Students will discuss papers on life history strategies, competition theory, predation and population extinction. The development of a coherent theoretical framework will be stressed. *Prerequisites: consent of instructor and Biology 122.* (Satisfactory/Unsatisfactory grades only.) (W or S)

261. Environmental Physiology and Biochemistry of Marine Organisms (3)
Emphasis on adaptation to environmental factors such as temperature, pressure, and salinity. *Prerequisites: consent of instructor. Background in biochemistry and an interest in biology.* (3)

262. Developmental Biology of Marine Organisms (3)
A survey of developmental patterns, and their experimental modification, in selected groups of marine organisms. Emphasis will be on the morphogenesis, physiology and biochemistry of development, larval adaptation and evolution. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisite: SIO 280 or consent of the instructor.*

262L. Laboratory in Developmental Biology (2)
A laboratory course concentrating on such developmental phenomenon as oogenesis, fertilization, morphogenesis and attainment of larval forms in selected phyla. *Prerequisite: SIO 292, Biology 262 or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

264. Poisons - Natural and Man-made - and their Mechanisms of Action (3)
An introduction to the effects of environmental agents on biologic systems, particularly emphasizing effects on humans. Emphasis will be placed on the biochemical mechanisms by which toxic agents affect organisms, and these mechanisms will be correlated with physiologic changes. (Graduate students will be expected to write a paper in addition to the final exam). Three hours lecture, one hour discussion. *Prerequisites: Biology 106,110A or 144 or consent of the instructor.* (Satisfactory/Unsatisfactory grades permitted.) (S)

266. Membrane Physiology (3)
Biophysical and biochemical properties of membranes. Membrane structure and synamics. Kinetics, equilibria, and mechanisms of solute permeability. Active and passive transport. Topics will include model systems, red cells, epithelial, excitable and energy-transducing membranes. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisites: knowledge of thermodynamics and kinetics or consent of the instructor.* (S)

269. Cellular Neurobiology (3)
An examination of the molecular and cellular events underlying nerve function and synaptic transmission. Synaptic neurochemistry. Neuronal development and synapse formation *in vivo* and *in vitro*. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisites: biochemistry; cell biology recommended.* (F)

270. Seminar in Microbial Physiology (1)
Weekly seminars and discussions led by faculty, postdoctoral fellows and graduate students concerning recent research in the areas of structure and function of microbial cell surfaces and morphogenesis in microoorganisms. material covered will include such topics as cell wall metabolism, bacterial L-forms, spore formation and germination. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisite: consent of the instructor.* (S)

272. Human Population Genetics (3)
Examine the effects of selection, inbreeding, mutation and drift on the human gene pool. Extent of human genetic diversity. Blood group, histocompatibility and enzyme polymorphisms. Genetic loads and the impact of rare and common genetic diseases. Genetic engineering and eugenics. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisite: Biology 173 or consent of the instructor.* (W)

299. Research in Biology (1-2)
(F,W,S)

500. Apprentice Teaching (4)
Participation in the undergraduate teaching program is required of all students working toward a Ph.D. degree. In general, students are not required to teach in the first year, but are expected to serve as teaching assistants 50 per cent of the time for one quarter in each subsequent year. Satisfactory/Unsatisfactory grades only. (F,W,S)

Biophysics

OFFICE: 3430 Mayer Hall

This is an undergraduate program within the Department of Physics, which prepares the students for a career in biophysics.

No graduate degrees in biophysics are awarded at present. Research in biophysics is being actively pursued in several departments (e.g., Physics, Chemistry, Biology), which also offer courses in or relevant to biophysics. Students interested in working toward a graduate degree in one of the areas of biophysics presently receive their degrees from the department to which their thesis supervisor belongs.

It is contemplated to provide an interdisciplinary graduate degree in biophysics in the near future.

Physics Major with Specialization in Biophysics The upper-division program is essentially the same as the standard physics major, with some modification to provide the education in biology and chemistry needed for advanced work in biophysics. Students entering the program with deficient backgrounds in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics:

(a) Lower division:
(1) Physics: Natural Science or Physics 2A-B-C; or Physics 3A-B-C-D; or Science 4A-B-C and 4BL or 4CL. (2) Chemistry: Natural Science 2D-DL-F-FL; or Science 3A-AL-B-BL. (3) Biology: Natural Science 2E.

(b) Upper division:
(1) Physics: Physics 100A-B-C, 110A, 120A-B, 130A-B, 131, 153. (2) Chemistry: Chemistry 131, 140A-B, 143A. (3) Biology: Biology 102, 110A-B-C. (4) Mathematics: Mathematics 110A. (5) Restricted Elective: Mathematics 120 is recommended.

(c) Suggested Schedule:

FALL	WINTER	SPRING
Junior Year		
Physics 100A	Physics 100B	Physics 100C
Physics 110A	Math 110A	Restricted Elective
Chemistry 140A	Chemistry 140B	Physics 120A
Chemistry 143A		
Senior Year		
Physics 130A	Physics 130B	Biology 102
Physics 120B	Physics 131	Biology 110C
Biology 110A	Biology 110B	Physics 153
	Chemistry 131	

Physics Major with Specialization in Biophysics-Premedical The upper-division program is essentially the same as the standard physics major, with some modification to provide the education in biology and chemistry needed for the study of medicine. Students entering the program with deficient backgrounds in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics-premedical:

(a) Lower division:
(1) Physics: Natural Science or Physics 2A-B-C; or Physics 3A-B-C-D; or Science 4A-B-C and 4BL or 4CL. (2) Chemistry: Natural Science 2D-DL-F-FL; or Science 3A-AL-B-BL. (3) Biology: Natural Science 2E. (4) Mathematics: Mathematics 2D-E or 2DA-EA.

(b) Upper division:
(1) Physics 100A-B-C, 110A, 120A-B, 130A-B, 131, 153. (2) Chemistry: Chemistry 131, 140A-B, 143A. (3) Biology: Biology 101 or 110X, 102, 106, 117. (4) Mathematics: Mathematics 110A. (5) Restricted Elective: Mathematics 120 is recommended.

(c) Suggested Schedule:

FALL	WINTER	SPRING
Junior Year		
Physics 100A	Physics 100B	Physics 100C
Physics 110A	Math 110A	Physics 120A
Biology 101	Restricted Elective	Biology 117
Senior Year		
Physics 130A	Physics 130B	Biology 102
Physics 120B	Physics 131	Biology 106
Chemistry 140A	Chemistry 140B	Physics 153
Chemistry 143A	Chemistry 131	

Chemistry

OFFICE: 2112 Urey Hall
Student Information: 2116 Urey Hall

Professors:
James R. Arnold, Ph.D.
Russell F. Doolittle, Ph.D.
Murray Goodman, Ph.D. *(Chairman of the Department, 1976-77)*
Nathan O. Kaplan, Ph.D.
David R. Kearns, Ph.D.
Joseph Kraut, Ph.D.
Joseph E. Mayer, Ph.D. *(Professor Emeritus)*
Stanley L. Miller, Ph.D.
G. N. Schrauzer, Ph.D.
Kurt E. Shuler, Ph.D.
Hans E. Suess, Ph.D.
Teddy G. Traylor, Ph.D.
Harold C. Urey, Ph.D. *(University Professor, Emeritus)*
Bruno H. Zimm, Ph.D.

Associate Professors:
John N. Abelson, Ph.D.
William S. Allison, Ph.D.
F. Thomas Bond, Ph.D.
Leigh B. Clark, Ph.D.
Marlene A. DeLuca, Ph.D.
Edward A. Dennis, Ph.D.
Robert C. Fahey, Ph.D.
Elvin Harper, Ph.D.
Robert G. Linck, Ph.D.
Katja Lindenberg, Ph.D.
Xuong Nguyen Huu, Ph.D.
Kurt Marti, Ph.D.
Trevor C. McMorris, Ph.D.
Hans Oesterreicher, Ph.D.
Charles L. Perrin, Ph.D.

Robert L. Vold, Ph.D.
Joseph W. Watson, Ph.D. *(Provost of Third College)*
John H. Weare, Ph.D.
John C. Wheeler, Ph.D.
Kent R. Wilson, Ph.D.

Assistant Professors:
Edward C. Alexander, Ph.D.
Jack E. Kyte, Ph.D.
John Leong, Ph.D.
Douglas Magde, Ph.D.
Robert W. Holley, Ph.D., *Adjunct Professor*
Martin D. Kamen, Ph.D., *Adjunct Professsor*
G. David Novelli, Ph.D., *Adjunct Professor*
Leslie E. Orgel, Ph.D., *Adjunct Professor*
Lemuel Bowie, Ph.D., *Assistant Adjunct Professor*
Nathan Gochman, Ph.D. *Associate Adjunct Professor*

* * *

The Undergraduate Program The undergraduate major in chemistry is intended to enable a student to pursue further studies in chemistry or in related fields of science, engineering, or medicine. The program combines a thorough preparation in the fundamentals of chemistry and related fields with an opportunity for more advanced work in particular areas of chemistry.

Lower-Division Requirements
Lower-division chemistry requirements vary slightly with the college as described later, but in general should include general chemistry including laboratory, one year of physics, and one year of calculus. In addition Mathematics 2D (Differential Equations) and/or 2E are advised, preferably before the junior year. Transfer students should take particular note of these requirements.

Revelle College The Natural Science 2 sequence is advised; Natural Science 2D, 2DL, 2F, and 2FL are essential and should be taken in the sophomore year by students who have begun in the 1 sequence.

Muir College Science 3A, 3AL, 3B, 3BL, and 3C are essential along with a year of physics (Science 4A, 4B, 4C). Students who have done well in 3A and 3B may start organic chemistry (Chem 141A) in the fall of the sophomore year. Others may take Chemistry 140A, 140B, 143A, but will need a third quarter of organic chemistry, Chem 141A.

Third College and Fourth College
Lower-division and upper-division requirements are stated in following pages.

Upper-Division Requirements
Except as noted below for special concentrators, the department's requirements are:

- 1 year of Physical Chemistry (130, 131, 132)
- 1 year of Organic Chemistry (141A, 141B, 141C)
- 2 quarters of Inorganic Chemistry (120A, 120B)
- 4 lab courses: 143A, 143B, 105A and one of the following (143C or 105B, or 112).
- 5 additional upper-division or graduate courses in chemistry or related areas.

The minimum passing grade in these courses is a D, and a minimum of a C average in the major is required for the degree. Except for independent research (Chem 199) departmental courses may not be taken on a "Pass/Not Pass" basis by chemistry majors. Chemistry 199 must be taken on a "Pass/Not Pass" basis and may count toward the additional course requirement. Substitution for these requirements may be made by students wishing to concentrate in biochemistry, earth sciences, or chemical physics as spelled out below.

Major Program in Chemistry

FALL	WINTER	SPRING
Junior Year		
Chemistry 141A	Chemistry 141B	Chemistry 141C
Chemistry 130	Chemistry 131	Chemistry 132
Chemistry 143A (½)	Chemistry 143B (½)	Advanced Laboratory***
Chemistry 120A* **	Chemistry 120B* Chemistry 105A (½)	
Senior Year		
Upper Division or Graduate Courses: Consult with an adviser, assigned in the Student Affairs Office of the Chemistry Department, if necessary.		

* Chemistry 120A, 120B may be dalayed until the senior year.

** Premedical students are advised to take Biology 101 in the fall of the junior year and two additional upper-division biology courses.

*** Either Chemistry 105B, 143C, or 112. Students should note that the prerequisites for these courses are strctly enforced.

Biochemistry The following program is designed for those wishing to major in chemistry, but with an emphasis on biochemistry and with the options indicated, is

suitable for pre-medical students. The core biochemistry offering is a five-quarter sequence starting in the winter of junior year consisting of Chemistry 114, 115, 118, 116, 113.

Major Program in Chemistry for Biochemistry Concentrators

Fall	Winter	Spring
Junior Year		
(Org) Chem 141A * **	(Org) Chem 141B* (Phy) Chem 131 (Bio) Chem 114	(Org) Chem 141C* (Phy) Chem 132 ** (Bio) Chem 115
(Org L) Chem 143A	(Org L) Chem 143B (Phy L) Chem 105A***	(Bio L) Chem 112***
Senior Year		
(Bio) Chem 118 (Inorg) Chem 120 A	(Bio) Chem 116 ------	(Bio) Chem 113 **

* Premedical students are advised to take 3 upper division biology courses. These may be counted as electives and should include Biology 101 (Genetics) fall of the junior year.

** Electives from among the following courses: Chemistry 117, 119, 120B, 130, 145 or Biology 101, 110B, 111, 114, 117. Chemistry 199 may not be substituted for required or elective courses. Students are encouraged to take Chemistry 199 in the senior year.

* Students who have had Chemistry 140A, 140B or equivalent need not take 141B, 141C, but must take 141A.

** Chemistry 130 may be substituted for those who took it prior to or during 1974-75.

***Chemistry 105B or 143C may be substituted.

****May be taken senior year.

STUDENTS FOLLOWING THIS PROGRAM NEED NOT CONSULT AN ADIVSER FOR APPROVAL OF COURSE CHOICES. STUDENTS WITH QUESTIONS SHOULD CONTACT THE CHEMISTRY DEPARTMENT STUDENT AFFAIRS OFFICE.

Chemical Physics That branch of physical science which 1) applies the concepts and quantitative methods of physics, preeminently quantum theory, to the description of atoms and molecules, 2) presents an analysis of ordinary macroscopic matter as statistical ensembles of these molecular building blocks and 3) develops and exploits physical (largely spectroscopic) experimental tools with which to test and refine such theories. The specialization is designed as preparation for graduate work. It requires completion of the Natural Science 2 sequence and the Mathematics 2 sequence through 2E, or their equivalents, in the sophomore year. Chemistry 141C is not required. Required upper-division electives are Mathematics 110A, Physics 110A, 110B or 100A, 100B, and Chemistry 133 or 135, plus two additional courses in physical chemistry or complementary courses in Physics, Mathematics, AMES, or APIS.

Major Program in Chemistry for Chemical Physics Concentrators (Typical Program)

FALL	WINTER	SPRING
Junior Year		
Chemistry 130	Chemistry 131	Chemistry 132
Chemistry 141A	Chemistry 141B	
Physics 110A or 100A	Physics 110B or 100B	Chemistry 135
Chemistry 143A (½)	Chemistry 105A (½)	Chemistry 143C* Chemistry 105B (½)
Senior Year		
Chemistry 120A	Chemistry 120B	Chemistry 133
Chemistry 102A	Mathematics 110A	Mathematics 110B or 120

*Substituted for Chemistry 143B

Earth Sciences A chemistry major with specialization in earth sciences is also available for undergraduates. See "Earth Sciences" for description of this program, which may be arranged by consultation with advisers in the Department of Chemistry and Scripps Institution of Oceanography.

Normally the student does course work for a major in chemistry, physics or mathematics plus additional enrichment courses in geology. The specifically required courses are: ES 101 Introduction to Earth Sciences, ES 103 Introduction to Geophysics, ES 102 Introduction to Geochemistry, ES 120 Mineralogy, and SIO 253 A Igneous and Metamorphic Petrology. At least two other earth sciences courses will be taken. See below. Field Geology (SIO 256A) is essential for geology students. It should be taken by students planning to go on to graduate school or to do professional geologic work with their undergraduate degree. The courses should be taken in the following sequences — beginning in the junior year: ES 101 may be taken by sophomores who have had the equivalent of one year of college level chemistry, math and physics *if* space is available.

Major Program in Chemistry for Earth Science Concentrators

FALL	WINTER	SPRING
Junior Year		
ES 101	ES 103	ES 102
Chem 130	Chem 131	Chem 132
Chem 141A	Chem 141B	ES 120
Chem 143A (½)	Chem 105A (½)	Chem 105B (½)

Senior Year		
Chem 120A	Chem 120B	
SIO 253A	*	

* Two other courses are required and may be chosen from the following: SIO 244, 245A, 245B, 256A, Chem 171, Chem 272.

Third College
Typical Major Program in Chemistry

FALL	WINTER	SPRING
Freshman Year		
Chemistry 10B	Chemistry 11B	
Sophomore Year		
Chemistry 12A	Chemistry 12B	Chemistry 12C
Chemistry 12AL	Chemistry 12BL	
Physics 15A	Physics 15B	Physics 15C
		Biology 22* (Genetics)
Junior Year		
Chemistry 140A	Chemistry 140B	Chemistry 132
Chemistry 143A	Chemistry 143B	Chemistry 105B *or*
Chemistry 129	Chemistry 131	Chemistry 143C *or*
	Chemistry 105A	Chemistry 112
Cytology*	Cytogenetics*	
Senior Year		
Chemistry 141A	Chemistry 114	Chemistry 115
Chemistry 130*		Chemistry 117
Materials Science 101	Materials Science 102	Materials Science 103
Natural Products 142*		Clinical Chemistry 154*

(*Elective)

The Department of Chemistry major in Third College is designed to meet the academic interests and needs of a broad spectrum of students ranging from those who intend to do graduate study in chemistry and those planning to enter medical and dental schools or related health professions, to those interested in teaching chemistry in secondary schools as well as those wishing employment in chemical or related laboratories upon attainment of the bachelor's degree. The program is designed with the double objective of providing the student with a fundamental understanding of the basic branches of chemistry and the flexibility to tailor a program to meet his or her individual interests and career objectives.

Students who have completed high school chemistry and physics may be allowed, depending on their performance in a placement examination, to start at the sophomore level. Other students must first complete freshman courses in physics, chemistry, and mathematics. Third College students may take Chemistry 141A, 141B and 141C in lieu of Chemistry 140A, 140B and 141A.

In the senior year, students who plan to continue in medicine or related fields are required to take three quarters of biochemistry. Other students will have a choice of biochemistry or three quarters in materials science. In addition, there will be elective courses in natural products chemistry, clinical chemistry, and Chemistry 199.

Fourth College The Department of Chemistry offers programs to meet both the major and minor requirements in Fourth College. At present, the major leads to a B.A. degree. The major program may be structured to prepare the student to pursue graduate work in chemistry; to pursue graduate work in an allied science such as biochemistry, materials science, or earth, oceanographic or space science; to undertake study in a professional school such as medicine or law; or to pursue a career at the bachelor's level.

The first two years of the major program normally proceed as follows:

FALL	WINTER	SPRING
Freshman Year		
Chemistry 4A	Chemistry 4B	Chemistry 4C
Writing 10A	Writing 10B	Chemistry 4AL
Mathematics 2A	Mathematics 2B	Mathematics 2C
Minor*	Minor*	Minor*
		Elective**
Sophomore Year		
Chemistry 141A	Chemistry 141B	Chemistry 141C
Chemistry 4BL	Chemistry 143A	Chemistry 143C***
Physics 2A or 3A	Physics 2B or 3B	Physics 2C or 3C
Mathematics 2D	Mathematics 2E***	Elective**

*See the general Fourth College requirements. If neither physics nor mathematics is to be used as a minor, it is essential that at least one of the minors be started as early as possible.

**The student undecided among chemistry, biochemistry, and biology should consider the above program with the addition of Biology 4 or the equivalent in the first two years.

*** Generally recommended, but not required for all specializations.

In the third and fourth years, the student will follow a program consistent with the general chemistry requirements or one of the chemistry specializations, as outlined above. All of those, as described, satisfy the college degree requirements. In addition, the following two options exist in Fourth College: the student may major in chemistry and minor in materials science or the student may incorporate some of the materials science courses into a chemistry program to create a major with emphasis in solid state and materials chemistry and still pursue two other minors.

Minor Programs in Chemistry These generally require Chemistry 4A, B, and C with the associated 4AL and 4BL followed by any three upper-division lecture courses in chemistry and one upper-division half-course in chemistry laboratory. However, for biology majors pursuing a contiguous minor in chemistry, the requirement is the introductory sequence with its labs, two quarters of organic lecture with one organic lab, and any three additional upper-division courses or half-courses.

The Graduate Program The department accepts students for study toward the M.S. or the Ph.D. The department usually recommends financial support only for students who are seeking the Ph.D. The doctoral program is designed to encourage initiative on the part of the student and to develop habits of independent study. Students with normal preparation start research early.

In order that they may participate effectively in this program, entering graduate students will be required to have a mastery of the subjects usually presented in an undergraduate chemistry curriculum: physical, organic, and inorganic chemistry. So that students may be properly advised, their mastery of these undergraduate subjects will be tested by written examination on their arrival. Deficiencies in undergraduate preparation must be remedied during the first year of graduate study. Physical chemists will be expected to present the equivalent of two years of physics, and mathematics at least through integral calculus. The appropriate background courses in biology or geology are highly desirable for students interested in biochemistry and geochemistry, respectively, but will sometimes be taken after arrival.

In the first year the student will usually take several of the graduate courses listed below, including Chemistry 250. The student may also take upper-division undergraduate courses. Depending on the student's special interests, he or she may also take courses in other departments. The student will normally select a thesis adviser by the end of the first year of study and begin thesis research. in the second year the student will usually carry a lighter load of formal courses, but will continue to participate in seminars and informal study groups.

Students whose native language is not English must submit TOEFL scores. There is no foreign language requirement, but it is recommended very strongly that a student acquire at least a reading knowledge of one foreign language, preferably German or Russian.

The oral qualifying examination for admission to candidacy must be taken before the end of the fifth quarter of graduate study and will be conducted as follows:

The candidate will present a major and a minor presentation, the former consisting of a statement summarizing an original research problem. The candidate should be prepared to discuss both the theory and the experimental techniques involved, as well as the significance of the proposition and its relation to previous knowledge. The minor presentation consists of a critical analysis of one or more recent research papers assigned by the chairperson of the doctoral committee.

Successful passing of the qualifying examination advances the student to candidacy for the Ph.D. The candidate then devotes most of his or her time to thesis research and study. A final examination is conducted by the student's doctoral committee upon completion of the dissertation. The examination is oral and deals with the dissertation and its relation to the general field of study.

Every graduate student is required to perform half-time teaching for two quarters in the first year of residence and one quarter out of every three quarters of residence thereafter. Course credit may be obtained for this teaching by registration in Chemistry 500.

The interdisciplinary tradition is strong on the San Diego campus. The chemistry faculty has close ties with the Departments of Applied Mechanics and Engineering Sciences, Biology, and Physics, as well as with the Scripps Institution of Oceanography and the School of Medicine. Opportunities and facilities are thus available to the graduate student for study and research in a wide variety of interdisciplinary fields.

Graduate Program in Biochemistry
The Department of Chemistry offers a major program in biochemistry in cooperation with

the Department of Biology. Please refer to the biochemistry listing in this catalog for details.

Joint Doctoral Program with San Diego State University The Department of Chemistry at UC San Diego cooperates with the Department of Chemistry in the Division of the Physical Sciences, San Diego State University, in offering a joint program of graduate study leading to the Ph.D. degree in chemistry.

An applicant must first be admitted to regular graduate standing at the University of California, San Diego and then can apply for classified graduate standing in the Graduate Division of San Diego State University. In seeking admission to the two graduate divisions, the applicant must pay all fees required by each institution and comply with the admission procedures stated in this catalog and in the current edition of the Bulletin of the Graduate Division of San Diego State University, where the program is more fully described.

Courses

Lower Division

Revelle College students take the 1 or 2 sequence depending on mathematical preparation: (See course listings: Natural Sciences.)

1A. Natural Science: Chemistry
1B. Natural Science: Chemistry
1BL. Natural Science: Chemistry
2D. Natural Science: Chemistry
2DL. Natural Science: Quantitative Chemical Analysis
2DS. Natural Science: Chemistry
2F. Natural Science: Chemistry
2FL. Natural Science: Quantitative Chemical Analysis

Muir College students take the following sequence: (See course listings: Science.)

3A. General Chemistry
3AL. Quantitative Chemical Analysis
3B. General Chemistry
3BL. Quantitative Chemical Analysis

Third College students take the following sequence: (See course listings: Science & Technology.)

10B. Chemistry
11B. Introduction to Chemistry
12A-B-C. Chemistry
12AL. Chemistry
12BL. Chemistry

Fourth College students take the following sequence:

4A-B-C. Introductory Chemistry (4)
This course will present the introductory concepts and theories upon which chemical science is based. Topics include atomic structure, periodicity, thermodynamics, kinetics, gases, liquids, solids, solutions, electro-chemistry and organic chemistry. (F,W,S)

4AL. Quantitative Chemical Analysis (2)
A laboratory course that introduces the student to laboratory techniques, analytical procedures and physical measurements. Includes gravimetric, volumetric and instrumental methods of chemical analysis. Emphasis is on accuracy and precision. One hour lecture and two three-hour laboratories. Interchangeable with Natural Science 2DL in Revelle, and Science 3AL in Muir. (S)

4BL. Quantitative Chemical Analysis (2)
A continuation of Chemistry 4AL. One hour lecture and two three-hour laboratories. Interchangeable with Natural Science 2FL in Revelle and Science 3BL in Muir. *Prerequisite: Chemistry 4AL.* (F)

Upper Division

102A. Thermodynamics (4)
Thermodynamics of Chemical Systems, the three laws, with emphasis on the formal structure of thermodynamics. Chemical equilibrium, stability theory, heterogeneous equilibrium. Solutions. Intended as a preparation for Chemistry 204A. *Prerequisites: Chemistry 131, 132 or equivalent.* (F)

105A. Physical Chemistry Laboratory (2)
Laboratory course in experimental physical chemistry. *Prerequisites: Chemistry 130 or 131 (may be taken concurrently.* (F,W,S)

106. The Chemical Bond (4)
An introduction to theoretical chemistry for beginning graduate students and senior undergraduate students in chemistry and biochemistry, comprising the application of quantum mechanical principles in the description of the chemical bond. Three lectures. *Prerequisites: Chemistry 131, 132; 141A-B.* (Not offered 1976-77.)

107. Synthetic Macromolecules (4)
The organic and physical chemistry of high polymers with emphasis on synthesis, structure, characterization and properties. Polymers as materials are important as films, fibers and elastomers. They play an ever-increasing role in science, technology and medicine. *Prerequisites: Chemistry 131, 141B.* (W)

112. Molecular Biochemistry Laboratory (4)
The application of techniques including electrophoresis, peptide mapping and sequencing, affinity chromatography, amino acid analysis, gas-liquid chromatography, and enzyme kinetics, to the study of the chemistry of protein structure and function and the chemistry of lipids, carbohydrates, and nucleic acids. *Prerequisites: Chemistry 143A-B, 104, 114, and Biology 106. (Some of these courses may be taken concurrently.)* (s)

113. Chemistry of Biological Macromolecules (4)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisites: organic chemistry, biochemistry and at least two quarters of upper-division chemistry.* (S)

114. Biochemical Structure and Function (4)
Introduction to biochemistry from a structural and functional viewpoint. *Prerequisites: elementary organic and physical chemistry (which may be taken concurrently).* (W)

115. Biochemical Energetics and Metabolism (4)
This course is an introduction to the metabolic reactions in the cell which produce and utilize energy. The course material will include: energy-producing pathways: glycolysis, Krebs cycle, oxidative phosphorylation, fatty-acid oxida-

tion. Biosynthesis — amino acids, lipids, carbohydrate purines, pyrimidines, proteins, nucleic acids. *Prerequisite: Chemistry 114.* (S)

116. Chemistry of Enzyme Catalyzed Reactions (4)
A discussion of the chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mechanisms and coenzyme chemistry are emphasized. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (W)

117. Biochemistry of Human Disease (4)
An advanced course in biochemistry which will deal primarily with the molecular basis of human disorders. *Prerequisite: elementary biochemistry.* (S)

118. Advanced Biochemistry (4)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matter of elementary courses. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (F)

119. Biochemical Evolution (4)
The course emphasizes the chemical aspects of evolution, including the origin of living systems on Earth, primitive energy acquisition devices, the coupling of information storage and replication catalysis, protein evolution, and the biochemical unity and diversity of extant organisms. *Prerequisites: organic chemistry, introductory biochemistry.* (S)

120A-B. Inorganic Chemistry (4-4)
The chemistry of the elements of the periodic table is presented in terms of unifying concepts. The structure of atoms, the influence of atomic properties on the structure of compounds, synthesis of compounds, and the kinetics and mechanisms of chemical reactions are discussed. Thermodynamic aspects of inorganic chemistry and spectral and magnetic 7 properties of compounds are treated. Other topics include: solids, ions in solution, complex ions, solution structure, organometallic compounds. Three lectures, one recitation. (F,W)

128. Physical Chemistry of Biological Systems (4)
Elementary principles of thermodynamics and chemical kinetics and their application to equilibria reaction mechanisms and other aspects of biological systems. *Prerequisites: calculus and organic chemistry (may be taken concurrently).* (F)

129. Computational Chemistry (4)
An introduction to applied mathematics aimed at preparation for physical chemistry courses, with emphasis on problem-solving. Differential equations, partial differentiation, line integrals, multiple integrals, introduction to probability. Related topics if time permits. *Prerequisites: Math 2A-B-C or 1A-B-C.* (F)

130. Physical Chemistry (4)
Quantum mechanics, atomic and molecular spectroscopy, molecular structure. *Prerequisites: Natural Science 2D, Mathematics 2C, or consent of instructor.* (F)

131. Physical Chemistry (4)
Thermodynamics, Chemical equilibrium, phase equilibrium, chemistry of solutions. *Prerequisites: Natural Science 2D, Mathematics 2C, or consent of instructor.* (W)

132. Physical Chemistry (4)
Chemical statistics, kinetic theory, reaction kinetics. *Prerequisites: Natural Science 2D, Mathematics 2C, Chemistry 131, or consent of instructor.* (S)

133. Elementary Statistical Thermodynamics (4)
Equilibrium distribution functions; development of partition functions; derivation of thermodynamic properties of simple systems from partition functions. *Prerequisites: Chemistry 130, 131, 132, Mathematics 2D.* (F)

135. Spectroscopy and Structure (4)
The interaction of electromagnetic radiation with molecules and bulk matter: X-ray and optical scattering; electronic, vibrational, and rotational spectroscopy; nuclear and electron magnetic resonance. Emphasis will be placed on the interpretation of experimental data. *Prerequisite: Chemistry 130.* (S)

140A-B. Organic Chemistry (4-4)
A two-quarter sequence in organic chemistry with emphasis on material fundamental to biochemistry. Topics include: bonding theory, structure, isomerism, conformation, chemical and physical properties; reaction mechanisms; substitution, elimination, and addition reactions; special topics related to biology. *Prerequisite: two quarters of lower-division chemistry or consent of instructor.* (F,W,S)

141A-B-C. Organic Chemistry (4-4-4)
Lectures in organic chemistry for students majoring in chemistry. The lectures will be concerned with (1) structure and properties of covalent molecules, (2) classification of reactions of first-row elements, and (3) reactions of organic compounds, with an introduction to biochemistry. Credit is not given for both Chemistry 141B,C and Chemistry 140A, B, or the equivalent. *Prerequisite: Natural Science 2FL or Science 3BL.* (F,W,S)

142. Natural Products Chemistry (4)
An outline of the biochemistry of terpenes, steroids, alkaloids and plant phenols developed on the basis of modern biogenetic theory. Special emphasis will be given to biologically active substances such as hormones and antibiotics. *Prerequisites: Chemistry 140A-B or 141A-B-C.* (W)

143A. Organic Chemistry Laboratory (2)
Introduction to laboratory techniques needed in Organic Chemistry. Stresses physical methods including separation and purification, spectroscopy, product analysis and effects of reaction conditions. *Prerequisite: Chemistry 141A or Chemistry 140A (may be taken concurrently).* (F,W,S)

143B. Organic Chemistry Laboratory (2)
Continuation of 143A, emphasizing synthetic methods of organic chemistry. *Prerequisites: Chemistry 143A; 141B or 140B (may be taken concurrently).* (W)

143C. Organic Chemistry Laboratory (4)
Identification of unknown organic compounds by a combination of chemical and physical techniques. *Prerequisites: Chemistry 143A, 141C (may be taken concurrently).* (S)

145. Structure and Properties of Organic Molecules (4)
Introduction to the measurement and theoretical correlation of the physical properties of organic molecules. Topics to be covered include simple molecular orbital theory, bond lengths, bond energies, dipole moments, ionization potentials, infrared and ultraviolet spectra, nuclear magnetic resonance and electron spin resonance. *Prerequisites: Chemistry 130, 141B.* (W)

146. Kinetics and Mechanism of Organic Reactions (4)
Methodology of mechanistic organic chemistry: integration of rate expressions, determination of rate constants, transition state theory; catalysis, kinetic orders; isotope effects, substituent effects, solvent effects; linear free energy relationships; product studies, sterochemistry; reactive intermediates; rapid reactions. *Prerequisites: Chemistry 132, 141C.* (S)

147. Mechanisms of Organic Reactions (4)
A qualitative approach to the mechanisms of various organic reactions: substitutions, additions, eliminations, condensations, rearrangements, oxidations, reductions, free-radical reactions, and photochemistry. Includes considerations of molecular structure and reactivity, synthetic methods, spectroscopic tools, and stereochemistry. The

topics emphasized will vary from year to year. This is the first quarter of the advanced organic chemistry sequence. *Prerequisite: Chemistry 141C.* (F)

148. Synthetic Methods in Organic Chemistry (4)
A survey of reactions of particular utilities in the organic laboratory. Emphasis is on methods of preparation of carbon-carbon bonds and oxidation reduction sequences. *Prerequisite: Chemistry 141C or consent of instructor.* (F)

149A. Chemistry and the Air Environment (4)
Sources, control, chemistry, meteorology, dynamics and effects of air pollution. Legal and economic aspects. Relation to growth and energy usage. *Prerequisite: any introductory sequence in mathematics, chemistry and physics.*

150. Phase Equilibria (4)
Thermodynamic properties. Multicomponent phase equilibria. Phase transformations, stability and synthesis in alloys. Rate processes, diffusion, nucleation and growth. *Prerequisites: one year of calculus and completion of a natural science sequence or equivalent, or the consent of the instructor.* (S)

154. Clinical Chemistry (4)
Introduction to the principles and techniques utilized in the chemical analysis of body fluids for diagnostic purposes. Special emphasis will be given to diagnostic enzymology and automated instrumental analysis. *Prerequisite: organic chemistry or elementary biochemistry.* (S)

170. Cosmochemistry (4)
Composition of stars, of planets, of meteorites and the earth. Nuclear stability rules and isotopic composition of the elements. Chemical properties of solar matter. Origin of the elements and of the solar system. *Prerequisite: natural science sequence or equivalent, physical chemistry desirable.* (S)

171. Radiochemistry (4)
Nuclear chemistry, radioactive decay, stability systematics, neutron activation, radiochemistry. Szilard-Chalmers reactions, hot-atom chemistry, radiation chemistry, effects of ionizing radiation. *Prerequisite: Natural Science 2 Sequence.* (W)

190. Mathematical Methods of Chemistry (4)
Calculus, special functions, differential equations; probability and statistics; vectors, matrices and determinants; applications of computers, linear algebra. Three lectures. *Prerequisites: Chemistry 132, Mathematics 2D.* (F)

195. Chemistry Instruction (2 or 4)
Introduction to the teaching of elementary college chemistry. Each student will be responsible for and teach a class section of one of the lower-division chemistry courses. Limited to senior chemistry majors who have maintained a B average or better in their major course work. One meeting per week with instructor, one meeting per week with assigned class section, and attendance at lecture of the lower-division course in which the student is participating. *Prerequisites: Chemistry 132, 141C; consent of instructor.* (F,W,S)

199. Senior Reading and Research (2-4)
Independent literature or laboratory research by arrangement with, and under the direction of, a member of the Chemistry faculty. Students must register on a P/NP basis. *Prerequisite: permission of instructor and department.* (F,W,S)

Graduate

200A-B. Molecular Quantum Mechanics (4-4)
The fundamental concepts and techniques of quantum mechanics which are necessary for the treatment of problems of chemical interest are developed and applied. *Prerequisites: Chemistry 132 and 190 or equivalent.* (W,S)

202A. Thermodynamics (3)
Thermodynamics of chemical systems; the three laws, with emphasis on the formal structure of thermodynamics. Chemical equilibrium stability theory, heterogeneous equilibrium, solutions. Intended as a preparation for Chemistry 204A, as well as prerequisite to Chemistry 202B. *Prerequisites: Chemistry 131, 132 or equivalent.* (F)

204A. Statistical Mechanics of Chemical Systems (4)
Equilibrium Statistical Mechanics, derivation of the formal ensemble equations and the laws of thermodynamics from the principles of classical and quantum mechanics, the relations between the different ensembles, the use of the equations for various chemical systems, gasses, crystals and liquids. *Prerequisite: physical chemistry or thermodynamics, or consent of instructor.* (W)

206. Topics in Biophysics and Physical Biochemistry (3)
Application of physical methods to biochemistry, e.g., x-ray diffraction, optical rotatory dispersion and circular dichroism, magnetic resonance. Same as Physics 206. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (W) (Not offered 1976-77)

207. Synthetic Macromolecules (3)
The organic and physical chemistry of high polymers with emphasis on synthesis, structure, characterization and properties. Polymers as materials are important as films, fibers and elastomers. They play an ever-increasing role in science, technology and medicine. *Prequisite: Chemistry 131 and 141B or equivalent.* (S)

209. Special Topics in Chemical Physics (4)
Topics of special interest will be presented. Examples include NMR, solid-state chemistry, phase transitions, stochastic processes, scattering theory, non-equilibrium processes, and advanced topics in statistical mechanics, thermodynamics and chemical kinetics. (F,W,S)

210. Seminar in Biochemistry (1)
Seminars presented by advanced graduate students which will explore topics in specialized areas of biochemistry and provide opportunities for students to gain experience in the organization, critical evaluation, and oral presentation of information from the literature. Each quarter a different topic is discussed: recent topics have included: lipids, membranes, oxidative phosphorylation, nucleic acid structure, function, and synthesis, protein structure and function, history of biochemistry. *Prerequisite: one year of graduate study.* (F,W,S)

211. Introductory Biochemistry (3)
A comprehensive course in introductory biochemistry. The course is intended for entering graduate students, including those who have not previously had a formal course in biochemistry. *Prerequisites: physical and organic chemistry.* (F)

213. Chemistry of Macromolecules (3)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisite: elementary physical chemistry.* (S)

214. History of Biochemistry (2)
A summary of the contributions which led to the major concepts in the field of biochemistry. Emphasis will be placed on the research approach taken by eminent individuals. *Prerequisite: Chemistry 211.*

215. Metabolic Control Mechanisms (2)
A discussion of control mechanisms at different levels of cell function which influence the activity of representative enzymes and metabolic pathways. *Prerequisite: Chemistry 211 or equivalent.* (Not offered 1976-77)

216. Chemistry of Enzyme Catalyzed Reactions (3)
A discussion of the chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mechanisms and coenzyme chemistry are emphasized. *Prerequisite: organic chemistry.* (W)

217. Human Biochemistry (2)
An advanced course in biochemistry primarily dealing with the molecular basis of human disorders. *Prerequisite: Chemistry 211 or equivalent (may be taken concurrently).* (F)

218. Advanced Biochemistry (3)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matter of elementary courses. *Prerequisites: physical and organic chemistry and Chemistry 211 or equivalent.* (F)

219. Special Topics in Biochemistry (3)
Recent topics have included: techniques in experimental biochemical dynamics, topics in biophysics.

220. Advanced Inorganic Chemistry (3)
Introduction to theoretical inorganic chemistry. Chemistry of typical main group and transition elements; coordination compounds; organometallic chemistry, catalysis, experimental techniques. *Prerequisites; Chemistry 120B, 141C, and 131.* (S)

229. Special Topics in Inorganic Chemistry (1-3)

242. Natural Products Chemistry (3)
An outline of the chemistry of terpenes, steroids, alkaloids and plant phenols developed on the basis of modern biogenetic theory. Special emphasis will be given to biologically active substances such as hormones and antibiotics. *Prerequisites: Chemistry 140A-B or 141A-B-C.* (W)

244. Synthesis of Complex Molecules (3)
In order to plan the most economic synthesis of an organic molecule, one must consider many possible routes. The arguments used to weigh one route against another will be discussed in detail. The uses of specific reagents and protecting groups will be outlined. The control of stereochemistry during a synthesis will be emphasized. Examples will be selected from the recent literature. *Prerequisites: 148 or 248.* (Not offered 1976-77.) (W)

245. Structure and Properties of Organic Molecules (3)
Introduction to the measurement and theoretical correlation of the physical properties of organic molecules. Topics to be covered include simple molecular orbital theory, bond lengths, bond energies, dipole moments, ionization potentials, infrared and ultraviolet spectra, nuclear magnetic resonance and electron spin resonance. (W)

246. Kinetics and Mechanism (3)
Methodology of mechanistic organic chemistry: integration of rate expressions, determination of rate constants, transition state theory; catalysis, kinetic orders; isotope effects, substituent effects, solvent effects, linear free relationships; product studies, stereochemistry; reactive intermediates; rapid reactions. (S)

247. Mechanisms of Organic Reactions (3)
A qualitative approach to the mechanism of various organic reactions: substitutions, additions, eliminations, condensations, rearrangements, oxidations, reductions, free-radical reactions, and photochemistry. Includes considerations of molecular structure and reactivity, synthetic methods, spectroscopic tools, and stereochemistry. The topics emphasized will vary from year to year. This is the first quarter of the advanced organic chemistry sequence. *Prerequisite: Chemistry 141C.* (F)

248. Synthetic Methods in Organic Chemistry (3)
A survey of reactions of particular utility in the organic laboratory. Emphasis is on methods of preparation of carbon-carbon bonds and oxidation-reduction sequences. *Prerequisite: Chemistry 141C or consent of instructor.* (F)

249. Special Topics in Organic Chemistry (1-3)

250. Seminar in Chemistry (1)
Regularly scheduled seminars by first-year graduate students provide opportunities for practice in seminar delivery and for the exploration of topics of general interest. (F)

251. Research Conference (1)
Group discussion of research activities and progress of the group members. (Satisfactory/Unsatisfactory grades permitted.) *Prerequisite: consent of instructor.* (F,W,S)

272. Nuclear and Cosmochemistry (3)
Structure and properties of nuclei. Theory of alpha and beta decay. Interaction of radiation with matter. Nuclear reactions. Nuclear processes in chemistry. Abundance and synthesis of the elements. Radioactive methods of age determination. *Prerequisite: Chemistry 200A or consent of instructor.*

294. Organic Chemistry Seminar (2)
Formal seminars or informal puzzle sessions on topics of current interest in organic chemistry, as presented by visiting lecturers, local researchers, or students. *Prerequisite: advanced graduate-student standing.* (Satisfactory/Unsatisfactory grades only.) (F,W,S)

295. Biochemistry Seminar (2)
Formal seminars or informal puzzle sessions on topics of current interest in biochemistry, as presented by visiting lecturers, local researchers or students. *Prerequisite: Advanced graduate student standing.* (F,W,S)

296. Chemical Physics Seminar (2)
Formal seminars or informal sessions on topics of current interest in chemical physics as presented by visiting lecturers, local researchers, or students. *Prerequisite: advanced graduate student standing.* (F,W,S,)

298. Special Study in Chemistry (1-3)
Reading and laboratory study of special topics under the direction of a faculty member. Exact subject matter to be arranged in individual cases. (Satisfactory/Unsatisfactory grades permitted.) Credit is limited to 3 units per quarter. (F,W,S)

299. Research in Chemistry (1-12)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

500. Teaching in Chemistry (4)
Doctoral students in Chemistry are required to teach a four-unit course (50 per cent teaching assistantship) two quarters their first year and one quarter out of every three in residence. This is an introduction to teaching elementary college chemistry. Each student will be responsible for, and teach a class section from, one of the undergraduate chemistry courses. One meeting per week with instructor, one or two meetings per week with assigned class section, and lecture of the undergraduate course in which he or she is participating. *Prerequisites: graduate standing and consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (F,W,S)

Chicano Studies

OFFICE: Building 313, Matthews Campus

The Major The Chicano Studies major is a joint major. As such, it has a disciplinary emphasis, i.e., it is worked out jointly with a UC San Diego department. The disciplinary emphasis will be the foun-

dation for systematic study of the Chicano experience. Knowledge of the total context of the Chicano experience will also be developed through study in other disciplines and study of the Spanish language. Students may enter the program with a basic knowledge of Spanish (as obtained, for instance, in the language program), but a fluent knowledge of Spanish will be expected of all majors.

Majors will be advised by the Chicano Studies staff and departmental staff.

The exact requirements for the major will vary with the disciplinary emphasis, but in every case the number of required upper-division courses will total at least 13. These courses will fall into three categories:

1. core disciplinary courses (i.e., basic departmental requirements);
2. Chicano focus courses within the discipline or department. (For example: Sociology 115: The Mexican-American Family);
3. Chicano focus courses in *other* disciplines. (For example: Chicano Literature courses if the major is in Chicano Studies/History).

Since the specific departmental requirements (History, Literature, Sociology, Political Science) vary with each department, prospective majors should consult with the administration of the Chicano studies program.

The program is administered by a director and a committee composed of students and faculty.

Courses

Chicano Studies 14. Indigenous Roots of Chicano theatre (4)
This course traces the evolution of Chicano theater from its Meso-American and post-Conquest roots through the Spanish religious theater of the Southwest. (W)

Chicano Studies 115. The Mexican-American Family (4)
An analysis of the past and present structure and functions of the Mexican-American family. Special attention is given to variations in family organization, social functions of the family, and family methods for coping as a minority in American society. *Prerequisites: Sociology 1A, 1B, Sociology 2 or consent of the instructor.*

Chicano Studies 125A. Chicano Politics (4)
A survey of contemporary Chicano politics. The Chicano community in the American political system; government policies as they affect Chicanos; barrio and movement politics and strategies; social and economic trends as they affect politics. *Prerequisite: sophomore standing.* (W)

Chicano Studies 125B. Field Work in Chicano Politics (4)
Each student will be required to do field work relating to the Chicano community, in either individual or group projects. The topic should be on some aspect of Chicano politics, broadly defined, and have theoretical significance. Class will meet once a week for two hours and there will be some common reading. *Prerequisites: sophomore standing, Chicano Studies 125A, and consent of the instructor.* (S)

Chicano Studies 132. La Chicana (4)
A critical perspective of the Chicana's present minority status through an exploration of relevant crucial issues (i.e., employment, education, health, family). *Prerequisite: upper division standing.*

Chicano Studies 133. Contemporary Chicano Issues (4)
The course, interdisciplinary in nature, will study the contemporary Chicano experience from cultural, social, and historical perspectives, and provide students with information and understanding of the important characteristics of the Chicano community by exerting a critical analysis of the societal context in which "La Raza" has sought to maintain and develop its culture. *Prerequisite: consent of instructor.* (W)

Chicano Studies 136. The Chicano Community (4)
Origins of the Mexican-American immigrant in rural Mexico; context of contact; patterns of settlement in the United States; the Mexican community, social structure and social change; acculturation and generational patterns; community leadership and change. *Prerequisites: Sociology 1A and 1B, Sociology 2 or consent of instructor.* (W)

Chicano Studies 143. Spanish Language in America: Spanish Dialects (4)
A socio-linguistic study of the popular dialects in the USA and their relation to other Latin-American dialects. The course will cover phonological and syntactic differences between the dialects as well as the influence of English on the Southwestern dialects.

Chicano Studies 153. Introduction to Chicano Literature (4)
This course introduces students to Chicano literary works. Central to this study are the particular life experience of the Chicano and the unique expression given that experience by Chicano authors, whether in novels, short stories, poetry, or dramatic works. *Prerequisite: speaking and reading knowledge of Spanish or consent of instructor.* (W)

Chicano Studies 155A. Social and Economic History of the Southwest (4)
An introduction to American borderland history with special emphasis on historiography, economic and social developments of the border states during the 18th and 19th centuries. The course is designed to present various interpretations of American Southwestern history. (F)

Chicano Studies 155B. Social and Economic History of the Southwest (4)
The course will consider the significant trends in Mexican-American history over the past 100 years in the Southwest. Special emphasis will be placed upon primary documents relating to Mexican-Americans in economic and social institutions. (F)

Chicano Studies 159Q. Colloquium in American Ethnic History (4)
Readings for advanced students in the history of minority groups in American society. (W)

Chicano Studies 198. Directed Group Study (4)
(F,W,S)

Chicano Studies 199. Independent Study (4)
(F,W,S)

Chinese Studies

Office: 8029 Humanities and Social Sciences Building

Associate Professors:
David K. Jordan, Ph.D. *(Anthropology) (Program Chairman)*
Thomas A. Metzger, Ph.D. *(History)*
Wai-Lim Yip, Ph.D. *(Chinese, Comparative Literature)*

Assistant Professors:
Matthew Y.-Ch.Chen, Ph.D. *(Linguistics)*
Paul Pickowicz, Ph.D. *(History) (Undergraduate Adviser)*
Benjamin K. T'sou, Ph.D. *(Linguistics)*

Lecturer:
Kay A. Johnson, M.A. (Political Science)

* * *

Chinese Studies is an interdisciplinary program. Three features of this program are particularly important: first, study of some aspect of Chinese civilization in terms of a particular discipline; second, a broader approach to Chinese civilization based on a small number of courses drawn from a variety of disciplines; third, a basic knowledge of the Chinese language in terms of one of two major dialects or both of them.

The program is unusual in that it allows for training in either of two Chinese dialects and stresses a creative approach to Chinese civilization through the use of Chinese language in combination with a disciplinary perspective. It readily allows the student to pursue a double major.

The Major Program The major in Chinese Studies is intended to prepare a student for graduate work in some aspect of Chinese civilization. The student choosing the major in Chinese Studies must decide on a disciplinary focus and depending on the discipline focus, the course requirement may vary from 12 to 15 courses. These courses are divided among the following requirements:

1. Language—a minimum of two years of Mandarin or Cantonese. In certain disciplines an additional year of classical Chinese will be required;
2. Chinese focus—two to four courses dealing with China in the chosen discipline focus;
3. Chinese spectrum—two to four courses dealing with China but not in the chosen discipline focus;
4. Discipline spectrum—three to four courses in the chosen discipline focus. These courses should be concerned with theory and methodology in the discipline and not with China;
5. Cross-Cultural Spectrum — Three courses in any cultural area(s) other than China. (pending approval).

Major Program Course Requirements

Major Program in Chinese Studies
Course Requirement

No. of courses	Discipline focus	Anthro	History (Modern)	History (pre-mod)	Ling.	Lit.	Third World Studies
Chinese Studies Requirements							
Language*							
Modern		3	3	3	3	3	3
Classical		0	0	3	0	3	0
Chinese Focus		3	4	4	2	3	2
Chinese Spectrum		3	2	2	4	2	4
Discipline Spectrum		3	3	3	4	3	3
Total number of upper-division courses		12	12	15	13	14	12
Lower-division Chinese language prerequisite		3	3	3	3	3	3

*Language requirement listed here is in addition to first-year level background of three quarters or equivalent.

The Minor Program for Revelle The Chinese Studies minor consists of six courses chosen from any of the courses listed below. They will be selected in consultation with the undergraduate adviser of the program. The content of these courses will determine whether the Chinese Studies minor is classified as humanities or social science.

Courses

Committee Sponsored Courses

Upper Division*

159. Mandarin for Cantonese Speakers (4)
Introduction to Mandarin Chinese for Cantonese speakers. Systematic approach to differences between Mandarin and Cantonese (sound, vocabulary, grammar and writing) through lectures, recitation sessions and laboratory. Specially designed to facilitate the transition from Cantonese to Mandarin. *Prerequisite: Lang/Chinese 54 or equivalent.*

163. Introduction to Chinese Linguistics (2)
This course will be an introduction to linguistics for students of the Chinese language. It will cover phonological and grammatical structures, dialectology and a brief survey of the history of the language.

181A. Introduction to Classical Chinese (4)
Introduction to the classical language through Confucius, Mencius and the other Great Books. The emphasis will be on comprehension and reading ability. *Prerequisite: Lang/Chinese 56 or 66 or equivalent.*

181B. Introduction to Classical Chinese (4)
Continuation of Chinese 181A. *Prerequisite: Chinese Studies 181A or equivalent.*

183. Readings in Classical Chinese (4)
Introduction to major works written in Classical Chinese, including poetry and historical documents. *Prerequisite: Chinese Studies 181B or equivalent.*

198. Directed Group Study in Chinese Studies (2 or 4)
Study of specific aspects in Chinese civilization not covered in regular course work; under the direction of faculty members in Chinese Studies. *Prerequisite: consent of instructor.* (F,W,S)

199. Independent Study in Chinese Studies (2 or 4)
The student will undertake a program of research or advanced reading in selected areas in Chinese Study under the supervision of a faculty member of the Program in Chinese Studies. *Prerequisite: consent of instructor.* (F,W,S)

*For a description of lower-division language courses, see Language.

Chinese Studies Courses in the Departments

For descriptions of courses listed below, see appropriate Departmental listing.

Lang/Ch 51. Elementary Cantonese
Lang/Ch 52. Elementary Cantonese
Lang/Ch 53. Elementary Cantonese
Lang/Ch 61. Elementary Mandarin
Lang/Ch 62. Elementary Mandarin
Lang/Ch 63. Elementary Mandarin
Lang/Ch 64. Intermediate Mandarin
Lang/Ch 65. Intermediate Mandarin
Lang/Ch 66. Intermediate Mandarin
Anthropology 12. Chinese Society and Culture
Anthropology 103. Problems in Chinese Ethnology
History 180. The History of Imperial China
History 180Q. Topics in the History of Imperial China
History 182. Modern Chinese Revolutions: 1800-1911
History 183. Modern Chinese Revolutions: 1911-1949
History 184. People's Republic of China: 1949-1974
History 185A. Institutional and Economic History of Early Imperial China
History 185B. Institutional and Economic History of Late Imperial China
History 186. China's Intellectual History in Late Imperial Times
History 187. Intellectual History of Modern China
History 188. Peasant Revolution: Modern China
History 189Q. Special Topics in Modern Chinese History
Linguistics 164. Language Structures
Linguistics 263. Topics in Chinese Linguistics
Literature 101. Readings in Contemporary Chinese Literature
Literature 150-151. Masterpieces of Chinese Literature
Political Science 103. Chinese Foreign Policy
Political Science 132. Politics in the People's Republic of China

Classical Studies

OFFICE: Humanities and Social Sciences Building, Muir College
(Provost, Muir College)

Professor:
Edward. N. Lee, Ph.D. *(Philosophy) (Chairman)*

Associate Professors:
Georgios H. Anagnostopoulos, Ph.D. *(Philosophy)*
David K. Crowne, Ph.D. *(English, Comparative Literature)*
Sheidon Nodelman, Ph.D. *(Visual Arts)*

Assistant Professors:
Page Ann duBois, Ph.D. *(Classical and Comparative Literature)*
Alden A. Mosshammer, Ph.D. *(History)*

Lecture:
Lawrence Waddy, M.A. *(Classical Languages, Literature)*

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This program offers undergraduates an opportunity to study the cultures of Greece and Rome through the coordinated resources of the Departments of History, Literature, Visual Arts, and Philosophy. Besides training in the Greek and Latin languages, courses are included in the history, literature, art, and philosophy of Greece and Rome, using materials in the original languages and in translation.

The Major Program A major in classical studies consists of a choice of 12 upper-division courses approved for the program and listed below. Six of the 12 courses must involve some use of materials in the original language, either Greek or Latin. The particular courses making up each student's major will be selected with advice from the program staff. The major will normally include courses from three of the participating departments.

The Minor Program A Revelle minor in classical studies consists of six courses from those listed below, of which at least three must be upper-division. A knowledge of Greek or Latin is not required. The minor will normally include Classical Studies 19A-B-C: The Greco-Roman World, and three other courses, one from three of the participating departments.

Fourth College A Fourth College program of concentration in classical studies normally consists of Classical Studies 19A-B-C and three of the upper-division courses listed below.

Graduate courses may be taken by undergraduates with the consent of the instructor. The faculty of the program welcomes qualified undergraduates in graduate courses.

Additional courses counting toward a major in classical studies are offered on a year-to-year basis, both at the undergraduate and graduate levels. As these often cannot be listed in advance, interested students should consult the program faculty for an up-to-date list.

Courses

Undergraduate

Classical Studies 19A-B-C. The Greco-Roman World (4-4-4)
An introductory study of the Greco-Roman world, its literature, myth, philosophy, history, and art. (Not to be offered 1976-77.)

Humanities 11A-B-C. The Western Tradition (6)

Visual Arts 15A. The Art Course: European Art History (Ancient Section) (4)

Classical Studies 107. Myth, Religion and Philosophy in Late Antiquity (4)
(Not to be offered 1976/77.)

Classical Studies 111. Topics in Ancient Greek Drama (4)
(Not to be offered 1976/77.)

History 100. The Ancient Near East and Israel (4)
(Not to be offered 1976/77.)

History 101A-B. Greece in the Classical Age (4-4)
(Not to be offered 1976/77.)

History 101Q Special Topics in Greek History (4)
Topic for fall, 1976: The Athenian Empire.

History 102A-B. The Roman Republic and Empire (4-4)
(Offered winter-spring 1976/77.)

History 102Q. Special Topics in Roman History (4)
(Not to be offered 1976/77.)

History 199. Independent Study in Greek and Roman History

Lit/Gr 1. Elementary Greek (4)

Lit/Gr 2. Intermediate Greek (4)
Prerequisite: Lit/Gr 1 or equivalent.

Lit/La 1. Elementary Latin (4)

Lit/La 2. Intermediate Latin (4)
Prerequisite: Lit/La 1 or equivalent.

Lit/Gr 100. Introduction to Greek Literature (4)
Prerequisite: Lit/Gr 2 or equivalent.

Lit/Gr 101-102-103 Readings in Greek Literature (4-4-4)

Lit/La 100. Introduction to Latin Literature (4)
Prerequisite: Lit/La 2 or equivalent.

Lit/La 101-102-103. Readings in Latin Literature (4-4-4)

Lit/Gen 120. The Classical Tradition
Topic for 1976/77: Women, Slaves, and Barbarians in Classical Athens.

Lit 199. Special Studies in Greek and Roman Literature (4)

Philosophy 101. History of Philosophy: Greek Philosophy
Greek philosophy from the pre-Socratic philosophers through Plato.

Philosophy 102. History of Philosophy: Hellenistic and Roman Philosophy (4)
Greek philosophy from Aristotle to Plotinus including the major schools of Hellenistic philosophy: Stoicism, Epicureanism, Skepticism, and Neo-Platonism.

Philosophy 108. Mythology and Philosophy (4)
Study of various ancient Near-Eastern mythologies in relation to Greek philosophy. (Not to be offered 1976/77.)

Philosophy 199. Independent Study (4)

Visual Arts 112. Ritual Meanings in Architecture

Visual Arts 115J. Late Antique Art

Graduate

History 298. Directed Readings in Greek and Roman History (1-12)

Lit/Cl 210. Classical Studies (4)
Prerequisite: working knowledge of either Greek or Latin.

Lit/Comp 270. Ancient Literary Theory (4)

Lit/Cl 297. Directed Studies in Greek or Latin Literature (1-12)

Lit/Cl 298. Special Projects in Greek or Roman Literature (4)

Philosophy 201. Greek Philosophy (4)

Philosophy 202. Hellenistic and Roman Philosophy (4)

Philosophy 290. Directed Independent Study (1-4)

Communications

OFFICE: First Floor Media Center, Communications Building

Professor:
Herbert I. Schiller, Ph.D.

Associate Professor (Acting):
Samuel Popkin, Ph.D.

Assistant Professors:
Beryl Bellman, Ph.D.
Chandra Hecht, Ph.D.
Michael R. Real, Ph.D.
John Waterhouse, Ph.D.

* * *

Claudio Fenner-Lopez, M.A., *Lecturer (Communications/Visual Arts)*

UC San Diego faculty who teach Communications-related courses:

Bennetta Jules-Rosette, Ph.D., *Assistant Professor (Sociology)*
Elissa Newport, Ph.D., *Assistant Professor (Psychology)*
Will H. Wright, Ph.D., *Assistant Professor (Sociology)*

The Communications Program at UC San Diego offers a campus-wide undergraduate major in communications. Most communications courses are available also as electives for any advanced-standing student at UC San Diego. Because communications intersects with a variety of other disciplines it is possible to arrange interdisciplinary majors as well as a major exclusively in communications. Such additional majors have been arranged with the Departments of Sociology and Visual Arts.

Students in the Communications Program study humans as users of messages and symbols within the social contexts which shape these messages and symbols. Communications systems both reflect the values of a society and determine those values. Thus a central question which is analyzed is to what degree members of a society have access to its mass-communications systems, find a voice, a reflection of themselves therein, and to what degree the society's very nature is altered or maintained by the mass media.

In social contexts and face-to-face interactions, similar questions are analyzed: how are messages, responses, and countermessages shaped by context, role, and by the medium itself, whether verbal or non-verbal.

The communications segment of the Third College general educational requirements may be fulfilled by the satisfactory completion of one of the two following options:

Option A: two courses — Communications 20, and one other introductory upper-division course approved by the Communications Program, or two upper-division communications courses.

Option B: communications 20, or an upper-division communications course.

The Communications Major The communications major must satisfactorily complete the communications core curriculum, Communications 194 (Senior Seminar), two specialities in addition to that used to satisfy the Core Curriculum, and five additional upper division ccurses in communications or related disciplines, the latter to be approved by the communications faculty.

The Core Curriculum (seven courses)

Communications 102A
Communications 102B
1 Media Course
1 Micro Course
1 Macro Course
1 Specialty (consisting of 2 additional courses in one of the three areas: Media, Micro, and Macro)

The Major in Communications/Sociology To receive credit for a major in Communications/Sociology, a student must (a) satisfy the communications core curriculum, (b) satisfy the Department of Sociology's lower-division requirements (Soc. 1A-B,2) and (c) take one upper-division course in each of the five sociology cluster areas. The five cluster areas are (see Sociology for full course descriptions):

1. Social Psychology and Interaction: Soc. 100, 103, 104, 106, 107, 109, 116, 117, 163.
2. Social Organizations and Institutions: Soc. 105, 110, 111, 112, 113, 115, 124, 136, 143.
3. Social Control and Social Problems: Soc. 119, 120, 121, 122, 123, 127, 140, 142, 178, 179.
4. Social Change, Development and Comparative Sociology: Soc. 130, 131, 132, 133, 135, 137A, 137B, 138, 141, 144, 170, 171.
5. Social Bases of Culture and Knowledge: Soc. 108, 149, 150, 151, 152, 153, 155, 156, 159, 160, 161, 162, 187.

Students may complete Sociology 181, Statistical Analysis of Sociological Data, in lieu of one of the above cluster areas.

The Major in Communications/Visual Arts This major is designed to develop conceptual, analytical and technical skills in photography, video and film-making by combining courses in history criticism and production with those of the communications core curriculum. Creative skills as well as aesthetic, analytic and critical skills will be developed. To receive credit for a major in Communications/Visual Arts, a student must complete (a) the communications core curriculum, (b) five courses in criticism and history and (c) seven courses in production/studio.

Criticism and History Courses (any five)

Introduction to Art (Visual Arts 10)
First Look at the Movies (Visual Arts 88)
Hard Look at the Movies (Visual Arts 188)
Critical History of Photography (Visual Arts 121)
Special Projects in Afro-American Art (Visual Arts 127)
The Genre Series (Visual Arts 187)
The Director Series (Visual Arts 189)

Introduction to Production/Studio (seven required)

Beginning Photography (Visual Arts 60) This course must be completed before any of the six other production courses.
Photo-Silkscreening Techniques (Visual Arts (160A-B)
Camera Techniques (Visual Arts 166A-B)
Camera Strategies (Visual Arts 167A-B)
Film-Making (Visual Arts 185A-B)
Film Workshop (Visual Arts 186A-B)
Advanced Seminar in Photography (Visual Arts 191)
Communications Media Courses (see list below)

Media Courses

101A/101AL - Television Production and Analysis/TV Production Laboratory
101B/101BL - Television Documentary/ Television Documentary Laboratory
101C - Television As A Social Force
109 - Research Writing
110 - 8mm Film Workshop
113 - Writing For Films and Television Production
114 - 16mm Film Workshop

Micro-Communications Courses

102A - Introduction to Communications
108 - Cable Television
132 - Language and Society
152 - Myths and Symbols in Society
154 - Non-Verbal Communications
*160 - Use of Audio-Visual Resources
*161 - Images of Women
190 - Communications Analysis and Research
193 - Non-Western Communications and Culture

Macro-Communications Courses

102B - Introduction to Communications
119 - Radio and Society
150 - Media Analysis
153 - American Journalism of Dissent
155 - Sociology of the West
157 - Culture, Science and Society
180 - The Political Economy of Mass Communications
181 - The Political Economy of International Communications
185 - Mass Communications and Public Opinion
186 - The Film Industry
187 - Films and Society
188 - Popular Communications
191 - Communications and National Development
191 - Comparative Systems of Propaganda

*These classes will be accepted as *Micro* or *Media*

Courses

Lower Division

20. Communications (4)
An investigation of social communications in relation to the positive value of racial and cultural differences. Introduces communications on (a) the *macro* level of mass media control, images, and effects, and on (b) the *micro* level of language and non-verbal interaction.

Upper Division

101A. Television Production and Analysis (4)
An introductory course covering the techniques and conventions common to the production of news, discussion, and variety-format television programs. Particular emphasis will be placed on the choice of camera "point of view," and its influence on program content. *Prerequisites: Communications 113 and consent of instructor.*

101AL. Television Production and Analysis Laboratory (2)
Two laboratory sessions weekly will provide students with an opportunity to experiment with production elements influencing the interpretation of program content. Concentration on lighting, camera movement, composition and audio support will closely parallel program formats discussed in the lecture series. *Prerequisite: concurrent enrollment in Communications 101A.* (F)

101B. Television Documentary (4)
Advanced television course which will examine the history, form, and function of the television documentary in American society. Experimentation with documentary technique and style will require prior knowledge of television or film production. The class will meet twice weekly, with individual arrangements for laboratory access. *Prerequisites: Communications 101A and 101AL.* (W)

101BL. Television Documentary Laboratory (2)
Applied theory and methods in the documentary genre via technological process. integrate research, studio and field experiences of various media components. *Prerequisite: concurrent enrollment in Communications 101B.*

101C. Television as a Social Force (4)
Primarily a research and production course. Students will undertake the research, design, and production of a series of video-taped programs that serve some pressing social need. (For example, students may choose to produce a weekly news feature for cable distribution, or a series of educational programs for community centers.) *Prerequisite: completion of either 101A or 101B.* (S)

102A. Introduction to Communications (4)
An introductory course on the analysis of communication from a micro perspective. Emphasis is placed on both verbal and non-verbal processes across social contexts and in different cultures. We will analyze different communication systems and networks. Special focus will be directed to how meaning is produced and interpreted during the course of social interactions. *Prerequisite: communications major or upper division standing.*

102B. Introduction to Mass Communications (4)
A critical overview of mass media, social processes, and institutions that shape individual and group consciousness. Introduces areas of macro-communications: mass-media systems, social effects, political-economic structures, propaganda, popular culture, critical and descriptive theories.

107A-B. Voting, Campaigning and Elections (4)
This course will consider the nature of public opinion and voting in American government. Studies of voting behavior will be examined from the viewpoints of both citizens and candidates and an effort will be made to develop models of their electoral behavior. Attention will also be devoted to recent efforts to develop rational choice theories of electoral behavior and to critiques of elections as democratic institutions. The role of the mass media and money also will be examined.

108. Cable Television (4)
An exploration of alternatives to the traditional broadcast media. Research on the development of new program formats that have greater communicative viability. Emphasis on methods for determining how specific kinds of information should be presented to different cultural groups in the society. Students will be involved with public access broadcasting and the introduction of video recording to various communities in the San Diego area. *Prerequisites: upper-division standing and consent of instructor.*

110. 8mm Film Workshop (4)
An introduction to the practical and social aspects of 8mm film production. Basic camera, exposure, editing and sound techniques will be presented. Each student will produce one or two short films during the course. A brief review of film literature will be undertaken.

113. Writing for Films and Television Production (4)
Course will consist of scripts and scenarios with an eye to their use in film and television production. The first five weeks of the course will deal with dramatic fabulation, the second five weeks with documentary, non-dramatic formats.

114. 16mm Film Workshop (4)
Basic professional methods, crew and equipment operation techniques; double sound system, multiple-track editing etc. Students will write and produce short films. *Prerequisites: Communication 110 and 113.*

119. Radio and Society (4)
The social and technological constraints and freedoms of sound broadcasting in the United States. Contrastive analysis of radio communications systems abroad, and an examination of radio's potential as a community-oriented system. *Prerequisite: upper-division standing.*

132. Language and Society (4)
The class will deal with the socio-economic forces affecting the evolution of standardization of languages, bilingualism, diglossia and language maintenance. These processes will be studied particularly in relation to the Spanish and English languages in the U.S.A.

150. Media Analysis (4)
A systematic study of the means of contemporary information processing in the advanced industrial state. Institutional approaches to and empirical studies of the processing of information will be explored.

152. Myths and Symbols in Society (4)
A study of the contributions of mythical symbols and narratives to the establishment of social meanings and behavior in primitive and modern societies. Included will be a review of different theories of myth and narrative such as those of Levi-Strauss, Cassirer, and Propp.

160. The Use of Audio-Visual Resources (4)
Analysis of and instruction in various uses of video-taping and tape-recording in data collection and analysis in the study of communication in face-to-face interaction.

172. Non-Western Communications and Culture (4)
Participatory workshop which looks beyond mass-mediated industrial societies to explore the underlying unity of patterns of personal communication, consciousness, and culture common to Black American music, oriental philosophy, Native American brujos, and other alternatives to Western modes. *Prerequisites: Communications 188 or consent of instructor.*

180. The Political Economy of Mass Communications (4)
The social, legal, and economic forces affecting the evolution of mass-communications institutions and structures in the industrialized world. The character and the dynamics of mass communications in the United States today. (F)

181. The Political Economy of International Communications (4)
The character and forms of international communications; emerging structures of international communications; the United States as the foremost international communicator; differential impacts of the free flow of information and the unequal roles and needs of developed and developing economies in international communications. *Prerequisite: consent of instructor.* (W)

185. Mass Communications and Public Opinion (4)
Considers the concept of public opinion, its measurement and impact, the possibilities of manipulation and control, polling and the differing role of public opinion in differing social systems. (F)

186. The Film Industry (4)
A study of the social organization of the film industry throughout its history, addressing such questions as who makes films, by what criteria and for what audience. The changing relationships between studios, producers, directors, writers, actors, editors, censors, distributors, audience, and subject matter of the films will be explored.

187. Films and Society (4)
An analysis of films and how they portray various aspects of American society.

188. Popular Communications (4)
Participatory workshop investigating relationships between mass communications and popular culture. Emphasis on a critique of American mass culture in cross-cultural perspective and a search for non-exploitive alternatives.

190. Communications Analysis and Research (4)
Analysis of communication systems, networks within communities for distribution of information, media, and interpersonal face-to-face interaction. Techniques for observing, collecting, processing and implementing data. *Prerequisites: upper-division standing or consent of instructor.*

191. Communications and National Development (4)
Course deals with the role of communications in the developmental process, the specific contributions of mass communications to national integration in newly formed states, and varieties of interpersonal and group communications in developing societies. The role of consciousness as a vital factor in development is analysed and reviewed. *Prerequisites: Communications 20, 180, advanced standing or permission of instructor. (*(S)

192. Comparative Systems of Propaganda (4)
Considers how variant ideologies and cultures create and sustain their value systems through multiple communications patterns. Takes differences between East and West, capitalist and socialist, Caucasian and non-Caucasian peoples and systems, correlates these with variations in media, interpersonal, intrapersonal, and socio-cultural communications sets.

193. Advanced Topics in Communication (4)
Specialized study in micro, macro or media communications with topic to be determined by the instructor for any given quarter. Can be repeated for credit. *Prerequisite: consent of instructor.*

194. Senior Seminar (4)
A research seminar on special topics of interest to participating staff. Provides communications majors with a context for research done in cooperation with faculty. *Prerequisite: communications majors with senior standing.*

195. Undergraduate Teaching (4)
This course is offered to students with senior standing who wish to receive course credit for undergraduate instructional assistance. *Prerequisite: senior standing.*

196. Field Internships in Communication (4)
Individually arranged field studies designed to augment the student's academic training with practical experience outside the university. By special arrangement with a communications faculty member. *Prerequisites: consent of instructor and Communications Program approval.*

197. Fieldwork in Communications (4-16)
Supervised experience in developing and implementing projects requiring participation and involvement in a communications media operation in the community. Projects may cover television, newspapers, radio and similar areas. *Prerequisites: junior standing. Communications major, faculty sponsor's consent.*

198. Directed Group Study (2-4)
Directed group study under the direction of a member of the faculty in an area not covered by the present curriculum. *Prerequisites: upper-division standing and consent of instructor.*

199. Independent Study (4)
Individual guided reading and study in an area not covered by the present offerings. *Prerequisites: upper-division standing and consent of the instructor.*

Comparative Studies in Language, Society, and Culture

OFFICE: 7038 Humanities and Social Sciences Building

Graduate students in the humanities, social sciences, and arts in this program, and under guidance of an interdepartmental committee, are given the opportunity to design strongly interdisciplinary curricula, on the basis of which they write their dissertations. The program requires that the student be admitted and fundamentally trained in one discipline.

Application to the Program in Comparative Studies may be made during the third quarter of residency in the student's primary department. From the point of entrance into the program, the student's work is under the supervision of an interdisciplinary committee, which conducts the examination for Ph.D. candidacy and must approve all study and research plans, including the dissertation proposal, and forward them to the Graduate Council for final approval. The degree granted will indicate in its title the precise nature of the student's studies and research—e.g., Ph.D. in Comparative Literature and Ethnopoetics, in Linguistics and Literary Studies, in Economics and Chinese Studies, in Philosophy and History of Ideas. Inquiries should be directed at the earliest during the student's first year of residency at UC San Diego to the chairperson of the program directors.

Program Directrors:
George Anagnostopoulos, *Department of Philosophy*
Joseph Gusfield *(Chairman). Department of Sociology*
Roger Reynolds, *Department of Music*

Contemporary Issues

OFFICE: 2024 Humanities and Social Sciences Building
Lola Romanucci-Ross, Ph.D., *Director*

Lower Division

2. Freshman Seminars on Contemporary Issues (4)
Seminars for students of John Muir College directed by members of UC San Diego faculty and visiting professors, and treating in depth one contemporary issue or small group of related issues. (Consult the *Schedule of Classes* for possible offerings.) (F,W,S)

20. Wilderness and Contemporary Man (4)
The value and significance of the wilderness for contemporary man considered in terms of ecology, anthropology, literature, and recent history. Includes one mandatory field

trip lasting several days.

21. Contemporary Issues (4)
Designed as a directed "peer-group-leading" situation in which a discussion leader (who will have had a seminar working with the director and consulted with a faculty adviser) will work with a group of students on an issue of contemporary concern with the purpose of learning how to analyze, research, discuss, and prepare a presentation. Lectures by the director and guests to the group.

50. Information and Academic Libraries (2)
An introduction to research strategies directed at satisfying the information needs of the student using the academic library, with emphasis on the UC San Diego library system. Library techniques will be acquired through lectures and discussion, problem sets, and a term project. Students will learn to extend these techniques to independent research.

Upper Division

190. Culture/Personality and the Education Process (4)
Theories and societal assumptions about the teaching-learning process will be examined both from an interdisciplinary and cross-cultural perspective. Field observation techniques will be an adjunct to the lectures.

195. Discussion. Leading in Contemporary Issues (4)
Students (after preparation and training in Contemporary Issues Workshop 196) will lead groups of 10-20 students in discussion of contemporary concern. Students will meet with the director to plan and prepare for their discussions to be held weekly. Students will also consult with another faculty member specializing in his or her topic for further check on reading materials and course of discussion. *Prerequisites: Contemporary Issues 196, and consent of Director of Interdisciplinary Sequences.* L. Ross (spring quarter only)

196. Contemporary Issues Workshop (2)
A workshop for potential discussion leaders in the Contemporary Issues Program. Students will investigate topics for discussion and methods of presentation and inquiry. Participation in the workshop does not guarantee selection as discussion leader. (fall quarter only)

198. Group Studies in Comtemporary Issues (4)
Group studies, readings, projects and discussions in areas of contemporary concern. Course is set up so that students may work together as a group with a professor in an area of contemporary concern whereby the group emphasis would be more beneficial and constructive than individual special studies. *Prerequisite: consent of instructor.*

199. Special Studies in Contemporary Issues (2-4)
To be offered during fall, winter and spring quarters. Permission of the Provost of Muir College and the Director of Interdisciplinary Sequences is required.
The 199 course is to be made up of individual reading and projects in the areas of contemporary concern. Term paper and/or completed project is required. This class is given under special circumstances, e.g. student abroad.

Community Medicine 236. Medical Anthropology (3)
An analysis and synthesis of the growing body of anthropological concepts and investigations concerned with illness and curing events from primitive cultures to complex urban societies, and their relevance to medical practice. L. Ross (W)

Community Medicine 237. Contemporary Issues in Medicine (2)
Seminar concerned with research and analysis of problems of contemporary concern in the practice of medicine. Community and university resources will be used to explore such areas as forensic constraints, health cultures and subcultures, and medical ethics. L. Ross (S)

Cultural Traditions

OFFICE: 2024 Humanities and Social Sciences Building
Lola Romanucci-Ross, Ph.D., *Director*

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Each year several different three-course sequences are offered. The sequences are developed by a special committee of faculty and students in consultation with those who will teach them. The particular cultures to be studied vary from year to year, though some, such as the Afro-American, have attracted such widespread interest that they may be carried over from one year to the next. Other sequences have recently been offered in or are planned for such cultures as Asian, Latin American, Mediterranean, Black Studies, Chicano and Judaic Studies.

A descriptive list of the sequences offered for the coming academic year is available in time for the fall enrollment. Inquiries about the program or projected sequences should be addressed to the department.

Courses

1A-B-C. Cultural Traditions (4-4-4)
A 3-quarter sequence involving the study of the deep and surface structures of the life styles of one specific culture. The approach from several disciplines addresses itself to analyses of the social, political and economic institutions, the aesthetic structuring through formal artistic expression, and the cultural forms of everyday living. (F,W,S)

199. Special Studies in Cultural Traditions (2-4)
Individual reading and projects in the areas of cultural studies in which a particular culture will be viewed in reference to its history, arts, events, literature, music, societal structure. This course given under very special circumstances; e.g., a student is abroad at a time which interrupts his or her CT sequence but provides him or her a special opportunity in another culture or an upper-division student desiring to do such a study under the personal direction of the director. *Prerequisite: consent of director.* (F,W,S)

Drama

OFFICE: Building 407, Matthews Campus

Professors:
Eric Christmas, R.A.D.A
Floyd Gaffney, Ph.D.
Arthur Wagner, Ph.D. *(Chairman)*

Associate Professors:
Michael Addison, Ph.D.
Mary Corrigan, M.A.
Luther James

Assistant Professors:
Frantisek Deak, Ph.D.
Daniel Dryden, M.F.A
Deborah Dryden, M.F.A
Jorge Huerta, Ph.D.
Yen Lu Wong, M.A.

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The Undergraduate Program The curriculum in the Department of Drama has been developed to provide 1) an integrated and meaningful program for those students desiring a Drama major; 2) a sequence of courses to fulfill the fine arts and humanities requirements in Revelle, Muir, and Third Colleges; 3) a series of courses fulfilling Revelle and Fourth College minor requirements; and 4) elective courses for the general student desiring experiences in the dramatic arts.

The Drama Major The program for a drama major, the shape and scope of which is designed to provide a focus of humanistic learning as well as prepare those students who wish subsequently to pursue advanced study with the most solid artistic background possible within a liberal arts framework, consists of 18 courses, 12 of which are prescribed for all drama majors. The prescribed courses are:

Drama 41	Survey: Comedy
Drama 42	Survey: Tragedy
Drama 43	Survey: Epic
Drama 50 A,B	Elements of Prod.
Drama 130 A,B	Intermed. Acting
Drama 131	Art of Directing

plus three upper-division courses in literature/history/criticism to be taken from offerings in the Departments of Literature or Drama, and *one* upper-division technical theatre course.

The remaining six required upper-division courses may be taken as electives, at least three of which should be in an area of concentration (i.e., performance, production, literature/history). In addition, each student pursuing the drama major must participate in two major productions each year.

The Graduate Program—M.F.A. in Theatre Graduate study in drama at UC San Diego focuses upon intensive professional training in the areas of acting, directing, playwriting, and theatre criticism. A carefully limited number of students are admitted each year after audition and interview, chosen on the basis of demonstrated professional potential. The training program is highly integrated, with all graduate students participating in the acting process studio, the graduate theatre seminar, graduate thesis projects and theatre production. In addition, students in the graduate theatre program will be expected to engage in studies in areas related to their creative work, drawing from the humanities, the social sciences, and the arts. Students successfully completing the two-year course of study will be awarded the M.F.A. degree in Theatre.

Courses

NOTE: For changes in course offerings implemented after publication, inquire at the office of the Department of Drama.

Lower Division

11. Introduction to Theatre (4)
A broad exposure to the experience of theatre. The course involves active participation in and discussion of the multiple elements of living theatre—including examination of the creative contribution of the playwright, the designer, the director, the actor, and the critic.

12. Introduction to Performance (4)
Beginning experiences in the process of acting: observation, concentration, use of objects, use of self, actions and objectives, improvisations, theatre games, preparation of scenes.

13. Introduction to Production Styles (4)
A survey history of theatre production syles and techniques, focusing on elements of production (scenery, costume, lighting, and makeup) as they have evolved into 20th century theatre production methods. Lecture, discussion, films, and live theatre form the bulk of class content.

14. Indigenous Roots of Chicano Theatre (4)
This course traces the evolution of Chicano Theatre from its Meso-American and post-conquest roots through the Spanish religious theatre of the Southwest.

15. Introduction to Contemporary Chicano Theatre (4)
Continuing study of the history and growth of Chicano theatre, focusing on contemporary Chicano Teatros and playwrights.

16. Introduction to Black Drama (4)
This course is designed to provide students with a meaningful and accurate definition of the Black artist within the American theatre past, present and future. Some quarters will deal with a single Black artist—playwright, director, actor. May be repeated for credit. *Prerequisite: consent of instructor when repeated for credit.*

19. Introduction to Technical Theatre (4)
An introduction to the technical aspects of theatre production—scenery, lights, costume and makeup. Lectures, demonstrations, and workshops will serve to acquaint the student with contemporary production procedures and terminology. Students will be directly involved in technical work on UCSD Theatre productions throughout the term. *Prerequisite: consent of the instructor.*

Note: Drama 11 OR 16 taken together with Drama 12 AND 13 fulfills the Muir College fine arts requirement.

20. Modern Dance (4)
Exploration and analysis of dance as an expressive medium through the heightened development of physical,

sensory and rhythmic skills in workshop. Study of the history and theory of dance from primitive expression to contemporary trends in lecture.

41. Drama Survey: Comedy (4)
Comic theatre as a revelation of man's refusal to endure fools and charlatans, and as a celebration of the vital forces of life.

42. Drama Survey: Tragedy (4)
A close examination of plays that reveal man as overreacher, man as dreamer, man as self-destroyer and man as both victim and victor in the conflict with his cosmos.

43. Drama Survey: Epic (4)
The theatre as panorama, where broad-reaching human pageants reveal human collisions with man and society.

Note: Drama 41, 42, and 43 fulfill the humanities and fine arts requirements for Revelle, Muir, and Third College.

47. Shakespeare on Stage (4)
A close look at the performance of Shakespeare's plays in the theatre from the point of view of actor and director, illustrated with scenes presented live and on film.

48. History of Black Drama (4)
This course traces the development of black drama from its African beginnings through the plantation entertainments, minstrel shows and vaudeville, to the theatre forms of today.

50A-50B. Elements of Production (4)
A two-quarter sequence in the conception and realization of the scenic elements of production through lectures, outside reading, and practical laboratory experience. Investigation into the use and application of new materials for the theatre. Concentrated emphasis and practical experience in technical direction for productions. Introductory experiences in stage and lighting design. Production assignments in conjunction with academic work.

53. Elements of Costume (4)
An investigation of the basic procedures involved in costuming a theatrical production. Emphasis placed on the integration of theory and practice in costume. Exercises in use of color, line, form, and texture in fabric will be utilized in laboratory work.

Upper Division

101. Studies in Performance (0-2-4)
A course designed for the in-depth study of a particular play, its playwright, his times and milieu, culminating in a fully mounted presentation. *Prerequisite: consent of the instructor.*

122A-122B-122C. Studies in Dance Forms (4-4-4)
Examination of skills and techniques required by various dance forms from Afro-Cuban to Jazz. The course will emphasize compositional studies through the development and presentation of student works. *Prerequisite: consent of the instructor.*

126. Study of the Concepts of Effort/Shape (4)
Analysis of movement as a basic tool for the cross-cultural and interdisciplinary study of dance and non-verbal communication. *Prerequisite: consent of the instructor.*

130A-130B. Intermediate Acting (4-4)
The process of acting, its theory and practice, examined through exercises, text analysis, and the preparation of scenes from the modern repertoire. *Prerequisites: Drama 12 and/or consent of the instructor.*

131. The Art of Directing (4)
An examination of the director's artistic and interpretive responsibilities in the creation of theatrical productions. The course will culminate in student-directed scenes. *Prerequisites: Drama 130A and 130B, and/or consent of the instructor.*

138A-138B. Advanced Acting (4-4)
Further studies in the process of acting, theory, and practice, through concentrated work in character. Study and preparation of scenes from historical periods and the avant garde. *Prerequisites: Drama 130A and 130B and/or consent of the instructor.*

139. Advanced Directing (4)
Further examination of the director's artistic and interpretive responsibilities in the creation of theatrical productions dealing with plays from all periods. The course will culminate in student-directed one-act plays. *Prerequisites: Drama 131 and consent of the instructor.*

140. History of the Theatre (4)
Analytical and historical development of the theatre, its audience, and its playhouse as products of social, economic, literary, and aesthetic values. Playwrights, staging devices, and specific examples of dramatic literature will be discussed in detail. *Prerequisite: upper-division standing or consent of the instructor.*

141. Modern Black Drama (4)
From Lorraine Hansberry's *Raisin in the Sun* to the latest plays of Ed Bullins, black drama has mirrored and, in some instances, forecast the mood and aspirations of black people in America. The course examines the plays, playwrights and participants in contemporary black theatre, its concerns and influences.

142. Oral Interpretation of Dramatic Literature (4)
The development of stage speech and vocal expression through the interpretation of dramatic literature from black and/or white American writers. *Prerequisite: consent of the instructor.*

143. The Theatre of Fantasy, Myth, and Dream (4)
A seminar exploration of plays and production styles that employ the art of the theatre to enter imaginative worlds beyond our conscious experience. Plays as diverse as Euripides' *THE BACCHAE* and Genet's *THE BALCONY* will be considered. *Prerequisite: upper-division standing or consent of the instructor.*

144. Revolutionary Theatre of Leroi Jones (4)
A critical study of basic concepts in the Black Arts Movement as dramatized through the plays of Jones who, above other Black writers, has done more to articulate the relationship between art and politics. Protest, identity, achievement, revolt, freedom and nationhood are themes which will be examined. *Prerequisite: upper-division standing or consent of the instructor.*

145. Theatre & Society: Satire, Fact & Propaganda (4)
An examination of theatrical forms that probe social structure and human behavior, economics and class relationships, and politics and power. Ranging from the Greek to the modern theatre, plays will be studied in the context of the society for which they were written, and will include examples of social satire, social realism, documentary theatre, agit-prop drama, and didactic epic theatre. *Prerequisite: upper-division standing or consent of the instructor.*

146. Families & Friends: The Theatre of Private Life (4)
A close examination of theatre informed by a concern for the nature of human interaction and personal interplay, as revealed by conflict within families or small groups. *Prerequisite: upper-division standing or consent of the instructor.*

147. History of Avant-Garde Theatre (4)
The course will cover the tradition of the avant-garde theatre performances from the end of the 19th Century to the Second World War. It will deal with individual artists as well as movements which were the most representative and influential on the culture of the 20th Century. *Prerequisite: Drama 140 or consent of the instructor.*

148. Contemporary Avant-Garde Theatre (4)
The course is designed to inform students of various trends and aspects of contemporary theatre, and will connect the present experimentation in theatre with the tradition of the avant-garde theatre as well as project the possibilities for further development. *Prerequisites: Drama 147 or consent of the instructor.*

150. Basic Design (4)
Instruction and practice in design. Exercises and studies in line, mass, balance, texture and visual interest. Emphasis on balance, harmony, proportion, scale and color in theatrical design. Instruction in basic layout, design, and graphics. *Prerequisites: Drama 50A and 50B, and/or consent of the instructor.*

152. Theatrical Makeup (2)
This class is intended to be a workshop in the study of theatrical makeup and its application. Studies in age makeup, character makeup, animal makeup, prosthetic and hair piece application and construction, etc. should serve to acquaint the student with the basics needed to create the visual elements of an acting role.

153. History of Costume (4)
A study of historical dress in relation to its artistic, architectural, and music environment. Emphasis is placed on the evolution of period shapes and forms, as specifically revealed in costume. Discussions involve the relationship of period style and theatrical representation.

154. Costume Design (4)
Study in the theory and techniques of costume design. Weekly projects include costume renderings for specific plays. Much emphasis on dramatic interpretation (script and character analysis) as it applies to the art of design. Also work in rendering style, techniques and methods of presentation. *Prerequisites: Drama 53 or 153 or consent of the instructor.*

155. Scene Design (4)
The elements of stage design, styles of scenery and their application to various types of stage presentation and their relationship to various historical periods. Dicussion of various techniques in painting and renderings. Exercises and practical experience in scenic design, model making, elevations and scene painting for productions. *Prerequisites: consent of the instructor. (Drama 150 recommended.)*

156. Principles of Lighting and Lighting Design (4)
Introduction to stage lighting, including lighting equipment, their structure, purpose, and use, basic physics of light and the principles of light, electricity, color, and artistic control of light. Instruction in the reading, layout, and design of light plots, and the execution of these principles in production. *Prerequisite: consent of the instructor.*

160. The History of Musical Theatre (4)
A discussion of the historical development of the form known as "musical comedy" beginning with the works of Gilbert and Sullivan through contemporary examples of Bernstein and Sondheim. An analysis of words and music and the tracing of the "form" as a specific genre of theatrical entertainment. Such composers and lyricists as Lehar, Kern, Berlin, Gershwin, Rodgers and Hammerstein and Lerner and Lowe will be discussed and analyzed.

165 A,B. Development of Chicano Teatro (4)
A. Exploration of the theatrical development of the teatro form and experimentation with various modes of realizing the acting styles, scenic modes, and production techniques of teatro.

B. A teatro production will be molded through intensive rehearsal, culminating in performances on the campus and in the community. *Prerequisites: Drama 15, consent of instructor, working knowledge of Spanish, and basic acting instruction.*

190. Masters of the Theatre (4)
This seminar study will focus on an artist of seminal importance to the development of the theatre. Intensive consideration will be given to theory and practice of the artist under consideration, with emphasis on theatrical realizations that can be reconstructed by integrative research, including biography, major theoretical texts, production records, correspondence, and critical studies. The goal is a newly rounded understanding of a complex theatre artist.

191. Theory of Theatre (4)
The basic objectives of this course are: 1) to survey the most important theories of theatre from Aristotle to present-day structuralism and to establish theoretical terminology; 2) to learn to analyze a theatre production; and 3) to learn to use theoretical material as a part of the creative process for actor, playwright, and director.

195. Instructional Assistance (2 or 4)
Assist with instruction in undergraduate Drama courses. *Prerequisite: consent of the instructor.*

197. Field Studies (4)
Course designed for students to expand their academic training through experience outside the University. *Prerequisite: consent of the instructor.*

198. Directed Group Studies (0-2-4)
Group studies, readings, projects and discussions in drama history, problems of production and performance, and similarly appropriate topics. *Prerequisite: consent of the instructor.*

199. Special Projects in Drama (0-2-4)
Qualified students will pursue special projects in reading drama, studying history, or doing research for a production. *Prerequisite: consent of the instructor.*

Graduate

210. Theatre Process Studio (3)
A systematic exploration of the dynamics of the process of acting, employing intensive experiential examination of various approaches, methodologies, genres, and periods to give form and substance to the actor's creative work.

211. Graduate Theatre Seminar (1-3)
A weekly seminar in which the vital inter-relationships of dramatic theory, text, and performance are probed. In addition to examination of aesthetic and critical formulations, literary analyses, historical models, and cross-cultural patterns of performance theory, the seminar will strongly relate to the work undertaken in the Theatre Process Studio and in Theatre Production.

212. Theatre Production (1-3)
Ranging from staged readings of new plays, documentary drama, or synthetically created dramatic texts to totally integrated productions of full-length plays (faculty or student directed), and incorporating the creative contribution of actors, directors, playwrights, and critics, this intensive involvement in multiple forms of theatre will serve as the necessary creative laboratory for the M.F.A. program.

213. Movement/Voice for the Theatre (2)
Continuing workshop training designed to develop and stretch the performer's external creative instruments through extensive engagement with dance, stage movement, mime, tumbling, stage combat, circus, plastiques, and voice production and articulation, all focused toward fusion with textual and theatrical necessities in performance.

220. Thesis Project (2-8)
Specific projects in theatre individually determined to meet the developing needs, interests, and abilities of M.F.A. candidates.

298. Special Projects (0-4)
Advanced seminar and research projects in theatre.

299. Thesis Research (0-4)
Thesis research for MFA degree.

500. Apprentice Teaching (0-2)
A course in which teaching assistants are aided in learning proper teaching methods by means of supervision of their work by faculty; handling discussions, preparation and grading examinations and other written exercises. All MFA students are required to teach at least one quarter at .25 each year.

Earth Sciences

OFFICE: Provost, Revelle College

* * *

Developments in the discipline of the earth sciences suggest that the most effective means for undergraduates to enter this fascinating field is for the University to enrich its course work for majors in the Departments of Chemistry, Mathematics, and Physics with contemporary and exciting courses in the earth sciences. These enrichment courses are taught by faculty members of the Scripps Institution of Oceanography.

The program in Revelle College is one which is based on the premise that a thorough grounding in one of the above disciplines is necessary. Thus an entering student will for the first two years take the Revelle core curriculum and then elect to enter the Department of Chemistry, Mathematics, or Physics. At the beginning of the junior year, a student will select courses in consultation with the earth sciences advisers in the Geological Sciences Group in the Scripps Institution of Oceanography and his or her own department. In most instances the student may be able to subsitute earth sciences courses for major requirements or restricted electives.

The degree will be granted by the major department and will indicate that the student's education has been enriched in the earth sciences (e.g., B.A. in Chemistry with specialization in Earth Sciences).

A student who plans to graduate with a specialization in earth sciences must complete ES 101, 102, 103, 120, and SIO 256A and two additional upper-division courses as a minimum course requirement. Additional courses for the earth sciences specialization will be selected with the aid of the earth sciences advisers. Because of course scheduling and prerequisites the normal sequence of courses begins with the series ES 101, 102, 103, 120.

This interdisciplinary program will provide the student with the information to make the choice of a graduate major with the freedom that an undergraduate major in a basic science provides. This program will not impede progress in such a basic science and will provide a concrete example of such sciences applied to Earth problems.

Courses

Lower Division

Lower division courses not intended as substitutes for E.S. 101.

1. The Oceans (4)
Presents modern ideas and descriptions in the physical, chemical, biological and geological aspects of oceanography, and considers the interactions between these aspects. Intended for students interested in the oceans, but who do not necessarily wish to become professional scientists. (Previously Interdisciplinary 1). Three hours lecture, one hour discussion. *No prerequisites.* Mr. Berger and SIO Staff (F)

2. Introduction to the Earth. The Properties, Interactions and History of the Solid Earth, Ocean and Air (4)
Continental drift and plate tectonics. Natural hazards of earthquakes, volcanoes, floods and storms, and their prediction and moderation. Fuels, metals and water as natural resources and limits to growth. Three lectures, occasional field trips. *No prerequisites.*

Upper Division

Prerequisite for all upper-division Earth Science courses: one year of the Revelle Natural Science Sequence or equivalent and one year of Mathematics.

101. Introductory Geology (4)
The origin and evolution of the Earth, especially its crust, and the evolution of life as indicated by the fossil record. Emphasis is on the nature of rocks and minerals, their origin, reconsitituion, and decay; the evolution of continents, ocean basins, and mountain belts; processes of vulcanism; and the work of wind, water, and glaciers in modifying the Earth's surface, with the aim of creating an awareness in the student of the geological environment in which we live. Three lectures, two laboratory periods, occasional field trips. SIO Staff (F)

102. Introductory Geochemistry (4)
The chemistry of the Earth and the solar system, and the applications of physical chemistry and nuclear physics to the study of the origin and geological history of the Earth. Cosmic and terrestrial abundances of elements; nucleosynthesis; origin of the Earth; mineralogy and chemistry of the Earth's crust, mantle, and core; geochronology and the geological time-scale; chemistry of the atmosphere and the oceans. Three lectures, one discussion period. *Prerequisite: Earth Science 101.* Mr. Bada and Mr. Macdougall (S)

103. Introductory Geophysics (4)
Selected geophysical subjects are treated in some depth. The emphasis is on topics that involve the entire planet Earth; the propagation of elastic waves through the Earth, oceans and atmosphere; gravity, isostasy and the shape of

the Earth; oceanic, atmospheric and bodily tides; mountains, earthquakes, and the movements of continents. Three lectures, one discussion period. Mr. Frazier (W)

120. Mineralogy (4)
Lectures and laboratory work on symmetry, morphology, goniometry, crystal structure, elementary X-ray crystallography, physical and chemical properties of minerals and recognition of common rock-forming minerals. Use of the petrographic microscope in the study of rock-forming minerals. Two three-hour periods of laboratory and lecture. *Prerequisite: Earth Sciences 101, and 102 or concurrent registration in 102.* Ms. Kastner (S)

199. Independent Study for Undergraduates (4)
Independent reading or research on a problem by special arrangement with a faculty member. (F,W,S)

Note: Also see *Courses, Curricula, and Programs of Instruction: Scripps Institution of Oceanography.*

Economics

OFFICE: 3419 Humanities-Library Building

Professors:
Richard Attiyeh, Ph.D.
John Conlisk, Ph.D.
Clive W. J. Granger, Ph.D.
John W. Hooper, Ph.D.
Daniel Orr, Ph.D.
R. Robert Russell, Ph.D.

Associate Professors:
Donald V. T. Bear, Ph.D.
Robert F. Engle, Ph.D.
Walter P. Heller, Ph.D.
Ramachandra Ramanathan, Ph.D.
Richard Schmalensee, Ph.D.
Dennis Smallwood, Ph.D.

Assistant Professors:
Vincent Crawford, Ph.D.
Richard Emmerson, Ph.D.
Judith Mann, Ph.D.
Wolfhard Ramm, Ph.D.

* * *

The Economics Major Program The undergraduate major in economics is designed to provide a broad understanding of resource allocation and income determination mechanisms. Both the development of the tools of economic analysis and their application to contemporary problems are stressed. This program serves to prepare students for graduate work in economics, and in such related areas as business, law, and public administration. It also provides useful training for students who plan to enter careers in business or public administration upon graduation.

Each student majoring in economics will be required to take either Economics 1A-B-C, or 2A-B-C or 3A-B-1C. Mathematics 1A-B-C or 2A-B-C are required for the major and should be taken if possible before beginning upper-division course work in economics. In addition to the lower-division requirements at least 12 upper-division courses in economics must be taken, including Economics 100A, 100B, 110A, 110B, 120A, and 120B. These courses introduce the major to basic tools and concepts which have applicability to a wide variety of real-world problems. Three or fewer economic history courses offered by the Department of History may be used in meeting the upper-division course requirement. A 2.0 (C) grade-point average in upper-division economics courses is a degree requirement for students majoring in economics.

The economics major is encouraged to discuss elective courses and choice of minor with the undergraduate adviser for economics. Depending on individual interests and career plans, courses in related fields such as political science, history, and mathematics may be appropriate. Graduate work in economics requires a strong mathematics background, which should include Mathematics 2D and 2E and, depending on the student's interests, might include certain upper-division mathematics courses.

In planning an upper-division program, the prospective economics major should consult with the undergraduate adviser for economics during the year in which the student takes the Economics 1, 2 or 3 sequence. It is recommended that majors take the Economics 100, 110, and 120 sequences by the end of their junior year.

The Management Science Major Program This program is designed to give the student an understanding of the quantitative techniques that have been designed for managers concerned with making the best use of scare resources, and of their applications in both private and public enterprise. While the student will gain some familiarity with the traditional functional fields of business management, this program is more tightly focused and more quantitative than the traditional business administration major.

Students with a B.A. in management science will find themselves well prepared for further study in business administration or management science. With appropriate choice of electives, individual programs can also provide excellent preparation for graduate work in economics or public

administration. Students interested in law school will normally choose the traditional economics program, though it should be noted that law schools tend to look favorably on students who have had some experience with the precise reasoning required by quantitatively-oriented courses. Graduates of this program who elect to seek employment upon graduation will have the advantage of having attained an understanding of the types of problems faced by practicing managers and of the modern techniques available for analyzing them. Consequently, they should face better employment opportunities than graduates of many other liberal arts majors.

Each student majoring in management science will be required to take Economics 2A-B-C, since a firm understanding of the basic principles of economics is essential. Mathematics 2A-B-C-E is also required, as it is also necessary that the student acquire the mathematical maturity needed to understand the quantitative techniques of management science. APIS 61 is also required since many applications of management science techniques involve the use of a computer.

At the upper division level, 15 courses are required including Economics 170A-B, Economics 171A-B-C, Economics 172A-B-C and Economics 173. The 170 sequence provides a deeper understanding of the economics of the individual enterprise than is given in lower-division economics and analyzes the nature and interdependence of managerial resource allocation decisions. Economics 171A-B-C presents techniques for analysis and decision-making under conditions of uncertainty, and Economics 172A-B-C provides a general survey of optimization techniques employed by management scientists. Economics 173 treats the structure and language of accounting systems and their use in managerial decision-making.

Of the six management science electives, at least two must be chosen from among Economics 175 — Financial Management, 176 — Marketing Management, 177 — Operations Management, and 178 — Business Forecasting. Each of these courses focuses on an important set of managerial problems. The remaining electives must be selected from a list available from the management science adviser. *Tentatively,* the list of allowable electives is as follows:

Economics	105	Psychology	141
Economics	101A-B		
Economics	111	Sociology	111
Economics	113	Mathematics	102
Economics	118	Mathematics	1140A-B-C
Economics	150	Mathematics	171A-B
Economics	151	Mathematics	180C
Economics	155	Mathematics	181B
Economics	174		
Economics	179		
		APIS	151A-B
AMES	141A-B-C	APIS	161A-B-C
AMES	146A-B-C	APIS	170
AMES	162A-B-C	APIS	186

The student should discuss his or her elective program with the management science adviser to be sure he or she is aware of any changes that have been made in this list.

The following schedule is recommended:

FALL	WINTER	SPRING
Freshman Year		
Mathematics 2A	Mathematics 2B	Mathematics 2C
Sophomore Year		
Economics 2A	Economics 2B	Economics 2C
APIS 61	Mathematics 2E	
Junior Year		
Economics 170A	Economics 170B	Economics 173
Economics 171A	Economics 171B	Economics 171C
Economics 172A	Economics 172B	Economics 172C
Senior Year		
Elective	Elective	Elective
Elective	Elective	Elective

A few of the upper division courses required for the management science major will not be offered until 1977-78. Those students wishing to major in management science who will have completed the lower division requirements prior to 1976-77 should see the undergraduate adviser for management science to discuss schedules.

The Noncontiguous Minor (Revelle College) Students majoring in mathematics, humanities, or the sciences who elect economics as a noncontiguous minor field have two options, depending on the use to which they put Economics 1A-B-C, 2A-B-C, or 3A-B-1C:

1. if one of the sequences is used to satisfy the Revelle College social-science requirement, the econmoics minor must include six upper-division courses;
2. otherwise, the minor must include either elementary sequence, plus any three upper-division courses.

Students who wish to pursue a noncontiguous minor involving the Department of Economics should consult with the undergraduate adviser for economics as early as possible.

The Graduate Program The department offers the M.A., C. Phil. and Ph.D. degrees. However, a student must be admitted to the Ph.D. program in order to be eligible for an M.A. or C. Phil. To receive a Ph.D., a student must pass qualifying examinations, complete an empirical project, and prepare an acceptable dissertation. The qualifying examinations consist of four written parts and an oral part. The four written parts cover microeconomics, macroeconomics, econometrics, and an elective special field. The oral part covers all areas.

There are no formal course requirements. However, to prepare for the micro, macro and econometrics qualifiers, nearly all students take the complete 200, 210 and 220 course sequences. Elective lecture courses and individualized reading tutorials prepare students for special field qualifiers. Foreign-language proficiency is required only when it is crucial to a student's dissertation research.

Ideally, a student will have finished all qualifying examinations by the end of the second year, and will have a nearly completed dissertation by the end of the third year. In fact, it usually takes longer, though students are discouraged from remaining in residence more than four years.

Prior to entering the program, a student is required to have a knowledge of economics at least through an introductory level, and to have at least the equivalent of a one-year course in calculus. The program emphasizes proficiency in the mathematical methods of modern economic analysis. Some of these methods are taught in the first quarters of the micro, macro, and econometrics course sequences.

A detailed description of the Ph.D. program is available by writing the director of graduate studies, care of the Department of Economics. Residence and other campus-wide regulations are described in the graduate studies section of this catalog.

Courses

Lower Division

1A-B-C. Elements of Economics (4-4-4)
The objectives of this survey course are to prepare students for a major or minor in economics, and to give those who will not specialize in economics an understanding of how the economy functions. Elementary theories of resource allocation and income determination are used to analyze policy issues of major significance.

2A-B-C. Introduction to Economics Analysis (4-4-4)
The content of this course approximates that of the 1 sequence, but analytical methods are stressed. *Prerequisite. Math 1C.*

3A-B. Principles of Economics (4-4)
The content of this course approximates that of Economics 1A-B, except there is a special emphasis on policy issues relating to urban and development economics.

Note: Normally the timing of the sequences will be as follows: Fall 1B, 2A, 3A. Winter 1A, 2B, 3B. Spring 1C, 2C. The A courses are not required for the B courses, but both the A and B courses are required for the C courses. Students with scheduling problems may combine A, B and C courses from different sequences.

Upper Division

Note: All upper division courses have as prerequisites one of the lower division sequences: 1A-B-C, 2A-B-C or 3A-B-C or a combination of A, B, and C courses from different lower division sequences. Additional prerequisites are listed under the course offerings.

100A-B. Microeconomics (4-4)
Household and firm behavior as the foundations of demand and supply. Market structure and performance, income distribution, and welfare economics. *Prerequisites: Economics 1C or 2C, and Mathematics 1C.*

101. International Trade (4)
Analysis of the causes and patterns of international trade and investment, of the scope for increasing national welfare through foreign trade and investment, and of the policies for realizing those gains and for distributing them internationally. *Prerequisites: Economics 1C or 2C.*

103. International Monetary Relations (4)
Balance of payments, international capital movements, and foreign exchange examined in light of current theories, policies, and problems. *Prerequisite: Economics 101.*

105. Industry Organization and Public Policy (4)
Study of the structure and performance of American industry. Dimensions and determinants of market structure and performance, empirical evidence. Anti-trust laws, regulation of industry and other aspects of public policy toward industry. *Prerequisites: Economics 100B or 170B.*

110A-B. Macroeconomics (4-4)
The theory of national income determination as the basis for explaining fluctuations in income, employment, and the price level. Use of monetary and fiscal policy to stabilize the economy. *Prerequisites: Economics 1C or 2C and Mathematics 1C.*

111. Financial Institutions and Monetary Policy (4)
A study of the financial structure of the United States economy including analysis of bank behavior and the techniques of central bank monetary control. *Prerequisites: Economics 110B.*

113. Mathematical Economics (4)
Mathematical concepts and techniques used in advanced economic analysis; applications to selected aspects of economic theory. *Prerequisites: Economics 100B or 170B, and Mathematics 2C.*

115A-B. The Evolution of Economic Theory and Policy (4-4)
An examination of the evolution of economic theory and policy in Western Europe and Great Britain during the eighteenth and nineteenth centuries. While attention is given to the works of such individuals as A. Smith, D. Ricardo, T. R. Malthus, J. S. Mill, K. Marx, J. E. Cairnes and others, the primary emphasis is on the development of economic analysis as a response to the economic prob-

lems of the times. *Prerequisites: Economics 1C or 2C.* (Not to be offered 1976-77)

116. Economic Development (4)
Analysis of current economic problems of less-developed areas and conditions for increasing their income, employment and welfare; case studies of specific less-developed countries. *Prerequisites: Economics 1C or 2C.*

117. Economic Growth: Problems and Prospects (4)
Problems of economic growth in modern developed economies, with emphasis on population growth, environmental degradation, and resource conservation. *Prerequisites: Economics 110B.*

118. Law and Economics (4)
Analysis of the economic effects of the structure of the law with particular emphasis on the law of liability, including liability for nuisances, zoning law, products liability, and accident liability. *Prerequisites: Economics 1C or 2C.*

120A-B-C. Statistical Methods in Economics (4-4-4)
Statistical methods of special application to economic problems, and statistical problems commonly encountered in confronting economic models with non-experimental data. Correlation and regression analysis with applications to time-series and cross-section data: estimation of simultaneous equations models. *Prerequisites: Economics 1C or 2C and Mathematics 1C.*

130A-B-C. Public Policy (4-4-4)
The application of macroeconomic and microeconomic theory to issues of public policy and the contributions of related disciplines, e.g., political science, sociology, education, history to the solution of these problems. (The student will be required to study one problem intensively.) *Prerequisites: Economics 1C or 2C.*

134. Regional Economics (4)
Location theory; agglomeration economics and diseconomies; transportation; migration; regional modelling. *Prerequisites: Economics 100B or 170B and 120B or 171B.*

135. Urban Economic Problems (4)
Analysis of causes of congestion, pollution, housing discrimination and segregation, crime, etc., and of public policies to deal with these problems. *Prerequisites: Economics 1C or 2C.*

136. Human Resources (4)
Theoretical and empirical analysis of public and private investment in people, emphasizing the contribution to productivity of education. *Prerequisites: Economics 1C or 2C.*

137. Inequality and Poverty (4)
Analysis of inequality in the distribution of income, education, and wealth; causes of poverty and public policies to combat it. *Prerequisites: Economics 1C or 2C and 120A or 171A.*

138. Economics of Health (4)
The application of economic analysis to health field; the role of health in income, production, and poverty; supply, demand and price determination in the public and private health sectors. *Prerequisites: Economics 1C or 2C.*

139. Labor Economics (4)
A study of labor markets including such topics as collective bargaining, evolution and impact of unions, labor force participation, labor mobility, the effects of technological change on unemployment. The implications for public policy will be given extended consideration. *Prerequisites: Economics 1C or 2C.*

150. Economics of the Public Sector: Taxation (4)
An analysis of the effects of government taxation on resource allocation and the distribution of income. The efficiency and equity of alternative forms of taxation. Optimal tax policies. Income redistribution through the fiscal process. *Prerequisites: Economics 1C or 2C.*

151. Economics of the Public Sector: Expenditures (4)
An analysis of the effects of government expenditure policies on resource allocation and the distribution of income. Political and economic determinants of optimal public expenditure and investment policies. An introduction to cost-benefit analysis. *Prerequisites: Economics 100B.*

155. Economics of Voting and Public Choice (4)
An economic analysis of social decision-making, including such topics as the desirable scope and size of the public sector, the efficiency of collective decision-making procedures, voting theory and collective vs. market resource allocation. *Prerequisites: Economics 1C or 2C.*

160. Economic Planning (4)
A development and evaluation of techniques for indicative planning (France) and central direction of the economy (Eastern Europe). *Prerequisite: Economics 1C or 2C.*

161. Comparative Economic Systems (4)
Capitalism and socialism, studied as ideal models and in actual performance. *Prerequisites: Economics 1C or 2C.*

165. Economic Methodology and Ideology (4)
The individualistic basis of modern Western welfare economics. Alternative tenets (Marxist, radical, Maoist, Fabian, technocratic) and their implications. The roles of scientific method and ethical judgments in economic analysis. Current research and thinking in political economy. *Prerequisites: Economics 1C or 2C.*

170A-B. Managerial Economics (4-4)
Microeconomic theory, with special reference to costs and production and the theory of the firm; some applications. Demand analysis and forecasting, costs and production, business conditions analysis, price and other marketing variables, financial analysis. Not open to students who have taken Economics 100A-B. *Prerequisites: Economics 2C and Math 2C.*

171A-B-C. Probabilistic Systems Analysis (4-4-4)
Basic probability theory; data handling; common distributions and stochastic processes; expectation, moments, and the central limit theorem. Estimators and their properties, hypothesis testing, relations among random variables, regression analysis. Unified approach to decision-making under uncertainty, Bayesian techniques, prior and posterior distributions, value of information and preposterior analysis. 171A-B not open to students who have taken 120A-B. *Prerequisites: Mathematics 2C, Mathematics 2E and APIS 61.* (171A-B will not be offered in 1976-77. Management Science majors should take Economics 120A-B.)

172A-B-C. Introduction to Operations Research (4-4-4)
Deterministic and stochastic optimization techniques. Linear programming, sensitivity, duality; integer programming; network models and related algorithms. Kuhn-Tucker theory, non-linear programming algorithms. Dynamic programming in deterministic and stochastic contexts; queueing and inventory systems and related problems. *Prerequisites: Math 2E, Economics 2C. Economics 171B or 120B is required for 172C. APIS 61 is strongly recommended.*

173. Managerial Accounting (4)
The structure of accounting systems, their underlying assumptions, and their use by management. Basic techniques for recording, summarizing and evaluating organizational activity; the income statement and balance sheet. Cost accounting and use of accounting for internal control and decision-making. *Prerequisite: Economics 1C or 2C.*

174. Advanced Topics in Management Science (4)
Content to vary from year to year; course will focus on a particular set of optimization techniques or managerial decision problems.

175. Financial Management (4)
Analysis and management of the flow of funds through an enterprise; functions and operations of money and capital markets, management of short-term assets and liabilities, raising long-term funds, selection of investment projects, and determination of the cost of capital. *Prerequisite: Economics 120A or 171A.*

176. Marketing Management (4)
The role of marketing in the economy and the functioning of markets. Operational models of buyer behavior, and techniques for demand analysis and sales forecasting. Managerial decisions relating to the marketing mix; promotion, product selection, pricing, and distribution. *Prerequisite: Economics 173.*

177. Operations Management (4)
Principles and techniques relevant to problems of effective resource use faced by operating managers. Topics include project planning and control, facility design and scheduling, quality control, maintenance policies and the function and management of inventories. *Prerequisite: Economics 173.*

178. Management Science: Business Forecasting (4)
An examination and evaluation of quantitative forecasting techniques in business and economics. These techniques are applied to demand and price changes, introduction of new products, inventory levels, demographic projections and other areas in business and economics. *Prerequisites: Economics 120B or 171B.*

179. Management in the Public Sector (4)
Problems in evaluating the consequences of government actions; applications of cost-benefit and cost-effectiveness analysis, budgeting systems. Problems involved in the management of non-profit enterprises, approaches to their solution. *Prerequisite: Economics 170B or 100B.*

190A-B-C. Research Seminar (4-4-4)
Each quarter's seminar will focus on a particular contemporary economic issue. Each student will do independent work on some aspect of that issue. Students will generally be required to present their findings orally and in writing. *Prerequisites: Economics 100B, 110B, and 120B.*

195A-B-C. Introduction to Teaching Economics (4-4-4)
Introduction to teaching economics. Each student will be responsible for a class section in one of the lower-division economics courses. Limited to senior economics majors with at least a 3.25 GPA in upper-division economics work. *Prerequisite: consent of undergraduate adviser for Economics.*

197. Field Studies (4)
Individually arranged field studies designed to augment the student's academic training with practical experience outside the University. By special arrangement with an Economics Department faculty member. *Prerequisites: consent of instructor and departmental approval.*

199. Independent Study (2 or 4)
Independent reading or research under the direction of and by special arrangement with an Economics Department faculty member. *Prerequisites: consent of instructor and departmental approval.*

Graduate

200A-B-C-D-E-F. Microeconomics (4-4-4-4-4-4)
Background mathematical techniques, consumer theory, theory of the firm, theory of markets, general equilibrium and welfare theory, and empirical applications involving both single and simultaneous equations methods.

201A-B. Advanced Economic Theory (4-4)
An intensive examination of the literature on selected topics of current importance in economic theory. *Prerequisite: Economics 200F and 210E, or consent of instructor.*

210A-B-C-D-E. Macroeconomics (4-4-4-4-4)
Neo-classical and Keynesian theories of employment, income, interest rate, price level, and other aggregate variables; macroeconomic policy; growth theory; empirical applications to single aggregate functions and to complete macroeconomic models.

211A-B. Fiscal and Monetary Theory and Policy (4-4)
Macroeconomic models and empirical studies emphasizing the monetary and government sectors, the interaction of fiscal and monetary policies, and their relative impact on aggregate output and the price level; microeconomic foundations of aggregate asset demand and supply; regulation of financial institutions. *Prerequisite: Economics 210E or consent of instructor.*

220A-B-C-D-E. Econometrics (4-4-4-4-4)
The construction and application of stochastic models in economics. This includes both single and simultaneous equations models. Matrix algebra and basic statistics are covered.

221A-B. Advanced Econometrics (4-4)
Extensions of the theory of the linear model; Bayesian analysis; principal components, discriminant analysis; spectral analysis of time series; insufficient data problems and the use of generalized inverse matrices; experimental design; formulation and evaluation of economic models, including the interpretation and testing of causality. *Prerequisite: Economics 220E, or consent of instructor.*

230A-B. Public Economics (4-4)
Impact of the government sector via expenditure and tax policies on resource allocation and income distribution; public goods; theory and applications of benefit-cost analysis; theory of social choice; efficiency and distributional effects of tax policies. *Prerequisite: consent of instructor.*

232A-B. International Trade (4-4)
Theory of international trade, finance and monetary relations. Growth, disturbances, capital movements and balance of payments adjustment. International economic policy and welfare. *Prerequisite: consent of instructor.*

234A-B. Industrial Organization (4-4)
Non-competitive market structures and their effects on firm behavior and resource allocation. Measurement of monopoly power and its change over time. Antitrust policy. *Prerequisite: Economics 200F, or consent of instructor.*

236A-B. Human Resource Economics (4-4)
Human capital formation and education; income distribution and poverty; the economics of health, the medical sector, and the role of insurance. *Prerequisite; consent of instructor.*

267. Special Topics in Economics (4)
A lecture course at an advanced level on a special topic (or set of related topics) in economics. May be repeated for credit. *Prerequisites: Economics 200F, 210E and 220E, or consent of instructor.*

269. Seminar in Economics (4)
A program of regular reports by graduate students on their own research, usually dissertation research. Faculty

and visitors are encouraged to participate, both to act as critics and to report on their research. May be repeated for credit. (Satisfactory/Unsatisfactory grades permitted.)

297. Independent Study (1-6)
(Satisfactory/Unsatisfactory grades permitted.)

299. Research in Economics for Dissertation (1-12)
(Satisfactory/Unsatisfactory grades permitted.)

500A-B-C. Teaching Methods in Economics (4-4-4)
The study and development of effective pedagogical materials and techniques in economics. Students who hold appointments as teaching assistants must enroll in this course, but it is open to other students as well. (Satisfactory/Unsatisfactory grades only.)

Education Abroad Program

Administered for the University of California by the Santa Barbara campus, the Education Abroad Program is now entering its fifteenth year of operation. Study Centers have been established in Brazil, Egypt, France, Germany, Ghana, Hong Kong, Israel, Italy, Japan, Kenya, Norway, Spain, Sweden, and the United Kingdom and Ireland. A special program for students interested in film has been established in Paris. New programs also have been opened recently in Barcelona, Leningrad and in a combination of Pau and Paris. All programs are for a single academic year, except for Hong Kong, where certain qualified students enter the program as seniors and remain for one additional year of graduate study.

Purpose The Education Abroad Program was originally designed to give mature, highly motivated, and academically superior upper division students from all UC campuses rich experience in a new cultural milieu as a part of their normal undergraduate program. Somewhat later, a graduate dimension was added which has now made a significant contributrion in assisting a small number of selected students in their programs toward advanced degrees.

The program stimulates the intellectual development of the participants, broadening the general education of all and giving a new depth to the particular academic interests of some. Most gain fluency in a language other than their own, and all grow in their ability to engage in independent study. Perhaps most valuable of all are increased self-understanding, clarified life purposes, and a broadening and deepening of personal values.

One of the most distinctive features of the program is the emphasis placed on the full integration of the UC students into the life of the host university. For the most part, UC students abroad live as do the students of the host university, attend the same classes, take courses from the same professors, and take part in local social and cultural activities. As an aid in facilitating UC student adjustment to unfamiliar educational practices, tutorials are included within the curriculum of most of the Study Centers, supplementing the regular academic offerings of the host university.

The Academic Program The academic program of each student includes: (1) a preparatory course in the language of the country (except for the programs in Egypt, Hong Kong, Africa and United Kingdom and Ireland); (2) a full academic year of credit courses; and (3) a wide-ranging opportunity to audit courses, either in the student's special field of interest or in new fields.

In order to assist students to adjust to different academic requirements of the host university and to provide a link to American university practices, many courses taken by UC students are supplemented by tutorials. The tutorials are conducted by graduate students or junior staff of the host university, who help UC students to resolve language difficulties, provide cultural background presupposed by the lectures, give opportunities for questioning and discussion, and supplement the lectures by reading assignments, papers and evaluation of progress.

Each student is concurrently enrolled on the home campus of the University of Califormia and at the host university. Full academic credit is received for courses satisfactorily completed. The selection of courses is such that, by advance planning and wise choice, most students can make normal progress toward graduation. Some students fulfill some general education requirements.

Academic Planning and Advising A participant who wishes to make normal progress toward graduation should counsel *in advance* with a departmental adviser and the provost of the college in order to ascertain how participation will affect his or her academic program. Descriptions of individual courses presently approved for UC credit may be found in the *EAP Advisers' Manual* in the International Center office, the four Provosts' Offices and the Central Library on campus. Since offerings at the host universities may change rapidly, the listings in the *EAP Advisers' Manual* repre-

sent some of the courses UC students have taken in the past. Many of the same or similar courses will be available in future years, but students should plan programs that are sufficiently flexible to allow them to take alternate courses. Each year new courses are added to the center's approved offerings as needed by UC students attending and as available at the host university. Although courses approved by the University of California carry full credit, each department retains the right to determine the extent to which it will accept units so earned in the fulfillment of the requirements for its own majors.

Normally, students apply for admission to the program during the fall or winter quarters of their sophomore year. However, a limited number of students are accepted each year to participate as seniors and as graduate students. Such students should make inquiries of the provosts of their colleges as well as with academic advisers in their major departments in order to learn in what ways participation will affect their status.

In order to facilitate the academic work of the students, University of California professors serve as directors and associate directors of the Study Centers. They work with their counterparts in the host university in developing the academic program and advise students on any problem pertaining to their work. In addition, the directors are responsible for all aspects of student welfare and conduct.

Selection Participants are chosen on each campus by a faculty committee appointed by the chancellor. Basic requirements are: upper division standing (84 units) in the University at time of participation, a 3.0 GPA at the time of application, and two years of university-level work in the language of the country with a B average (or the equivalent thereof), registration in two upper division language courses (Lit 10, Lit 11, or higher) during 2 quarters of the sophomore year, preferably the winter and spring quarters. In addition to academic criteria for selection, the faculty committee attaches much importance to indications of the student's seriousness of purpose, maturity, and the capacity to adapt to the experience of study abroad. As part of the screening process, students are required to consult with their advisers and to obtain clearance from the University's Student Health Service.

With the exception of students from California junior colleges, transfer students are eligible if they have completed at least one quarter in the University of California at the time of selection. California junior college students may apply for the Education Abroad Program prior to their active enrollment in a campus of the University of California, but only under certain conditions. Such students, considered during their sophomore year, must compete with UC students on the campus on which application for admission is being processed. If selected for EAP, a junior college transfer student must have been clearly admitted to UC prior to departure for the program.

Student Conduct and Parental Approval It is anticipated that the students selected for the Education Abroad Program will be of high caliber, committed to profiting from both the intellectual and social aspects of the experience. Since they will be guests in another country and another university, their conduct will reflect on both the University of California and the United States. Students participating in the Education Abroad Program are responsible to the director of the Center, to the director of the EAP, to the faculty of the University of California, and to the faculty members of the host university who are related to the program. The director of the EAP reserves the right to terminate the participation in the program of any student whose conduct (in either academic or non-academic matters), after careful consideration and full review, is judged to be contrary to the standards and regulations of the host university.

Participation in the program by minor students must be approved by their parents or guardians. In approving such participation, parents and guardians should be aware that a greater degree of personal freedom is afforded to students in the foreign university, and that the University of California cannot take responsibility for closely supervising the activities of individual students. The directors of the Centers will be available to students with problems and will maintain close contact with the student group as a whole. The University provides for comprehensive medical and hospitalization coverage for all participants.

Cost and Financial Aid The Regents endeavor to bring the program within the reach of all students, regardless of their financial resources. In most instances, participants may take their University scholarships with them. The NDSL and Regents' loan fund are also available. Costs range between $3280 and $4955 for the year programs (including tuition, room and board, round-trip transportation, books, health and accident insurance and some travel). Prospective participants who require financial assistance should counsel early with the Financial Aids Office.

Other Arrangements The Education Abroad Program arranges transportation to various Study Centers and will assist in finding inexpensive transportation back to the United States at a time and by a means of the student's choosing. In most Study Centers a variety of housing facilities is available, including residence halls and private dwellings.

Application forms for admission to the program are available in the Education Abroad Program Office at the International Center on Matthews Campus, UC San Diego, and are given to students following a discussion of various aspects of the program with the EAP Counselor. Completed applications are due before: October 8, 1976 for USSR (spring semester); November 12, 1976 for Brazil and United Kingdom-Ireland; January 28, 1977 for Egypt, France, Germany, Ghana, Hong Kong, Israel, Italy, Japan, Kenya, Mexico, Norway, Spain, Sweden and USSR (fall semester). All further information, such as course offerings, selection, orientation, withdrawal from the program after selection, schedules of departures and payment of fees may be obtained from the Education Abroad Program Office at the International Center on Matthews Campus, UC San Diego.

Engineering

The following undergraduate programs in Engineering are offered at the University of California, San Diego. Details are to be found in the sections devoted to the sponsoring departments.

Chemical Engineering - see Applied Mechanics & Engineering Sciences
Computer Engineering - see Applied Physics & Information Science
Electrical Engineering - see Applied Physics & Information Science
Engineering Sciences - see Applied Mechanics & Engineering Sciences.

Experimental Pathology

OFFICE: 2234 Bonner Hall

Graduate Adviser:
Harvey A. Itano; Room 2402 Bonner Hall

Professors:
Nicholas M. Alexander, Ph.D. *(Pathology, in residence)*
Kurt Benirschke, M.D. *(Reproductive Medicine, in residence)*
Colin M. Bloor, M.D. *(Pathology)*
Abraham I. Braude, M.D., Ph.D. *(Medicine and Pathology)*
Russell F. Doolittle, Ph.D. *(Chemistry)*
Richard W. Dutton, Ph.D. *(Biology)*
John C. Griffiths, M.D. *(Pathology, in residence)*
John J. Holland, Ph.D. *(Biology)*
Cecil Hougie, M.B. *((Pathology)*
Harvey A. Itano, M.D., Ph.D. *(Pathology, Chairman of Group)*
Nathan O. Kaplan, Ph.D. *(Chemistry)*
Peter W. Lampert, M.D. *(Pathology)*
Dan L. Lindsley, Jr., Ph.D. *(Biology)*
Serafeim P. Masouredis, M.D., Ph.D. *(Pathology)*
Gordon H. Sato, Ph.D. *(Biology)*
Stewart Sell, M.D. *(Pathology)*
S. Jonathan Singer, Ph.D. *(Biology)*
Paul L. Wolf, M.D. *(Pathology, in residence)*
Alfred Zettner, M.D. *(Pathology)*

Associate Professors:
Charles D. Davis, M.D. *(Pathology, in residence)*
Jerry A. Schneider, M.D. *(Pediatrics)*
Melvin I. Simon, Ph.D. *(Biology)*
Juan Yguerabide, Ph.D. *(Biology)*

Assistant Professors:
Jack E. Kyte, Ph.D. *(Chemistry)*
Katsumi Miyai, M.D., Ph.D. *(Pathology)*
James A. Robb, M.D. *(Pathology)*

The Graduate Program The interdepartmental Group in Experimental Pathology offers a program leading to the Ph.D. degree. The faculty includes members of the Departments of Biology, Chemistry, Pathology, Pediatrics, and Reproductive Medicine. Research interests of the faculty involve areas in cytopathology, cardiopulmonary pathology, neuropathology, blood coagulation, immunopathology, immunohematology, host-parasite interactions, viral oncology, and biochemical, comparative, developmental, and genetic pathology.

A solid undergraduate background in molecular and cell biology, biochemistry, physical chemistry, physics, and mathematics is desirable. For students otherwise acceptable, deficiencies with respect to specific subjects will be made up by provisional admission pending satisfactory demonstration of competence in these subjects. Programs of study will vary according to the interests and requirements of the student and his or her faculty adviser. During the first year the student will take the core course, "Pathology-Microbiology-Epidemiology," of the School of Medicine curriculum and will rotate through selected laboratories of the participating faculty. Thesis research may begin as early as the end of the first year, and formal course work will be completed in most cases by the end of the second year.

Fourth College

OFFICE: Provost, Fourth College

The Writing Program The foundation of the Fourth College Writing Program is Fourth College 10A-10B, which is required of every Fourth College student and is usually taken in the freshman year. The purpose of this course is to teach students to own their own writing, to write what counts for them and communicates to others, to criticize with a sense of the varying demands of writing in varying contexts. Classes are small and focus on peer criticism of student work; responsibility for the success of the class rests with the students as well as the teacher. Students are encouraged to confer with their instructors frequently on an individual basis. Fourth College 10A concentrates on overcoming blocks to writing, building facility and fluency, increasing sensitivity to language and the basic structures of prose. The class typically works from free writing through narrative toward argument. Fourth College 10B offers a choice of two kinds of sections: those which focus mainly on argumentative expository writing, and those which allow further exploration of narrative forms with less emphasis on the expository. Students are required to write a minimum of five thousand words per quarter.

Following Fourth College 10A-10B, the Fourth College Writing Program offers a group of elective lower-division courses which explore specific areas of writing at greater depth. Fourth College students may take a minor in writing, and those who do so will normally choose three of these courses as the lower-division component of the minor. Further information on the minor may be obtained at the Provost's Office or the Fourth College Writing Program Office.

10A-B. The Writing Course (4-4)
An open-ended, workshop-style course using constant practice and discussion to teach writing as an art of self-discovery and as a tool for getting jobs done.

11. Writing Workshop (4)
An advanced writing course for those who have completed the Fourth College writing requirement (10A-B), offering complete freedom of choice in the form of writing to be done. The course will include weekly presentation and criticism of work in progress. *Prerequisites: Fourth College 10A-B or equivalent.*

12. Poetry (4)
The emphasis in this course will be on the particular problems encountered in the writing of poetry and will include the study of some modern American poets. Weekly presentation and criticism of work will be required. *Prerequisites: Fourth College 10A-B or equivalent and consent of the instructor.*

13. Research Writing (4)
This course will focus on a large-scale investigative project more complex than the average term paper. Research methods, modes of argument, epistemological problems and the various stages of construction of a large research project will be covered. *Prerequisites: Fourth College 10A-B or equivalent and consent of the instructor.*

14. Technical Writing (4)
This course will deal with the creation of papers and reports suitable to the disciplines of science and engineering as well as problems encountered in writing for professional and/or popular audiences. Weekly presentation and criticism of work in progress will be required. *Prerequisites: Fourth College 10A-B or equivalent and consent of the instructor.*

15. Journalism (4)
This course deals with the special demands of journalistic writing, along with some consideration of the practical day-to-day experience of finding, researching and writing up stories for a particular audience, with strict deadlines. *Prerequisites: Fourth College 10A-B or the equivalent and consent of the instructor.*

16. Writing for Publication (4)
Emphasis will be on the practical business of finding a market and selling one's work. This course will include weekly presentation and criticism of work in progress. *Prerequisites: Fourth College 10A-B or equivalent and consent of the instructor.*

The Academic Field Studies Program

The Academic Field Studies Program is designed to enhance a Fourth College student's education by providing off-campus internship experiences. The program gives students the opportunity to gain practical work experience as a complement to their classroom education.

All Fourth College students have the option of undertaking one or more academic field studies during their junior or senior year. In special circumstances sophomores may be allowed to participate. While on assignment, students will be working full or

part time for a public or private organization. Placements are designed so that each student's major area of academic study is matched with the sponsoring organization's responsibilities and activities. Students might work in a political office in Washington, a conservation group in San Francisco, a legal-aid office in Los Angeles, a business in San Diego or any number of other possibilities.

While "on assignment" students are supervised by an agency sponsor. Each student also has a faculty sponsor who evaluates the student's written analytical report of the field studies experience. Upon satisfactory completion of this requirement, the student will earn 4-16 credits. Field studies are repeatable up to a total of 16 credits.

Field studies are a valuable form of professional training which provide students the opportunity to test out their career interests in an off-campus setting. The field studies program is a motivating force, which encourages students to consider the meaning and worth of their academic education.

Students planning an academic field study are required to see the coordinator at least two terms before they wish to be enrolled in the program.

197 Academic Field Studies (4-16)
Individual placements for field learning which are integrated with academic programs will be developed and coordinated by the College. A written contract involving all parties will include learning objectives, a project outline, and means of supervision and progress evaluation, and must be received prior to the pre-enrollment period. *Prerequisites: consent of instructor and submission of a written contract.*

Frontiers of Science

OFFICE: Provost, Revelle College

This sequence of courses is designed to be used as a noncontiguous minor by Revelle College students who are not majoring in the sciences. However, inasmuch as the sequence will be given at the upper-division level, a knowledge of the material covered in a Revelle College lower-division sequence in the natural sciences will be presupposed. (See *Natural Sciences*, this section.)

Prerequisite for all "Frontiers of Science" courses: junior standing, completion of Revelle's Natural Science Sequence (or the equivalent), or consent of instructor.

Courses

104. Politics and Technology of the Arms Race (4)
The technological, political and strategic ideas that underline both the nuclear arms race and the attempts to control it will be discussed in historical perspective. Current attempts to limit strategic armaments also will be examined. (Not offered 1976-77)

111. Technology, Ecology, Morality (4)
The effects of technological development on the welfare of human beings and other living things. The course is designed both for scientists and engineering majors concerned with examining the moral aspects of their career choices, and for all who are actively interested in this broad complex of issues. The course will be built generally around Lewis Mumford's "The Myth of the Machine." Specific topics like nuclear weapons, the space program and DDT will be treated with some depth.

112. Quantitative Aspects of Social and Environmental Problems (4)
Scientific and technical aspects of the following topics will be discussed: elements of probability theory and statistics, vital statistics and population growth, mathematical theory of the arms race, mathematical theory of the occurrence of wars, spreading of information (news and rumors), why some people will always be smarter or richer or more productive than others, occurrence of extreme events (how to predict floods and earthquakes), population density in cities, citites as organisms. To find solutions to social and environmental problems it is first necessary to analyze these problems.

119A. Energy: Demands, Resources, Impact, Technology and Policy (4)
Past and estimated future energy demands. Renewable and non-renewable energy resources. Economic impact of energy use. Environmental impact of energy use. Energy conservation in manufacturing, transportation, home use. Energy policy. (F) *This course replaces Frontiers of Science 119.*

119B Energy: Non-Nuclear Energy Technologies (4)
Oil recovery from tar sands and oil shale. Coal production, gasification, liquifaction. The hydrogen economy. Energy storage systems. Techniques for direct energy conversion. Solar-energy utilization. Energy from windmills. Tidal-and-wave-energy utilization. Hydroelectric power generation. Hydrothermal energy. Geothermal energy from hot rocks. Electrical power production, transmission and distribution. (W) *Prerequisite: Frontiers of Science 119A.*

119C Energy: Nuclear Energy Technologies (4)
A brief survey of energy demands and resources. Available Nuclear energy, physical background—thermal dynamics—atomic and nuclear physics; fission and fusion processes, physics of fission reactions—engineering aspects—safety and environmental effects, fusion, scaling laws and start-up criteria—laser fusion, magnetic confinement—equilibrium instability. (S). *Prerequisites: Frontiers of Science 119A and 119B. This course replaces Frontiers of Science 121.*

122. Transportation: A Technology in its Societal Setting (4)
Transportation systems: subsystems, modes, performance, evaluation. Transportation and social change: early times, industrial revolution, modern setting; law, politics, regulation. Functional elements, system operation, generation of new systems, user's viewpoints, intermode problems, status of major transport modes today and tomorrow.

123. Frontiers of Physics and Metaphysics (4)
This course will be an interface between Physics and Philosophy. Concepts of physics and their relationship to philosophy will be presented and discussed as they apply

to the human condition and man's understanding of the universe. All upper division with a technical and general orientation.

124. The Next Faltering Steps of Man (4)
Mankind's problems seem to be increasing faster than our population growth. We seek to provide, with the help of some outside speakers, an honest and sometimes scientific appraisal of man's present rather bleak situation. Additionally, we will try to cultivate thinking in students representative of alternatives and options not now emphasized for the next faltering steps of Man.

125. Thirty Years Later (4)
Mankind's unbridled technology has placed him in an uncomfortable and potentially dangerous situation. We seek to analyze the human culture and circumstances which have allowed us to arrive at this predicament. The approach will be moderately scientific, but will be focused on the increasing necessity of the interrelatedness of the arts, the sciences, and the humanities. This connection and interplay is primary to a complete understanding of the nature and direction of humankind. It is our purpose to cultivate a synthesis of thought and a development of possibilities, and alternatives that will lead to a better personal and global future.

126. Introduction to Atmospheric Science (4)
Introduction to topics in the atmospheric sciences. Behavior of gases, thermal radiation, and the heat balance in the atmosphere. The planetary boundary layer, local wind systems, fronts, cyclones, and anti-cyclones, the general circulation. Clouds and precipitation, hurricanes and tornadoes. Climate, weather and climate modification. *Prerequisites: one year of calculus and completion of a natural science sequence or equivalent in physics and chemistry.*

History

OFFICE: Room 5024 Humanities and Social Sciences Building

C-0054

Professors:
H. Stuart Hughes, Ph.D.
Gabriel Jackson, Ph.D.
Allan Mitchell, Ph.D.
Earl Pomeroy, Ph.D., *Chairman*
Armin Rappaport, Ph.D.
*Ramón Eduardo Ruiz, Ph.D.
Harry N. Scheiber, Ph.D.

Adjunct Professors:
Leften S. Stavrianos, Ph.D.

Associate Professors:
††Stanley Chodorow, Ph.D.
Judith M. Hughes, Ph.D.
Thomas A. Metzger, Ph.D.
Michael E. Parrish, Ph.D.
Edward Reynolds, Ph.D.
†David R. Ringrose, Ph.D.
Barbara Shapiro, Ph.D.

Assistant Professors:
Thomas Dublin, Ph.D.
Robert S. Edelman, Ph.D.
†††Cissie Fairchilds, Ph.D.
David S. Luft, Ph.D.
Michael P. Monteon, Ph.D.
Alden A. Mosshammer, Ph.D.
*Paul G. Pickowicz, Ph.D.
Robert C. Ritchie, Ph.D.
Ricardo Romo, Ph.D.
†Emory J. Tolbert, Ph.D.

*Leave of Absence, 1976/77
†Leave of Absence, Winter 1977
††Leave of Absence, Fall 1976, Winter 1977
†††Leave of Absence, Spring 1977

The Major Program

Students majoring in the Department of History are required to take (1) a three-quarter lower-division course (or the equivalent) and (2) a minimum of 12 upper-division courses in history. The upper-division courses must be distributed among the three fields offered by the department.

Prerequisites History 1A-1B-1C (Comparative History of the Americas)
or
History 3A-3B-3C (European Society and Social Thought)
or
History 7A-7B-7C Race and Ethnicity in the United States

Fields
1. Europe
2. Western Hemisphere (United States and Latin America)
3. Nonwestern History (Africa and Asia)

Students will fulfill a distribution requirement as follows:

1. seven quarter courses in one of the three fields;
2. three quarter courses in a field other than the primary one;
3. two quarter courses in the remaining fields.

History majors are urged to take courses in related disciplines to enhance their understanding of the historical process and to strengthen their preparation in the major. Such courses should be selected in consultation with the adviser. A "C" average is required to graduate with a major in history.

Honors The department offers a special program for outstanding students leading to the degree Bachelor of Arts with a major in history honors. Candidates for history honors are chosen during the spring quarter from among juniors in history who have taken at least four upper-division courses in the department. Juniors with a 3.5 GPA in history (3.0 overall) are eligible to apply. Admission to the program is based upon the student's academic record and the recommendation of professors fa-

miliar with the student's work. Interested candidates should complete application form (available in Department of History office) prior to April 1.

The honors program consists, in addition to regular course work in the department, of a colloquium in history offered in the fall quarter of the senior year and a program of independent study leading to the preparation of an honors essay on a topic of the student's choice. During the fall quarter of the senior year candidates select a topic and begin preliminary work on the honors essay in consultation with a major field adviser and the honors committee. During the winter quarter the student pursues a course of independent study devoted to the completion of the honors essay. The award of history honors is based on satisfactory completion of the colloquium in history and the honors essay and upon the maintenance of an average of 3.0 or better in all work taken within the department. In addition, honors candidates are expected to include at least three colloquia in their regular course work.

Candidates for history honors should organize their work as follows:

1. six quarters in one of the major fields offered by the department, of which two or three courses should be colloquia;
2. three quarter courses in a field other than the primary one, of which one course should be a colloquium unless the requirement of three colloquia has been satisfied in the major field;
3. History 196Q Colloquium in History;
4. History 196A-B (4-4): History Honors-Honors Essay

History 196A. History Honors (4)
A program of independent study providing candidates for history honors with an opportunity to develop, in consultation with an adviser, a preliminary proposal for the honors essay.

History 196B. The Honors Essay (4)
Independent study under the supervision of a faculty member, leading to the preparation of an honors essay.

History 196Q. Colloquium in History (4)
The nature and uses of history are explored through the study of the historian's craft based on critical analysis of historical literature relating to selected topics of concern to all historians. Required of all candidates for history honors and open to other interested students with the instructor's permission.

The Graduate Program

Master's Degree Program

The Department of History offers work leading to a Master's Degree with a concentration in the Third World, United States Social and Ethnic history, or European history. Admission to the master's program is based upon the applicant's undergraduate record, previous graduate work if any, and letters of recommendation. Applicants are required to submit Graduate Record Examination scores and one or two papers written for history courses. The grade/point average ordinarily required for admission is 3.0. Applicants are expected to have attained a somewhat higher average in history and related courses in the humanities and social sciences. Students are ordinarily admitted to the graduate program only to begin in the fall quarter. The deadline for filing applications is January 15th.

General Requirements

Students admitted to the master's program are expected to finish their degree requirements within one academic year. They must successfully complete a minimum of thirty-six units, of which at least twenty units must be in colloquia. With the permission of the instructor, master's students may enroll in seminars offered for Ph.D. candidates. In addition to meeting these course requirements, each student must pass a comprehensive oral examination. Students in European history and Third World history are required to demonstrate a reading knowledge of at least one foreign language relevant to their course work, a requirement satisfied by a score of at least 600 on the Educational Testing Service (ETS) examination.

Area of Concentration: Third World

Master's students who pursue this area of concentration should gain an understanding and appreciation of the people of the Third World in their historical development and relationship to the West. In addition to training in historical literature and concepts, students may take appropriate courses offered in other departments. The requirement of nine courses (36 units) is distributed as follows:

I. History 190Q: Colloquium in Third World History (four units to be offered in the fall quarter; required of all master's students in the Third World area of concentration);

II. six courses (twenty-four units, of which no more than sixteen may be in any one field) in Chinese, African, or Latin American history;

III. two additional courses (eight units), approved by the student's graduate adviser, in history or in another department.

Area of Concentration: United States Social and Ethnic

This area of concentration offers the master's student a broad grounding in the history of ethnic groups in American society from colonial times to the present. Its basic purpose is to provide systematic training in the history of ethnicity and ethnic social groups in the United States, with particular emphasis upon problems of migration, the maintenance of cultural identities, urbanization, civil rights, and the role of minority groups in the labor force, intellectual life, and politics. For this area of concentration, the requirement of nine courses (36 units) is distributed as follows:

I. History 150Q: Colloquium in the Literature of Ethnic History (four units; to be offered in the fall quarter; required of all master's students in United States Social and Ethnic History);

II. History 152Q: Colloquium in Social and Ethnic History (four units; to be offered in the spring quarter; required of all master's students in United States Social and Ethnic History);

III. two courses (eight units) in Mexican, South American, African, or European history;

IV. three courses (twelve units) in Afro-American history, Mexican-American, Southwestern regional history and/or urban social history of the United States;

V. two courses (eight units) in American history or in a discipline other than history chosen in consultation with the student's graduate adviser.

Area of Concentration: European

Candidates for the Master's Degree in European history pursue a program concentrating on the impact of industrialization in modern European society. In addition to providing a general training in the history of modern Europe, the program requires some background in earlier European history, in order to set the effects of industrialization in historical perspective, as well as some training in disciplines other than history. The requirement of nine courses (36 units) is normally distributed as follows:

I. History 106Q (or 208A): Colloquium — Central Problems in European History from 1500-1715 (four units; offered in the fall quarter; the three-quarter sequence of 106Q, 107Q and 108Q (or 208A, 208B, 208C) is required of all master's students in the European area of concentration);

II. two courses (eight units) in pre-industrial Europe (1450-1750);

III. two courses (eight units) in industrialized Europe (1750-present);

IV. two additional courses (eight units) in *either* pre-industrial *or* industrialized Europe, depending on the student's period of concentration;

V. two courses (eight units) in disciplines other than history, chosen in consultation with the student's graduate adviser.

Note: 106Q may be used for the distribution requirement for early modern Europe. 107Q may be used for the distribution requirement for either early modern Europe or modern Europe.

Ph.D. Program

Admission The Department of History offers graduate work leading to the degree of Doctor of Philosophy, with a concentration in European history, Hispanic World, or United States history. Admission to these programs is based upon the applicant's undergraduate preparation, previous graduate record and letters of recommendation. Applicants are required to submit Graduate Record Examination scores. Applications should be supported also by one or two papers written for history courses. The minimum grade-point average for admission is 3.0, and applicants are expected to have attained a somewhat higher average in history and related courses in the humanities and social sciences. While proficiency in a foreign language is not an absolute requirement for admission, prospective applicants are strongly urged to begin study of a foreign language relevant to the proposed area of concentration as early as possible in their academic careers. Students are ordinarily admitted to the graduate program only for the fall quarter. The deadline for filing applications is the 15th of January.

Fields of Study During the first quarter of residence each student, after consulting with a graduate adviser in the area of concentration and obtaining approval of the graduate committee, selects one major field of study and two minor fields. Within the major field, the student should indicate a special interest from which the dissertation may develop. The first minor is ordinarily a supplementary field within the student's area of concentration; while the second minor is a complementary field outside the area of concentration. The basic programs of study are as follows:

1. European History
   A. Major Fields
      1. Modern Europe with a specialty in England, Spain, France, Germany, social history, economic history, or intellectual history.
      2. Early Modern Europe with a specialty in expansion of Europe or any of the above.
      3. Medieval Europe with a specialty in political theory, canon law, or the politics of the eleventh-thirteenth centuries.
   B. First Minor
      Any of the following fields may be selected, provided that the study concentrates on a chronological period outside the major:
      1. Greek and Roman history
      2. Medieval Europe
      3. Early Modern Europe
      4. Modern Europe
      5. England
      6. Russia
   C. Second Minor
      1. A geographic area outside of Western Europe
      2. Expansion of Europe
      3. A related disipline

II. Hispanic World
   A. Major Fields
      1. The national period of Spanish America with a specialty in Cuba, Mexico, or socio-economic history
      2. Colonial Spanish America with a specialty in economic history, political institutions, or history of Mexico
   B. First Minor
      The student should select either the national period or the colonial period as a chronological supplement to the major.
   C. Second Minor
      1. Spain
      2. United States
      3. Another geographic area outside Spanish America
      4. Expansion of Europe
      5. A related discipline

III. United States History
   A. Major Fields
      1. Colonial and Early American period to 1789
      2. National period, 1789-1877
      3. Modern America, 1877 to present
      4. Diplomatic history
      5. Economic history
   B. First Minor
      1. Any of the fields listed above
      2. Ethnic-urban history of the United States
   C. Second Minor
      1. A geographic area outside the United States
      2. A related discipline

The department also offers graduate work in African and Chinese history. Students may select minor fields in these areas as appropriate.

Language Requirements

1. Students ordinarily satisfy the foreign language requirements by passing an Educational Testing Service examination with a score of 600 or better. In some instances, when the graduate committee determines that an ETS examination is not appropriate, the student may be required to pass an examination prepared by the department.

2. Students concentrating in European history must pass two foreign language examinations. The choice of the two languages must be approved by the graduate committee. A third language may be required when necessary for dissertation research. In the special case of British history, the language requirement may, upon petition, be reduced to one.

3. Students concentrating in Hispanic World must pass one foreign language examination. A second language may be required for purposes of dissertation research.

4. Students concentrating in United States history are not required to pass a foreign language examination. However, they must complete two courses in a discipline other than history. Students may in some instances be permitted to substitute a foreign language for this extradisciplinary requirement. Note: When specifically relevant, additional language requirements may be set for individual students by their thesis adviser.
5. At least one foreign language examination must be completed by the end of the first year of study. Failure to meet this requirement is grounds for dismissal from the program. Students in European or Hispanic history are not permitted to take the preliminary examination before the completion of one language requirement. No student is permitted to take the qualifying examination before the completion of all language and extradisciplinary requirements.

Course Work Graduate work in the department is ordinarily conducted by means of two-quarter research seminars (four units per quarter), one-quarter colloquia (four units per quarter) and directed reading. A full-time program consists of a minimum of 12 units per quarter, of which a maximum of four units may be in apprentice teaching. Students are expected to complete the following minimal program of formal courses: two two-quarter research seminars, five quarters of colloquia in the major and first minor and three quarters of colloquia in the second minor. Under certain circumstances, when appropriate colloquia are not available, students may substitute upper-division undergraduate courses for colloquia in the minor fields.

Apprentice Teaching and Research As preparation for a future academic career, every graduate student in history is expected to participate in one of the department's teaching and research programs. Under the supervision of a professor, the student may become a teaching assistant in one of the introductory courses for undergraduates; or he or she may develop special research techniques. Such apprenticeship training, for which regular academic credit is awarded, is an integral part of the graduate program in history at UC San Diego and, as such, constitutes one of the requirements for the Ph.D.

Examinations Students must complete both a preliminary examination supervised by the graduate committee and a qualifying examination administered by the department, in cooperation with the student's doctoral committee and constituted by the Office of Graduate Studies and Research. The preliminary examination consists of a final written examination in the first minor, a preliminary written examination in the major, and an oral examination in both fields. The qualifying examination consists of a final written examination in the second minor, a final written examination in the major and a comprehensive oral examination. Students are expected to take the preliminary examination in November of the second year of residence and the qualifying examination in November of the third year of residence. Permission either to accelerate or to prolong the examination process may be granted only upon petition to the graduate committee. Examinations are administered only in November and May of each year. Failure on either examination constitutes grounds for dismissal from the program. Students may, however, petition the graduate committee for permission to stand for the examination again at the next scheduled administration. A second failure results automatically in dismissal from the program.

In addition to the formal examination procedure, each student's progress is reviewed at the end of the first year of residence. Students are advised of the results of this review by the graduate committee.

All students in the Ph.D. program will be awarded an M.A. degree upon the completion of 36 units of course work, a major seminar paper, and the preliminary examination.

Dissertation Upon completion of the examinations and advancement to candidacy, the student writes a dissertation under the supervision of the major professor and the doctoral committee. The dissertation must be completed not later than six years from the beginning of the program. Normally, the dissertation should not exceed 250 pages, notes included. A final defense of the thesis is conducted by the student's doctoral committee.

The various requirements noted above apply to students who have done no previous graduate work in history. If a candidate has completed some graduate work before entering UC San Diego, there may be appropriate adjustments in the course work. Nevertheless, candidates will be required to demonstrate reading knowledge of one or more foreign languages depending on the major field; to pass the departmental and qualifying examinations; to write a dissertation; and to pass the final oral examination.

Lower Division

The Department of History cooperates in the teaching and administration of the Humanities sequence for Revelle College students. (See "Interdisciplinary Courses".) (Transfer students with credit for a two-semester, lower-division history sequence may be admitted to the upper-division courses.)

1A-B-C. Comparative History of the Americas (4-4-4)
A lecture-discussion course on the comparative history of Spanish America and the United States from the pre-Columbian period to the present. Through lectures, panel discussions, and readings, students will compare and contrast selected aspects of the political systems, economic developments, and cultural currents in the Americas. Among the topics to be covered are: patterns of conquest, slavery and race relations, the impact of technology, war, and imperialism.

3A-B-C. European Society and Social Thought (4-4-4)
An examination by lectures and discussions of European social development and social theory from the later medieval period to the twentieth century. Important writings will be considered both as responses and as provocations to social change in Europe.

7A-B-C. Race and Ethnicity in the United States (4-4-4)
A lecture-discussion course on the comparative ethnic history of the United States. Of central concern will be slavery, race, oppression, mass migrations, ethnicity, city life in industrial America, power and protest in modern America. Attention is focused on Native American, Mexican-American, the Black, Asian-American, and White ethnic groups.

30A-B-C. The United States (4-4-4)
Examines intensively a series of nine topics over the year drawn from American history, chosen to show the diversity of materials and techniques which historians use. (Not to be offered 1976/77.)

31. Environment and Economy in Historical Perspective (4)
The influence of geography, disease, technology, and climate on historical change. Problems of population and man's impact on his ecological context. From the perspective of pre-industrial Europe, pre-industrial Third World, and industrial Europe and the United States. *Prerequisite: none.*

90. Contemporary Spain and Portugal (none)
Freshman seminar intended to introduce students to culture and politics of the Iberian peninsula. Readings in *New York Times, The Economist, Nation,* etc. with a view to placing current revolutionary political developments in historical perspective. *Prerequisites: curiosity, willingness to read.*

Upper Division

100. The Ancient Near East and Israel (4)
The history of Israel is studied in the context of Ancient Near Eastern civilization as a whole. Topics include the birth of civilization in Southern Mesopotamia, the Assyrian and Babylonian empires and the rise of Persia as well as Israel in the Biblical period (1900-445 B.C.). (Not to be offered 1976-77.)

101A-B. Greece in the Classical Age (4-4)
The political, economic and intellectual history of Greece from the birth of the city-states to the death of Alexander the Great. Three hours lecture and discussion. (Not to be offered 1976/77).

101Q. Special Topics in Greek History (4)
See *Colloquia,* below.

102A-B. The Roman Republic and Empire (4-4)
The political, economic and intellectual history of the Roman world from the foundation of Rome to the death of Constantine. Lecture and discussion.

102Q. Special Topics in Roman History (4-4)
See *Colloquia,* below.

103A-B. Medieval England (4)
Course covers the history of England from Roman times to the Wars of the Roses. Students will study the development of English government, society, and culture. *Prerequisite: humanities sequence or equivalent or permission of instructor.*

104A-B. The Rise of Europe (4-4)
The development of European society from the decline of the Roman Empire to 1250. *Prerequisite: humanities sequence or its equivalent.*

104Q. Special Topics in Medieval History (4)
See *Colloquia,* below.

105A-B. Renaissance Europe, 1348-1517 (4-4)
The intellectual, political, and economic transformation of late-medieval Europe from the crisis of the Italian civic spirit to the flowering of the Renaissance monarchies. The concurrent evolution of diplomacy, warfare, and political behavior.

105Q. Topics in the Intellectual History of Early Modern Europe (4)
See *Colloquia,* below.

106A-B. Reformation Europe, 1500-1660 (4-4)
A lecture-discussion course focusing on the impact of the Reformation, the development of monarchial institutions and the impact of the scientific revolution. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

106Q. Central Problems in European History from 1500-1715 (4)
See *Colloquia,* below.

History 107A-B. The Old Regime and the French Revolution (4-4)
A lecture-discussion course on Europe from 1660-1815, examining the political and social institutions of the absolutist state and the causes and impact of the French Revolution. 107A covers the period of the Old Regime; 107B covers the period of the French Revolution. 107A is not a prerequisite for 107B. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

107Q. Central Problems in European History from 1715-1850 (4)
See *Colloquia*, below.

108A-B. Europe 1815-1870 (4-4)
The impact of the French Revolution and the Industrial Revolution on European society and politics. Special emphasis will be placed on the social effects of industrialization, and the emergence of the working classes and revolutionary ideology. 108A covers 1815 to 1848; 108B, 1848-1870. 108A is not a prerequisite for 108B. *Prerequisite: upper-division standing or permission of the instructor.* (108B will not be offered 1976/77.)

108Q. Central Problems in European History from 1850-1945 (4)
See *Colloquia*, below.

109A-B. Europe Since 1870 (4-4)
A lecture-discussion course dealing with major problems of European history since 1870 and investigating the special character of Europe's crisis of modernization. The course will emphasize the impact of the second industrial revolution, the crisis of socialism, the emergence of fascism, and the two World Wars. *Prerequisite: upper-division standing or permission of the instructor.*

109Q. Special Topics in Twentieth-Century European Social Thought (4)
See *Colloquia*, below.

110A. Russian History from Ninth Century to 1855 (4)
The roots of Russian backwardness. The role of dominant personalities (Ivan the Terrible, Peter the Great, Catherine the Great) will be assessed in terms of their long-range historical input. May be taken without 110B. *Prerequisite: upper-division standing or permission of the instructor.*

110B. Russia: 1855 to the Present (4)
The long-term causes of the Revolution and its ultimate consequences. Herzen, Lenin, Stalin, and Nicholas and Alexandra. May be taken without 110A. *Prerequisite: upper-division standing or permission of the instructor.*

110Q. Lenin and the Russian Revolution (4)
See *Colloquia*, below.

111A-111B. Renaissance and Reformation England (4-4)
An examination of social, political and intellectual developments from the early Tudors to the beginning of the eighteenth century. Topics to be covered include: the establishment of the Tudor monarchy, humanism, the English Reformation, the rise of the gentry, Puritanism, administrative development, constitutional conflict, the English Revolution, and the scientific revolution. 111A covers 1470-1603, 111B covers 1603-1716. *Prerequisite: upper-division standing or permission of the instructor.*

111Q. Topics in the Intellectual History of England: 1500-1700 (4)
See *Colloquia*, below.

112A. Economic Life in Pre-Industrial Europe: 1000-1750 (4)
Analysis of the underlying structures of a rural economy and society, including interaction of geography, population change, resources, and technology. Evolution of market and state as the dominant economic institutions of modern life: medieval commercial cities, unification of the European market system, mercantilism, and the economic impact of emerging bureaucracies. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

112B. The Industrialization of Europe (1750-Present) (4)
The beginning of industrialization in England and its spread through 19th century Europe; role of the state, imperialism, economic ideologies, organization of production, impact on traditional socio-economic structures. World War I and the redefinition of economy: private enterprise vs. social justice, national income accounting, big business vs. state planning, environmental limitations on material "progress". *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

112Q. Special Topics in European Economic History (4)
See *Colloquia*, below.

113. European Diplomatic History, 1870-1945 (4)
The creation of the alliance system and the practice of European diplomacy at its zenith. The limitations of this diplomacy and the outbreak of the First World War. Efforts at peace and peacemaking, 1917-1919. The unresolved German question and the breakdown of the postwar settlement. The advent of Hitler and the disarray of the Western democracies. The Second World War: reversals of alliances and emergence of the superpowers. *Prerequisite: upper-division standing or permission of the instructor.*

114. European Intellectual History, 1795-1890 (4)
Focus on social thought in the central decades 1830-70, primarily in France and Germany, with more peripheral attention to Great Britain and Italy. Reading in Saint-Simon, Hegel, Tocqueville, Mill, Marx, Darwin, and Nietzsche. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

115. Causes of the Great European Revolutions (4)
Why they happen; how they happen. A comparative treatment of the English, French, and Russian revolutions. Stress will be placed on the historiographical, theoretical, and philosophical implications of these events. *Prerequisite: upper-division standing or permission of the instructor.*

116. The Social History of Early Modern Europe (4)
A survey of European society from ca. 1600-1848. Topics covered will include: agrarian society, the impact of industrialization, the rise of professions, witchcraft, banditry and crime, the history of childhood, and position of women, education and popular culture. *Prerequisite: upper-division standing or permission of the instructor.*

116Q. Special Topics in the Social History of Early Modern Europe
See *Colloquia*, below.

117. The Atlantic World in the Revolutionary Age: 1700-1825 (4)
This course will explore the connections between the rapid expansion of Atlantic commerce in the 18th century and the widespread changes in political organization around the Atlantic between 1775 and 1825. It will compare the commercial societies of England, Holland, France, and Iberia with their extensions in 18th century America and analyze the differing responses to commercial growth at the beginning of the 19th century. *Prerequisite: upper-division standing or permission of the instructor.*

117Q. Europe in the Industrial Age (4)
See *Colloquia*, below.

118. The Austrian Empire: 1809-1918 (4)
The social, political, and cultural history of 19th century Austria, particularly after 1867. The course emphasizes the crisis of the liberal elites; the Viennese cultural renaissance (Freud, Hofmannsthal, Wittgenstein, Mahler); the emergence of modern mass politics, nationalism, and antisemitism; the impact of Austria's decline on modern Germany. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

119. European Intellectual History, 1890-1933 (4)
A lecture-discussion course on the crisis of bourgeois culture, the redefinition of Marxist ideology, and the transformation of modern social theory. Readings will in-

clude Sorel, Weber, Freud, and Mann. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976-77.)

119Q. Special Topics in Modern European Intellectual History (4)
See *Colloquia*, below.

120. Modern French History (4)
A lecture-discussion course on the political and social history of France during the nineteenth and twentieth centuries. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

120Q. Colloquium in Nineteenth-Century Europe (4)
See *Colloquia*, below.

121. Modern German History (4)
A lecture-discussion course on the political and social history of Germany during the nineteenth and twentieth centuries. *Prerequisite: upper-division standing or permission of the instructor.*

121Q. Colloquium in Twentieth-Century Europe (4)
See *Colloquia*, below.

122. British History since 1867 (4)
Emphasis on changes in social structure and corresponding shifts in political power. The expansion and the end of empire. The erosion of world economic leadership. The welfare state and its mounting costs. *Prerequisite: upper-division standing or permission of the instructor.*

123. Social and Political Thought in Europe: 1500-1700 (4)
Special topics in English and European social and political thought between 1500 and 1700. *Prerequisite: upper-division standing or permission of the instructor.*

124. Social and Cultural History of Europe since 1945 (4)
Europe in the post-European world. The failure of the wartime Resistance. The restoration of bourgeois society. Economic boom and the new role of meritocracy, labor unions, and public enterprise. The end of empire. Population shifts and the problems of foreign workers. Neorealism, existentialism, and the German cultural revival. Thaw and refreeze in Eastern Europe. The European Economic Community. *Prerequisite: upper-division standing or permission of the instructor.*

125. Italy since 1860 (4)
Political and social history since the unification treated primarily in terms of the successive attempts of parliamentary monarchy, Fascism, Christian Democracy, and Communism to cope with such basic issues as church-state relations, the problem of the South, and the cleavages within Italian society. *Prerequisite: upper division standing or permission of the instructor.*

126Q. Ideology and the Imagination in France, 1850-1950 (4)
See *Colloquia*, below.

127Q. Ideology and the Imagination in France, 1850-1950 (4)
See *Colloquia*, below.

129Q. History of Law in Philosophical Perspective (4)
See *Colloquia*, below.

130A-130B. The Expansion of Europe (4-4)
The techniques, economic organization and institutional evolution of European colonizations in Africa, the Far East and the Americas. The great geographical discoveries and the beginnings of world trade, with emphasis on comparative aspects.

130Q. Special Topics: Expansion of Europe (4)
See *Colloquia*, below.

133. Medieval and Golden Age Spain (4)
Interaction of the Muslim, Christian and Jewish communities, c. 700-1100. The Reconquest, economic and social development of Castile and Aragon. Inquisition, Renaissance, and Counter-Reformation. Political and cultural role in Europe and America, 1500-1650. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

133Q. Colloquium on Medieval and Renaissance Spain (4)
See *Colloquia*, below.

134Q. Spain in the Eighteenth Century (4)
See *Colloquia*, below.

135. Spain since 1808 (4)
Resistance to Napoleon, Liberal revolution, Carlist wars and the era of pronunciamientos. Industrialization, urbanization, Krausism, socialism, anarchism. The Primo dictatorship, the Republic, the Civil War, and the Franco regime, 1923-present. *Prerequisite: upper-division standing or permission of the instructor.*

135Q. Colloquium on the Spanish Civil War (4)
See *Colloquia*, below.

136. Peasant and Proletarian Movements in Spain (4)
Peasant ideologies, cantonalism, rural anarchism in the nineteenth century; socialist and anarcho-syndicalist labor federations; Left parties and collectivist experiments of the 1930's. *Prerequisite: permission of the instructor.* (Not to be offered 1976/77.)

136Q. Colloquium on Spain since 1790 (4)
See *Colloquia*, below.

137A-B. Latin America: Colonial Design and Modern Reality (4-4)
The evolution of Latin America: the first quarter covers the aboriginal civilizations and the Iberian colonies; the second quarter will discuss the early republics and the modern nations. A political background will be presented but emphasis will be on the demographic, economic, and social problems. (137A is not a requirement for 137B.) *Prerequisite: upper-division standing or permission of the instructor.*

137Q. Colonial Latin America (4)
See *Colloquia*, below.

139. Social History of Early Colonial Spanish America (4)
A lecture-discussion course on the development of urban and rural societies in Spanish America from 1520-1620. Demographic and urban history, social structures, social stratification, interracial relations, and miscegenation. *Prerequisite: upper-division standing or permission of the instructor.*

140. Early Latin American Economic History (4)
A lecture-discussion course covering the period 1493-1640. Colonial economic structures, production, trade, the economic revolution in the New World and its world-wide impact. *Prerequisite: upper-division standing or permission of the instructor.*

142. Independence in Latin America (4)
Lecture-discussion course on the precedents, causes, development and consequences of political independence, covering the period 1790-1830. *Prerequisite: upper-division standing or permission of the instructor.*

145. Machismo and Matriarchy: The Latin American Social Structure (4)
The course will examine the social history of Latin America as the product of family structure and sexual mores. In addition to looking at the different settings in which the Latin American family evolved, the course will discuss the importance of miscegenation, the role of women, and the

current social crisis of the region. *Prerequisite: upper-division standing or permission of the instructor.*

146A-B. A History of Mexico (4-4)
From the Conquest through the Reforma, with special emphasis on social and cultural currents. The second quarter covers the period since 1876. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

146Q. Topics in Spanish American History, 1810-1910 (4)
See *Colloquia*, below.

147. Cuba: From Colony to Socialist Republic (4)
A lecture-discussion course on the historical roots of revolutionary Cuba, with special emphasis on the impact of the United States on the island's development and society. (Not to be offered 1976/77.)

147Q. Topics in Spanish American History, since 1910 (4)
See *Colloquia*, below.

148A. The Urban Culture of South America, 1830-1920 (4)
The evolution of the city in South America, from the urban crisis after Independence to the origins of the social crisis of "modernization". This course will include a discussion of the export economies, immigration, and early labor history. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

148B. The City in South America, 1920-1970 (4)
The course will focus on several of the largest South American cities and discuss the impact of these cities on the recent social and economic history of the continent. Students will be encouraged to do research on a particular South American city. *Prerequisites: students must have taken at least one previous course on the History of Latin America; upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

148Q. Latin American Underdevelopment in Historical Perspective (4)
See *Colloquia*, below.

149. Egalitarian Revolutionary Movements in Latin America, 1850-1970 (4)
Will discuss the social origins, personalities, and ideologies of the major Latin American revolutionary movements in the modern era; emphasis will be placed on the issue of violent upheaval as a means of substantial social change. *Prerequisites: students must have taken at least one previous course in the history of Latin America; upper-division standing or permission of the instructor.*

150. Anglo-American Rural Life: 1450-1750 (4)
This course will deal with the changing structure of English rural life as it responded to the growth of capitalism and then to the problems of the New World. *Prerequisite: upper-division standing or permission of the instructor.*

150Q. Colloquium in the Literature of Ethnic History (4)
See *Colloquia*, below.

151Q. Colloquium in Nineteenth Century United States History (4)
See *Colloquia*, below.

152Q. Colloquium in Social and Ethnic History (4)
See *Colloquia*, below.

153Q. Colloquium: American Federalism (4)
See *Colloquia*, below.

155A. Social and Economic History of the Southwest (4)
An introduction to American borderland history with special emphasis on historiography, economic and social developments of the border states during the eighteenth and nineteenth centuries. The course is designed to present various interpretations of American Southwestern history.

155B. Social and Economic History of the Southwest (4)
The course will consider the significant trends in Mexican-American history over the past 100 years in the Southwest. Special emphasis will be placed upon primary documents relating to Mexican-Americans in economic and social institutions.

156A-B. The Social History of the American City (4-4)
A two-term topical approach to the processes of urbanization in the United States. Among the subjects covered are urban historiography, comparisons between pre-industrial and industrial cities, urban growth, occupational and social mobility, immigration, and urban economic, social, and political structures.

156Q. American Urban History (4)
See *Colloquia*, below.

157A-B. American Legal and Constitutional History (4-4)
A lecture-discussion course on the growth of constitutionalism in the United States from 1787 to the present, with particular emphasis upon the judicial process, the role of the Supreme Court, and legal institutions. *Prerequisite: upper-division standing or permission of the instructor.*

157Q. Colloquium in American Legal and Constitutional History (4)
See *Colloquia*, below.

158A-B. Economic History of the United States (4-4)
A two-quarter course providing analysis of the American economy's development from the colonial period to the present. Readings and lectures will emphasize institutional aspects of economic change, including such topics as federal and state resource-use policies, the nature and impact of southern slavery, business entrepreneurship and management, and agricultural reform movements. *Prerequisite: upper-division standing or permission of the instructor.*

158Q. Colloquium in American Economic History (4)
See *Colloquia*, below.

159A-B. Afro-American History (4-4)
A lecture-discussion course on the history of Afro-Americans from the colonial period to the present. *Prerequisite: upper-division standing or permission of the instructor.*

159Q. Colloquium in American Ethnic History (4)
See *Colloquia*, below.

160. United States: Colonial Period to 1763 (4)
Political and social history of the 13 colonies; European background, settlement and expansion, beginnings of culture and the imperial context. *Prerequisite: upper-division standing.*

160Q. Colloquium in Colonial American History (4)
See *Colloquia*, below.

161. United States: The American Revolution, 1763-1800 (4)
Causes and consequences of the revolution; intellectual and social change, the problems of the new nation, the Constitution, the origins of political parties. *Prerequisite: upper-division standing.*

161Q. Special Topics: The American Revolution (4)
See *Colloquia*, below.

163. The History and Social Role of Women (4)
Study of women as a group and as members of different ethnic, racial and socio-economic groups from pre-

industrial times to the present. Emphasis is on the relationship of economic systems to women's social, work, and family roles.

164A-B. American Intellectual History (4-4)
The first quarter deals with colonial times through the pre-Civil War period, European origins and the development of political, social, economic, and religious thought in an American context. Emphasis on principal thinkers and ideas, with some reference to the general historical background and values. The second quarter deals with the period 1860 to the present. *Prerequisite: upper-division standing or permission of the instructor.*

164Q. Colloquium in American Intellectual History (4)
See *Colloquia*, below.

166. The History of Public Health in the United States (4)
This course would cover three periods of public health growth, the *ante-bellum*, late nineteenth century, and twentieth century. It would focus on concepts of disease, institutional attempts to cope with death and disease in the city, the public health movement, and the federal government's provision of health care services. *Prerequisite: upper-division standing or permission of the instructor.* (Not to be offered 1976/77.)

166Q. American Society in the Cold War (4)
See *Colloquia*, below.

167A-B. United States in the Twentieth Century (4)
A lecture-discussion course on American society from 1890 to the present. Emphasis will be placed upon the domestic sources of public policy, including the effects of haphazard industrial growth, urbanization, and demographic change upon the social structure and politics of a rural, democratic, entrepreneurial culture. Close attention will be given to the origins and strategies of local, state, and national reform movements, the role of private-interest groups, the effects of war, and the Black revolution. *Prerequisite: upper-division standing.*

167Q. Colloquium in Twentieth Century American History (4)
See *Colloquia*, below.

168Q. America in the 1930's (4)
See *Colloquia*, below.

169A-B. History of American Foreign Policy and Diplomacy (4-4)
A two-quarter course in the history of American foreign policy and diplomacy covering the period from the establishment of the colonies to the present. The course deals with the policy of the United States and the forces — intellectual, economic, cultural, and social — which shaped that policy. *Prerequisite: upper-division standing or permission of the instructor.*

169C. History of American Foreign Policy & Diplomacy (4)
A continuation of History 169B designed to concentrate on the period of the Cold War. The course will deal with the origins of the Cold War, with its progress in the 1950's, 1960's, and 1970's and the period of detente beginning in the early 1970's which is changing the nature of the struggle and shifting its focus. *Prerequisite: upper-division standing or permission of the instructor.*

169Q. Colloquium in American Diplomatic History (4)
See *Colloquia*, below.

170Q. Colloquium on the Second World War (4)
See *Colloquia*, below.

171Q. Quantitative Methodology in History (4)
See *Colloquia*, below.

172Q. Colloquium on the Philosophy of History (4)
See *Colloquia*, below.

173Q. Colloquium on the Methodology of History (4)
See *Colloquia*, below.

175A. History of Africa (Ancient Africa to 1807) (4)
This course deals with Ancient Africa, the Medieval States of the West African Sudan, East Africa in Medieval Times, the Forest Kingdoms of West Africa, the Great Migrations and the impact of the Atlantic Trade. *Prerequisite: upper-division standing or permission of the instructor.*

175B. History of Africa (Nineteenth Century Africa) (4)
This course deals with European penetration and African resistance in the nineteenth century, the Islamic Revolution and its impact, African states in the nineteenth century, Partition and the African response thereto. *Prerequisite: upper-division standing or permission of the instructor.*

175C. History of Africa (Twentieth-Century Africa) (4)
This course deals with Africa in the Twentieth Century; African development, the rise of nationalism and the response of metropolitan powers, the transfer of power, self-rule and military coups and the quest for identity and unity. *Prerequisite: upper-division standing or permission of the instructor.*

177Q. Colloquium in the Economic History of Africa (4)
See *Colloquia*, below.

178. Economic History of Africa (4)
Lecture-discussion course on the economic development of sub-Saharan Africa from earliest times to the present. Topics will include: pre-European trade, the Atlantic slave trade, the era of legitimate trade, economic imperialism, and the colonial economy and post-independence economic development. *Prerequisite: upper-division standing.*

181A. The History of Chinese Thought and Society: The Ancient Imperial Period (4)
This course deals with the genesis of Chinese thought and institutions in Shang and Chou times as well as Han political structure and thought. *Prerequisite: upper division standing or permission of the instructor.*

181B. The History of Chinese Thought and Society: The Middle Imperial Period (4)
This course deals with the decline of the Han empire, the rise of Buddhism, the transformation of Chinese society in T'ang and Sung times, and the beginnings of Neo-Confucianism. *Prerequisite: upper-division standing or permission of the instructor. 181A or permission of the instructor.*

181C. The History of Chinese Thought and Society: The Late Imperial Period (4)
This course deals with the economic, political, and intellectual development of China during the five hundred years before the impact of the West. *Prerequisite: 181A and 181B or permission of the instructor. Upper division standing or permission of the instructor.*

182. History of the Modern Chinese Revolution: 1800-1911 (4)
This course stresses the major social, political, and intellectual problems of China in the period from the Opium War to the Revolution of 1911. Special emphasis is placed on the nature of traditional Chinese society and values, the impact of Western imperialism and popular rebellion on the traditional order, reform movements, and the origins of the early revolutionary movement. *Prerequisite: upper-division standing or permission of the instructor.*

183. History of the Modern Chinese Revolution: 1911-1949 (4)
This course deals with the formative period of the twentieth-century Chinese revolution. Considerable stress is

placed on the iconoclastic New Culture period, the rise of the student movement, Chinese communism, the labor movement, revolutionary nationalism, and the emergence of the peasant movement. *Prerequisite: upper-division standing or permission of the instructor.*

184. History of the People's Republic of China (4)
This course analyzes the history of the PRC from 1949 to the present. Special emphasis is placed on the problem of post-revolutionary institutionalization, the role of ideology, the tension between city and countryside, Maoism, the Great Leap Forward, and the Cultural Revolution. *Prerequisite: upper-division standing or permission of the instructor.*

186. Self and Society in Modern Chinese Thought (4)
This course examines the confluence of traditional and modern ways of thought in China, dealing with revolutionary, liberal, and conservative trends in the twentieth century and with their relationships to traditional orientation. The first quarter is a lecture course, the second, a colloquium. *Prerequisite: upper division standing or permission of the instructor.*

186Q. Self and Society in Modern Chinese Thought (4)
See *Colloquia*, below.

187. Intellectual History of Modern China (4)
This course is designed to focus on selected topics in the intellectual history of modern China. The theme of the course will change each year. Potential topics include: Confucian perceptions of Western ideas, traditional conservatism, reform thinkers, anarchism, liberalism, Marxism, nationalism, and populism. *Prerequisite: upper-division standing or permission of the instructor.*

188. Peasant Revolution: Modern China (4)
This course focuses exclusively on the role of the peasant in the modern Chinese revolution. It examines the social and economic status of the peasant in Confucian society, traditional peasant rebel ideologies, the peasant in Marxist theory, Chinese communist mobilization of the peasantry, and the peasant during the transition to socialism. This is a lecture-discussion course which places considerable emphasis on student participation. *Prerequisite: upper-division standing or permission of the instructor.*

189Q. Special Topics in Modern Chinese History (4)
See *Colloquia*, below.

190A-B-C. History of Science (4-4-4)
The first quarter concerns the history of physical science from megalithic astronomy to Copernicus and from pre-Socratic thought to the late medieval attack on Aristotelian physics. The second quarter deals with the history of the scientific revolution in the seventeenth century, from Kepler and Galileo to the Newtonian synthesis. The third quarter will focus chiefly on three topics: the emergence of modern chemistry from Lavoisier to van't Hoff; the coming of Darwinism; and the roots of Einstein's special theory of relativity. *Prerequisite: upper-division standing or permission of instructor.* (Not to be offered 1976/77).

190Q. Colloquium in the Literature of Third World History (4)
See *Colloquia*, below.

196A. History Honors (4)
A program of independent study providing candidates for History Honors with an opportunity to develop, in consultation with an adviser, a preliminary proposal for the honors essay. An IP grade will be awarded at the end of this quarter. A final grade will be given for both quarters at the end of 196B. *Prerequisite: permission of the instructor.*

196B. The Honors Essay (4)
Independent study under the supervision of a faculty member leading to the preparation of an honors essay. A letter grade for both 196A and 196B will be given at the completion of this quarter. *Prerequisite: permission of the instructor.*

196Q. Colloquium in History (4)
See *Colloquia*, below.

198. Directed Group Study (4)
Directed group study on a topic not generally included in the regular Department of History's curriculum. By special arrangement with a faculty member. *Prerequisite: permission of faculty member (instructor).*

199. Independent Study for Undergraduates (4)
Program to be arranged between student and instructor, depending on student's needs and instructor's advice in terms of these needs. *Prerequisite: upper-division standing and approval of instructor.*

Colloquia Colloquia are courses devoted to extensive study of special topics. These courses are limited to 20 or fewer students and are generally organized as seminars or discussion classes.

101Q. Special Topics in Greek History (4)
Detailed study of selected problems or periods in the history of Greece. Topics vary from year to year and students may therefore repeat the course for credit. Topic for fall 1976: Athenian Empire. *Prerequisite: upper-division or graduate standing.*

102Q. Special Topics in Roman History (4)
Detailed study of selected problems or periods in the history of Rome and the Roman empire. Topics vary from year to year and students may therefore repeat the course for credit. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

104Q. Special Topics in Medieval History (4)
Course will focus on specific historical problems or subjects raised by the process of development in Medieval Europe. *Prerequisite: 104A-B or permission of the instructor; upper-division or graduate standing.*

105Q. Topics in the Intellectual History of Early Modern Europe (4)
Topics will vary from year to year, and students may therefore repeat the course for credit with the permission of the instructor. *Prerequisite: upper-division or graduate standing.*

106Q. Central Problems in European History from 1500-1715 (4)
A three-quarter sequence of readings and discussions, taught by different members of the staff each quarter. Required for all beginning graduate students, including M.A. candidates, in early modern and modern European history, as well as for students preparing a secondary field in either area. *Prerequisite: graduate standing, or upper-division with permission of the instructor.*

107Q. Central Problems in European History from 1715-1850 (4)
A three-quarter sequence of readings and discussions, taught by different members of the staff each quarter. Required for all beginning graduate students, including M.A. candidates, in early modern and modern European history, as well as for students preparing a secondary field in either area. *Prerequisite: graduate standing, or upper-division with permission of the instructor.*

108Q. Central Problems in European History from 1850-1945 (4)
A three-quarter sequence of readings and discussions, taught by different members of the staff each quarter. Required for all beginning graduate students, including M.A. candidates, in early modern and modern European

history, as well as for students preparing a secondary field in either area. *Prerequisite: graduate standing, or upper-division with permission of the instructor.*

109Q. Special Topics in Twentieth-Century European Social Thought (4)
A study of twentieth-century European intellectuals and their social, political, historical, and cultural theories. Topics change from year to year. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

110Q. Lenin and the Russian Revolution (4)
Wiill examine the societal roots of the Revolution of 1917, Lenin's role in the development of the revolutionary movement, and the actual events of 1917. Emphasis will be placed on conflicting interpretations. *Prerequisites: upper-division or graduate standing. Permission of the instructor.*

111Q. Topics in the Intellectual History of England: 1500-1700. (4)
Topic will vary from year to year and students may therefore repeat the course for credit with the permission of the instructor. *Prerequisite: upper-division or graduate standing.*

112Q. Special Topics in European Economic History (4)
Analysis of the economic and social interactions between cities and their surrounding regions, comparing the impact of political, commercial, and industrial urbanization in the historical development of regions and countries. Each student will study one such city and present his or her findings to the seminar. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

116Q. Special Topics in the Social History of Early Modern Europe (4)
Topic varies from year to year. *Prerequisite: upper-division or graduate standing.*

117Q. Europe in the Industrial Age (4)
Reading and discussion of basic works on the origin and nature of the European Industrial Revolution and its social and political implications in the 19th century. Europe as an industrial society: war, depression, national planning, and economic integration. *Prerequisite: upper-division or graduate standing.*

119Q. Special Topics in Modern European Intellectual History (4)
Topic varies from year to year.

120Q. Colloquium in Nineteenth-Century Europe (4)
This course alternates with History 121Q, and the topics of these will vary from time to time. *Prerequisite: upper-division or graduate standing.*

121Q. Colloquium in Twentieth-Century Europe (4)
This course alternates with History 120Q, and the topics of these will vary from time to time. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

126Q. Ideology and the Imagination in France, 1850-1950 (4)
A century of social and cultural change as mirrored in the writings of representative essayists, memorists, novelists, and social critics and theorists. An IP grade will be given at the end of the first quarter. The final grade will not be given until the end of the second quarter, which is History 127Q. *Prerequisite: upper-division or graduate standing.*

127Q. Ideology and the Imagination in France, 1850-1950 (4)
A century of social and cultural change as mirrored in the writings of representative essayists, memorists, novelists, and social critics and theorists. An IP grade is awarded at the end of 126Q; final grade will be awarded at the conclusion of 127Q. *Prerequisite: 126Q. upper-division or graduate standing.*

129Q. History of Law in Philosophical Perspective (4)
Course will study the way in which the historical development of the Western legal system reflects issues raised in the literature of legal philosophy. Students will read of legal philosophy in conjunction with studies of the history of legal doctrines and institutions. *Prerequisite: upper-division or graduate standing.*

130Q. Special Topics: Expansion of Europe (4)
Topics will vary from year to year. Topics for 1976/77: Spain and her Empire. *Prerequisite: upper-division or graduate standing.*

133Q. Colloquium on Medieval and Renaissance Spain (4)
Emphasis on the symbiosis of Christian, Muslim, and Hebrew elements; the Inquisition, the conversos, the moriscos, and the Erasmists; relationship of literature to history. *Prerequisites: fluent reading knowledge of Spanish or French; upper-division or graduate standing.* (Not to be offered 1976/77.)

134Q. Spain in the Eighteenth Century (4)
Readings and discussion of recent studies on Spain in the eighteenth century: the attempt at national revival, social and economic conditions, Spain and the Enlightenment, and the breakup of the Old Regime after 1790. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

135Q. Colloquium on the Spanish Civil War (4)
Analysis of domestic and international issues raised by the Civil War; special attention to conflicting interpretations. The Southworth Collection will be used extensively. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

136Q. Colloquium on Spain since 1790 (4)
Impact of the French revolution, Napoleonic occupation, the Liberal revolution, the Carlist war; development of capitalism, caciquismo, urbanization, Masonry, anticlericalism, Krausism, Marxism, anarchism, and regional autonomy movements. *Prerequisite: fluent reading knowledge of Spanish; upper-division or graduate standing.* (Not to be offered 1976/77.)

137Q. Colonial Latin America (4)
Readings and discussion in the monographic literature and in the sources of selected topics. Emphasis on analysis of the historiography of the period. *Prerequisite: upper-division or graduate standing.*

146Q. Topics in Spanish American History, 1810-1910 (4)
Topic will vary from year to year. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

147Q. Topics in Spanish American History, since 1910 (4)
Topic will vary from year to year. *Prerequisite; upper-division or graduate standing.* (Not to be offered 1976/77.)

148Q. Latin American Underdevelopment in Historical Perspective (4)
Readings on the cultural and economic underdevelopment of Latin America; emphasis will be placed on the theories of economic backwardness and "imperialist exploitation" of the region. *Prerequisite: upper-division or graduate standing.*

150Q. Colloquium in the Literature of Ethnic History (4)
An introduction to the historical and social science literature of ethnicity and intergroup social-cultural relations in the United States. Required of M.A. candidates concentrating in United States social and ethnic history. *Prerequisite: upper-division or graduate standing.*

151Q. Colloquium in Nineteenth-Century United States History (4)
Readings in selected topics in American history in the national period to 1877. *Prerequisite: upper-division or graduate standing.*

152Q. Colloquium in Social and Ethnic History (4)
A reading course focusing upon the history of ethnicity and ethnic groups in the United States, with particular emphasis upon migration, cultural identiy, and the role of minority groups. Required of M.A. candidates concentrating in United States social and ethnic history. *Prerequisite: upper-division or graduate standing.*

153Q. Colloquium: American Federalism (4)
This colloquium will consider the theory of federalism in American political thought and constitutional law; the historic uses and distribution of power in the federal system; the impact of the regulatory and welfare state on federalism; and similar topics. *Prerequisites: senior or graduate standing and instructor's permission.*

156Q. American Urban History (4)
Readings on urban politics, the allocation of municipal services, and the quality of life in nineteenth-and twentieth-century American cities. *Prerequisite: upper-division or graduate standing.*

157Q. Colloquium in American Legal and Constitutional History (4)
Readings for advanced students in the history of American law. *Prerequisite: upper-division or graduate standing.*

158Q. Colloquium in American Economic History (4)
Readings for advanced students in American economic history. *Prerequisite: upper-division or graduate standing.*

159Q. Colloquium in American Ethnic History (4)
Readings for advanced students in the history of minority groups in American society. *Prerequisite: upper-division or graduate standing.*

160Q. Colloquium in Colonial American History (4)
The colloquium will consider late colonial history, with special attention to neglected or undigested topics including: The Great Awakening as a social movement unrelated to the American Revolution; developing markets, social communication and mobility and their impact on community integration and conflict; corporation-exclusivity, regulation and professionalization in the occupations; the origins of the American nationality; socio-economic character of the early American. *Prerequisite: upper-division or graduate standing.*

161Q. Special Topics: The American Revolution (4)
Colloquium will deal with special topics on the American Revolution and the formation of the United States, 1763-1800. *Prerequisite: upper-division or graduate standing.*

164Q. Colloquium in American Intellectual History (4)
This course will deal with a variety of topics in American Intellectual History. Topic varies from year to year. *Prerequisite: upper-division or graduate standing.*

166Q. American Society in the Cold War (4)
An inquiry into the social, political, economic, and constitutional impact of the Cold War upon American society between 1945-1960. *Prerequisite: upper-division or graduate standing and permission of the instructor.*

167Q. Colloquium in Twentieth-Century American History (4)
Leading works on Progressivism, New Deal, Depression and American foreign policy will be considered and discussed. The emphasis will be on historiography. *Prerequisite: upper-division or graduate standing.*

168Q. America in the 1930's (4)
The impact of the Great Depression upon American society will be investigated in this reading and discussion course. In addition to using other types of historical materials, the course will consider literary works which explore aspects of social life during the decade. *Prerequisites: upper-division or graduate standing.*

169Q. Colloquium in American Diplomatic History (4)
A one-term colloquium designed to give the beginning graduate or qualified upper-classman an overview of United States foreign policy from Independence to modern times. Stress will be placed on economic and political as well as more traditional pragmatic motivations. *Prerequisite: upper-division or graduate standing.*

170Q. Colloquium on the Second World War (4)
The diplomacy of appeasement, early German victories and comparison of their occupation policies in different areas, creation of the Allied Coalition, resistance movements, the German defeats in Russia and the West, scientific developments and effects of the war on civilian populations, destruction of the "Old Regime" in Prussia and Eastern Europe. *Prerequisite: upper-division or graduate standing.*

171Q. Quantitative Methodology in History. (4)
An introduction to the uses and abuses of quantification in history which will acquaint the student with the potential applications of social-science methods to historical studies and teach basic quantitative skills, the use of packaged computer programs and basic statistics. *Prerequisite: upper-division or graduate standing.* (Not to be offered 1976/77.)

172Q. Colloquium on the Philosophy of History (4)
Establishment of the distinction between analytic and speculative philosophy of history, with emphasis on the former. Examination of the concepts and terms ordinarily used in historical discourse, as exemplified in major works of interpretation from Vico to Marc Bloch.. *Prerequisite: upper-division or graduate standing.*

173Q. Colloquium on the Methodology of History (4)
Topic varies from year to year. Topic will be psychosocial history. After a background of theoretical readings in Freud and Fairbairn, the course will focus on reinterpreting British and German social practices as exemplifed in autobiography,, case history, and the novel. No previous work in psychoanalytic theory or modern European history required. *Prerequisite: upper-division or graduate standing.*

177Q. Colloquium in the Economic History of Africa (4)
Will examine selected topics in African economic history. Topics will include the pre-colonial economy, economics of colonialism, economics of underdevelopment and postcolonial economic development. *Prerequisite: upper-division or graduate standing.*

186Q. Self and Society in Modern Chinese Thought (4)
This course examines the confluence of traditional modern ways of thought in China, dealing with revolutionary, liberal, and conservative trends in the twentieth century and with their relationships to traditional orientations. The first quarter is a lecture course; the second quarter is a coloquium. *Prerequisite: History 186 or permission of the instructor. Upper-division or graduate standing.*

189Q. Special Topics in Modern Chinese History (4)
This colloquium is designed to provide students who have sufficient background in modern Chinese history with an opportunity to explore special topics. Topic varies from year to year. *Prerequisite: upper-division or graduate standing.*

190Q. Colloquium in the Literature of Third World History (4)
Critical study of the literature of selected topics. Emphasis will be placed on traditional society, colonization, imperialism, resistance and revolution, movements for national independence and neo-colonialism. Geographical emphasis varies from year to year. Required of all master's students in the Third World area of concentration. Note: Topic for fall 1976 is same as History 248A: Interdisciplinary Seminar on Latin America. *Prerequisite: upper-division or graduate standing.*

196Q. Colloquium in History (4)
The nature and uses of history are explored through the study of the historian's craft based on critical analysis of historical literature relating to selected topics of concern to all historians. Required of all candidates for History Honors and open to other interested students with the instructor's permission. *Prerequisite: upper-division or graduate standing.*

Graduate

204A-B. Seminar in Medieval History (4-4)
Topics will include the Investiture Contest concentrating on the personalities involved in the ideas on both sides of the dispute, and the study of the development of Canonical jurisprudence, 1140-1234. An IP grade will be awarded at the end of the first quarter. Final grade will not be given until the end of the second quarter. *Prerequisites: graduate standing; reading knowledge of French, German, Italian or Latin.*

206A-B. Seminar in Early Modern Europe (4-4)
The seminar will focus on the topic "Science and Society in Early Modern Europe." Primary emphasis will be on England in the 17th Century. An IP grade will be awarded at the end of the first quarter. Final grade will not be given until the end of the second quarter. *Prerequisite: graduate standing.*

208A. Central Problems in European History from 1500-1715 (4)
A three-quarter sequence of readings and discussions, taught by different members of the staff each quarter. Required for all beginning graduate students, including M.A. candidates, in early modern and modern European history, as well as for students preparing a secondary field in either area. *Prerequisite: Graduate Standing. Upper-division with permission of the instructor.*

208B. Central Problems in European History from 1715-1850. (4)
A three-quarter sequence of readings and discussions, taught by different members of the staff each quarter. Required for all beginning graduate students, including M.A. candidates, in early modern and modern European history, as well as for students preparing a secondary field in either area. *Prerequisite: graduate standing. Upper-division with permission of the instructor.*

208C. Central Problems in European History from 1850-1945 (4)
A three-quarter sequence of readings and discussions, taught by different members of the staff each quarter. Required for all beginning graduate students, including M.A. candidates, in early modern and modern European history, as well as for students preparing a secondary field in either area. *Prerequisite: graduate standing. Upper-division with permission of the instructor.*

214A-B. Seminar in the Cultural History of Europe (4-4)
Topics include cultural change and redefinition in Britain, France, Germany, and Italy, 1890-1914. *Prerequisite; graduate standing.* (Not to be offered 1976/77.)

220A-B. Topics in Modern European History (4-4)
Varied topics in Modern European History. An IP (in progress) grade will be awarded at the end of the first quarter. Final grade will not be given until the end of the second quarter. Topic for 1976/77: European Fascism. *Prerequisite: graduate standing or permission of instructor. 220A prerequisite for 220B.*

230A-B. Seminar in the Expansion of Europe (4-4)
The expansion of European culture into the non-Western world analyzed through a series of case studies. Emphasis will be on cross-cultural analysis of the colonial experience in Asia and Africa. *Prerequisite: graduate standing.*

234A-B. Readings in Spanish History Since 1790 (4-4)
Study of major Spanish historians of the nineteenth and twentieth centuries. *Prerequisites: graduate standing; reading knowledge of Spanish essential.* (Not to be offered 1976/77.)

236A-B. Seminar in Spain Since 1870. (4-4)
Topics in the History of Spain Since 1870. *Prerequisite: Fluent reading knowledge of Spanish required. German or French desirable. Graduate standing.*

237A-B. Seminar in Colonial Latin American (4-4)
Readings and discussion in the monographic literature and in the sources of selected topics. Emphasis on analysis of the historiography of the period. Several papers will be required. *Prerequisite: graduate standing.*

246A-B. History of Mexico (4-4)
A research and study seminar of two quarters with primary emphasis on social change and the Mexican Revolution of 1910. The first quarter deals with primary sources, bibliography, and the selection of a research project; in the second quarter, the student will complete the project and submit the study to the scrutiny of the seminar. An IP grade will be awarded at the end of the first quarter. Final grade will not be given until the end of the second quarter. *Prerequisite: graduate standing. 246A is a prerequisite for 246B.*

247. Selected Themes in the Mexican Revolution (4)
Examination through literary and historical texts of major themes and topics such as the role of labor, culture and revolution, peasant movements, nationalism, and literary images of social change. *Prerequisite: graduate standing.*

248A. Interdisciplinary Seminar on Latin America (4)
Three-quarter seminar on Latin America for graduate students in the humanitites and social sciences. This first quarter will discuss history and modern society - both the impact of the nineteenth and early twentieth century in shaping present Latin America and Latin Americans' perception of the past. Basic materials will be drawn from economic and social history, anthropology, and literature. Full credit will be given at the end of each quarter. The second and third quarters of the seminar will be listed as Sociology 248B and Sociology 248C. *Prerequisite: graduate standing or permission of the instructor.*

250A-B-C. The Literature of American History (4-4-4)
A three-quarter sequence of readings and discussions on the bibliographical and monographic literature of American history from the colonial period to the present. Taught by different members of the staff each quarter. The course is required of all beginning graduate students in American history. *Prerequisite: graduate standing.*

251. Readings in American History (4)
Readings and discussion in selected areas of American history for advanced graduate students. *Prerequisite: graduate standing.*

258A-B. American Economic History (4-4)
Examination of some of the major interpretive problems in American economic history, and case studies of public economic policies and their impact. The first quarter will be devoted to readings and discussions, and the second quarter to the writing of individual research papers. *Prerequisite: graduate standing or permission of the instructor.*

261A-B. United States, Colonial Period (4-4)
Prerequisite: graduate standing.

266A-B. United States History, 1789-1877 (4-4)
Analysis of sources and methods of historical research in the National Period to 1877. Readings and original research papers will be required. *Prerequisite: graduate standing.*

267A-B. United States Since 1877 (4-4)
Analysis of sources and methods of historical research in the period since 1877. Readings and original research papers will be required. An IP grade will be awarded at the end of the first quarter. Final grade will not be given until the end of the second quarter. *Prerequisite: graduate standing.*

268A-B. American Society in the Twentieth Century (4-4)
A 2-quarter research seminar. Students will receive training in the archival sources and research techniques relevant to study of selected topics on American society since ca. 1900. Individual research papers. An IP grade will be awarded at the end of the first quarter. Final grade will not be given until the end of the second quarter. *Prerequisite: graduate standing.*

269A-B. Topics in U.S. Diplomatic History (4-4)
Critical analysis of major works in U.S. diplomatic history, designed to acquaint the student with the historiographic developments in the field. Readings, discussions, and papers will form the basis of the course. *Prerequisite: graduate standing.*

277A-B. Seminar in West African History (4-4)
A two-quarter seminar on selected topics in West African history. One quarter will be devoted to readings and discussions, and the second quarter to the writing of individual research papers. *Prerequisite: graduate standing.*

298. Directed Reading (1-12)
Guided and supervised reading in the literature of the several fields of history. *Prerequisite: graduate standing.* (Satisfactory/Unsatisfactory grades permitted.)

299. Thesis Direction (1-12)
Independent work by graduate students engaged in research and writing of doctoral thesis. *Prerequisite: graduate standing.* (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching (1-4)
A course in which teaching assistants are aided in learning proper teaching methods by means of supervision of their work by the faculty; handling of discussions, preparation, and grading of examinations and other written exercises, and student relations. *Prerequisite: graduate standing.* (Satisfactory/unsatisfactory grades permitted.)

501. Teaching in the Humanities (1-4)
Consideration of pedagogical methods appropriate to the teaching of literary, historical, and philosophical texts at the undergraduate level. Pedagogical aids for the teaching of composition. Surpervised teaching in sections of the undergraduate humanitites sequence. Student must be a teaching assistant or fellow-teaching assistant in Revelle College. (Satisfactory/Unsatisfactory grades only.)

503. Teaching in Third World Studies (1-4)
A course in which teaching assistants are aided in learning proper teaching methods by means of supervision of their work by the faculty; handling of discussions, preparation and grąding of examinations and other written exercises, and student relations. *Prerequisite: graduate standing.*

Humanities

OFFICE: 1512 Humanities-Library Building

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These sequences of courses may be used by Revelle College students in fulfilling the humanities requirement of the College. Interested students from other Colleges may register for these courses if space is available. They are offered jointly by the Departments of Literature, Philosophy and History and are intended to provide an interdisciplinary introduction to major aspects of the Western humanistic tradition. Students learn to interpret important literary, historical and philosophical documents through lectures and discussions.

One purpose of the program is to develop the student's ability to write clear and well-ordered expository prose. Humanities 11A-B-C and 12A-B-C are designed to meet this objective, and one of these sequences must be completed by all freshmen in Revelle College. In these courses, students meet twice weekly in sections organized on a laboratory basis and designed to provide instruction specifically devoted to writing. Weekly written exercises are required. Completing these sequences satisfies the Subject A requirement for students who have not otherwise satisfied it. Additional special attention is given to those students who enter Revelle College with a Subject A deficiency.

In the sophomore year, regular written exercises are required in conjunction with students' work in discussion sections.

For detailed description of the Revelle College Humanities requirement see "Revelle College, General Education Requirements, Humanities and Fine Arts."

A student may not graduate from Revelle College with a major in humanities. Students interested in the area of humanities must choose a specific major within the humanities, i.e., literature, philosophy, etc.

Courses

11A-B-C. The Early Western Tradition (6-6-6)
(Not open to students who have completed Humanities 2-3-4 or 10A-B-C).

11A.
Readings in the history, literature, and philosophy of the western world from biblical times through the Renaissance, combined with training and practice in writing skills. Writing laboratory sections are organized to give students experience in several rhetorical strategies. Intensive practice in writing expository prose. 2 or 3 hours of lecture, 2 hours of writing laborabory, 1-10 hours discussion.(F)

11B-C.
Readings in the history, literature, and philosophy of the western world from biblical times through the Renaissance, combined with writing laboratories organized to give students training and practice in the preparation and critique of expository essays relevant to the materials studied concurrently in the humanities portion of the course. 2 or 3 hours of lecture, 2 hours of writing laboratory, 1-0 hours discussion. (W-S)

12A-B-C. The Western Tradition from the Renaissance to the Present (6-6-6)
(Not open to students who have completed Humanities 5-6-7 or 20A-B-C).

12A.
Readings in the history, literature, and philosophy of the western world from the Reformation period to modern times, combined with training and practice in writing skills. Writing laboratory sections are organized to give students experience in several rhetorical strategies. Intensive practice in writing expository prose. 2 or 3 hours of lecture, 2 hours of writing laboratory, 1-0 hours of discussion.(F)

12B-C.
Readings in the history, literature, and philosophy of the western world from the Reformation period to modern times, combined with writing laboratories organized to give students training and practice in the preparation and critique of expository essays relevant to the materials studied concurrently in the humanities portion of the course. 2 or 3 hours of lecture, 2 hours of writing laboratory, 1-0 hours of discussion. (W-S)

20A-B-C. The Later Western Tradition (4-4-4)
(Not open to students who have completed Humanities 5-6-7 or 12A-B-C).

Readings in the history, literature, and philosophy of the western world from the Reformation period to modern times. 2 hours lecture, 1 hour discussion, regular assignments in expository writing. (F-W-S) *Prerequisite: completion of freshman course in humanities or equivalent.*

Iberian and Latin American Studies

The Center for Iberian and Latin American Studies (CILAS) coordinates and assists interdisciplinary research and instruction as they relate to the cultures of the Spanish and Portuguese speaking peoples. The staff includes faculty members from the Departments of Anthropology, Community Medicine, Drama, History, The Institute of Geophysics and Planetary Physics, Literature, Political Science, Psychiatry, Sociology, and Visual Arts. The Center operates across these traditional departmental boundaries to encourage inquiry in four sub-areas: the historical cultures of Iberia, the varied experiences of Latin America, the past and present life of the Chicanos of the Southwest U.S., and the problems of interaction of the *Frontera* or borderland region societies of Southern California and Baja California, Mexico.

CILAS research assistants have prepared a guide to selected Ibero-American holdings of the Central University Library and compiled an inventory of current research interests of faculty and graduate students for coordination of projects and grant applications. Other activities on the UC San Diego campus include aiding in coordination of Arte Picante: A contemporary Chicano Arts Festival, held during the winter quarter of 1976, and sponsorship of speakers for the fall of 1976. One symposium planned with "Fronteras 1976," the regional Bicentennial project, is entitled "San Diego de Alcalá: the Colonization of California." This will include the performance of the Lope de Vega dramatic work *San Diego de Alcalá* followed by a scholarly symposium. A second symposium to deal with contemporary Argentina is also currently being planned.

CILAS is working in the development projects for extended academic scholarship to be pursued in Spain and Mexico as well as UC San Diego and also facilitating exchange for foreign students and faculty. A project for studies on contemporary Spain on this campus in conjunction with the Catedra Seminario Menéndez Pidal, an autonomous research institute of the University of Madrid, which sponsors faculty-graduate students humanistic laboratories is being developed. Similar facilities are planned for studies in Mexico, border studies and Chicano Research projects on the UC San Diego campus.

	Course title	Department(s)	Course No.	Faculty	Quarter
General	Studies in Modern Hispanic Literature & Culture: Romanticismo, España y America	Literature	Lit/Sp 252	Kirkpatrick	Winter
Latin America	Political Myth in Latin America	Anthropology	Anthr. 164	Taylor	Fall
	Spanish Language in America	Literature	Lit/Sp 120	Sanchez	Winter
	Lit & Soc St (CILAS): The Colonial Period in Spanish America	Literature	Lit/Sp 272	Staff	Spring
	Society & Politics in Latin America	Sociology	Soc 164	Waisman	
	The Politics of Industrialization	Sociology	Soc 147	Waisman	
	Interdisciplinary Seminar on Latin America	Sociology	Soc 248-B	Waisman	
	Comparative Rural Societies	Sociology	Soc 170-A	Blumberg	Fall
	Socio-economic Change in Underdeveloped Areas	Sociology	Soc 170-B	Blumberg	Winter
	Urban Underclass around the World	U&RS	U&RS 159	Blumberg	Spring
	Interdisciplinary Seminar on Latin America 19th & 20th Century	History	Hist 248-A	Monteon	Fall
	Comparative History of the Americas	History	Hist 1-B	Monteon	Winter
	Egalitarian Revolutionary Movement	History	Hist 149	Monteon	Spring
Chicano Culture	Colloquium in American Ethnic History	History	Hist 159-Q	Romo	Fall
	Indigenous Roots of Chicano Theatre	Drama	Drama 14	Huerta	Fall
	Introduction to Contemporary Chicano Theatre	Drama	Drama 15	Huerta	Winter
	Development of Chicano teatro	Drama	Drama 165-A	Huerta	Winter
	Development of Chicano teatro	Drama	Drama 165-B	Huerta	Spring
	Introduction to Chicano Literature	Literature	Lit/Sp 153	Staff	Fall
	Seminar: Chicano Fiction	Literature	Lit/Sp 190	Staff	Winter
	Machismo & Matriarchy	History	Hist 15	Monteon	Fall
	Race & Ethnicity in the United States	History	Hist 7-C	Romo	Spring
	Television Documentary	Communications	Comm 101-B	Fenner-Lopez	Winter

	Television as a Social Force	Communications	Comm 101-C	Fenner-Lopez	Spring
	The Mexican-American Family	Sociology	Soc 115	Ramos	Fall
Iberia	La Novela Picaresca Española	Literature	Lit/Sp 272	Guillen	Winter
	20th Century Spain	History	Hist 236-A	Jackson	Fall
	20th Century Spain	History	Hist 236-B	Jackson	Winter
	Special Topics & Expansion of Europe, Colonial Spain & the Empire	History	Hist 130-Q	Ringrose	
	Lit&Soc St (CILAS): Novela y Sociedad en el Siglo XIX	Literature	Lit/Sp 272	Kirkpatrick	Spring
	Lit&Soc St (CILAS): Analisis estructural del reportaje periodista	Literature	Lit/Sp 272	Catalan	Spring

Judaic Studies

OFFICE: 2024 Humanities and Social Science Building.

UC San Diego offers a number of courses and course sequences in the area of Judaic studies, which enable all interested students to gain insights into the principal aspects of Jewish culture, including history, philosophy, religion, literature, and language. Several of the courses offered emphasize the relationship of Judaism to other cultures.

Currently no regular major program in Judaic Studies is available. However the Special Project major in Muir College allows for a concentration in Judaic Studies. In addition, Revelle College has non-contiguous minors in Judaic Studies; Fourth College has Judaic Studies concentrations; and various general requirements in all colleges can be met by courses in the Judaic area. For details students should inquire at their Provost's Office.

UC San Diego students are eligible for participation in the UC Education Abroad Programs in Jerusalem and Haifa.

Following are course offerings in this area; it is expected that some additional courses will be available.

For descriptions of the courses listed below, refer to the appropriate department's section of the catalog.

Cultural Traditions, Judaic 1A-B-C (4-4-4)
(Also listed as Philosophy 30A-B-C)

History 100. Ancient Near East and Israel (4)

Humanities 10A. The Greek Hero and the Hebrew God (4)

Humanities 12A-B-C. The Ancient Near East and Greece (4-4-4)

Lit/Hebrew 1. Beginning Hebrew (4)

Lit/Hebrew 2-3. Intermediate Hebrew (4-4)

Lit/Hebrew 9. Introduction to Readings and Interpretations (4)

Lit/Hebrew 10. Readings and Interpretations (4)

Lit/Hebrew 11. Readings in Hebrew Literature and Culture (4)

Lit/Hebrew 121. Medieval Hebrew Literature (4)

Lit/Hebrew 126. Hebrew Literature (4)

Lit/Hebrew 190. Seminars (4)

Lit/Hebrew 121, 126 and 190 may be taken as Hebrew Literature by students proficient in the language or as General Literature by students without knowledge of Hebrew.

Philosophy 30A-B-C. (4-4-4)
(Also listed as Cultural Traditions, Judaic 1A-B-C)

Philosophy 160. Philosophy of Religion (4)

Language

OFFICE: Language Center, 2125 Psychology and Linguistics Building

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Courses numbered Language 1-2-3-4-5-6 consist of a combination of small tutorial meetings with a native speaker, weekly group conferences led by a linguist, assigned laboratory work and outside reading.

Students who begin their study of a language at UC San Diego should enroll in Language 1. Students who have studied a language previously must take a placement test if they wish to continue study of that language at UC San Diego. Placement within the language course sequence or in Literature 10 or 11 will be determined by the results of that examination.

Placement into language or literature courses will be as follows:

COURSE	PREREQUISITES		
	Previous Courses		Placement Result*
Language 1	none	or	0-400
Language 2	1	or	400-500
Language 3	2		
Language 4	3	or	500-550
Language 5	4		
Language 6	5		
Literature 9	3	or	500 (Russian) Native speaker (Spanish)
Literature 10	4, 5, or 6 (with a grade of A)	or	Basic Language Proficiency (550 plus oral interview)
Literature 11	10	or	Intermediate Language Proficiency (650 plus oral interview)
Literature 15	10		
Literature 24			Native Speakers (Spanish)
Literature 25	10		

*Numerical scores are for CEEB examination.

Courses numbered Language 11 are self-instructional and are intended for students whose concern is to learn only to read a language, and for graduate students preparing to fulfill French or German reading requirements.

The language laboratory and language library at UC San Diego offer a rich collection of materials that can be used for self-instruction in a variety of languages. To encourage students to take advantage of these materials, credit will be granted to undergraduate students who wish to study language on a self-instructional basis. Such students should enroll in Language 19. On the first day of the quarter students enrolled in Language 19 must meet with the supervisor of Language 19, who will establish a program of study and arrange for a mid-

term and a final examination. Subject to the availability of materials at a suitable level of advancement, Language 19 may be taken for full or half credit and may sometimes be repeated for credit.

Credit earned in language courses which duplicates credit gained in previous courses will not be counted towards graduation.

The facilities and materials in the language laboratory and language library are available to all students and faculty of the University, whether or not they are formally enrolled in one of the language programs.

Courses

Chinese

Lang/Ch 61. Elementary Mandarin (4)
Basic grammar and usage with initial emphasis on the spoken language. The written language will be progressively incorporated.

Lang/Ch 62. Elementary Mandarin (4)
Continuation of Lang/Ch 61. *Prerequisite: Lang/Ch 61 or equivalent.*

Lang/Ch 63. Elementary Mandarin (4)
Continuation of Lang/Ch 62. *Prerequisite: Lang/Ch 62 or equivalent.*

Lang/Ch 64. Intermediate Mandarin (4)
Grammar, conversation, reading and writing in Mandarin. Continuation of Lang/Chinese 63.

Lang/Ch 65. Intermediate Mandarin (4)
Continuation of work begun in Lang/Chinese 64, Intermediate Mandarin.

Lang/Ch 66. Intermediate Mandarin (4)
Continuation of work in Chinese 64, Intermediate Mandarin.

See also:
Chinese Studies/175. Readings in Contemporary Chinese 1 (4)
Chinese Studies/176. Readings in Contemporary Chinese II (4)
Chinese Studies/181A. Introduction to Classical Chinese (4)
Chinese Studies/181B. Introduction to Classical Chinese (4)

Esperanto

Lang/Es 16. Elementary Esperanto (4)
An introduction to the construction of Esperanto, its origins and its literature and general problems of man-made language projects. Students should be able to speak, write, read and understand Esperanto by the end of the quarter. (Esperanto may not be submitted to fulfill UC San Diego language requirements.)

Lang/Es 26. Intermediate Esperanto (4)
Conversation, play reading, use of instructional tapes. History of international language projects, birth and development of Esperanto, current uses, etc. *Prerequisite: Lang/Es 16 or equivalent.*

Lang/Es 36. Advanced Esperanto (4)
Discussion of literary works and poetry, both translations and original belles lettres. Translations into Esperanto of documents of significance in U.S. and World history. Preparation for active personal participation in annual international Esperanto congresses. *Prerequisite: Lang/Es 26 or equivalent.*

French

Lang/Fr 1-2-3-4-5-6 French (4-4-4-4-4-4)
See general description above.

Lang/Fr 11 Elementary French Reading (2-4)
A course designed to prepare graduate students to meet reading requirements in French. After a one-week introduction to French orthography/sound correspondences, students work with a self-instructional textbook. Mid-term and final examinations. (F,W,S)

See also:
Department of Literature
Lit/Fr 10 Readings and Interpretations (4)
Lit/Fr 25 Composition and Conversation (4)

German

Lang/Ge 1-2-3-4-5-6 German (4-4-4-4-4-4)
See general description above.

Lang/Ge 11 Elementary German Reading (2-4)
A course designed to prepare graduate students to meet reading requirements in German. After a one week introduction to German orthography/sound correspondences, students work with a self-instructional textbook. Mid-term and final examinations. (F,W,S)

See also:
Department of Literature
Lit/Ge 10 Readings and Interpretations (4)
Lit/Ge 25 Composition and Conversation (4)

Greek

See:
Department of Literature
Lit/Gr 1. Beginning Greek (4)
Lit/Gr 2. Intermediate Greek (4)

Hebrew

See:
Department of Literature
Lit/He 1, 2, 3. Hebrew (4-4-4)
Lit/He 9. Introduction to Reading and Interpretations
Lit/He 10. Readings and Interpretations (4)
Lit/He 11. Readings in Hebrew Literature and Culture

Italian

Lang/It. 1, 2, 3. Italian (4-4-4)
See general description above.
See also:
Department of Literature
Lit/It. 10 Readings and Interpretations (4)

Latin

See:
Department of Literature
Lit/La 1. Beginning Latin (4)
Lit/La 2. Intermediate Latin (4)

Russian

Lang/Ru 1-2-3 Russian (4-4-4)
See general description above.

See also:
Department of Literature
Lit/Ru 9 Intermediate Russian (4)
Lit/Ru 10 Readings and Interpretations (4)

Spanish

Lang/Sp 1-2-3-4-5-6 Spanish (4-4-4-4-4-4)
See general description above.

See also:
Department of Literature
Lit/Sp 9 Readings and Interpretations: Spanish for Native Speakers (4)
Lit/Sp 10 Readings and Interpretations (4)
Lit/Sp 25 Composition and Conversation (4)

Directed Study

Lang/19 Directed Study — Language (2-4)
Self-instructional materials are available at present in Afrikaans, Albanian, American Sign Language, Arabic (Iraqui), Arabic (eastern), Arabic (Egyptian), Arabic (Moroccan), Basque, Bengali, Bulgarian, Burmese, Chinese (Cantonese), Chinese (Mandarin) Chinese (Amoy), Czech, Danish, Dutch, Efik, English as a Foreign Language, Esperanto, Finnish, French, German, Modern Greek, Haitian Creole, Hausa, Hawaiian, Modern Hebrew, Hindi, Hungarian, Igbo, Icelandic, Italian, Japanese, Korean, Latin, Luganda, Malay, Maori, Navajo, Nepali, Nigerian Pidgin, Norwegian, Persian, Polish, Portuguese, Russian, Serbo-Croatian, Spanish, Swahili, Swedish, Tagalog, Tibetan, Thai, Turkish, Twi, Vietnamese, Yiddish, Yoruba.

Linguistics

OFFICE: 5237 Psychology and Linguistics Building

Professors: C-008
Edward Klima, Ph.D.
Sige-Yuki Kuroda, Ph.D.
Ronald W. Langacker, Ph.D.
Leonard Newmark, Ph.D.
Sanford Schane, Ph.D. *(Chairman)*

Associate Professors:
Margaret H. Langdon, Ph.D.

Assistant Professors:
Matthew Y-Ch Chen, Ph.D.
Sandra L. Chung
Timothy S. Smith, Ph.D.
Benjamin K. T'sou, Ph.D.

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Broadly speaking, linguistics is the study of language *as* language. Like other rapidly developing fields, linguistics resists simple classification into one of the traditional categories of academic disciplines. Considered as one of the humanities, linguistics concentrates on the historical development of a particular language or language family, or on the relation between a language and the literature composed in that language. Considered as a social science, linguistics may be related to anthropology, in describing language as part of culture; or it may be related to psychology, in describing language as a kind of behavior. One branch of linguistics, phonetics, may even be considered a natural science, related to the physical science of acoustics and the biological sciences of anatomy and physiology. Considered as an applied science, linguistics has found many applications in fields as far apart as language pedagogy and mechanical translation. Finally, linguistics may be considered a formal science in its own right, related to mathematics and formal logic.

(The Department of Linguistics supervises the teaching of the foreign languages offered in the Basic Language Program as well as Language 19. See *Language*.)

The Major Program An undergraduate major in linguistics is intended to give students the background that will best prepare them for graduate work in this field. At the same time, the department has attempted to design major programs consistent with the particular tone of each of the colleges. Because linguistics shares its object matter — language — with so many other disciplines, this major is unlike many others in that it requires fewer courses in the major department itself. The major in linguistics will consist of 12 upper-division courses: six basic courses in the Department of Linguistics, complemented by six other courses directly related to the study of language. For all courses counted toward the major in linguistics, the student must receive grades of C or better.

All linguistics majors must take at least six upper division courses in the Department of Linguistics. These are normally preceded by Linguistics 1-2, or their equivalent with the permission of the instructor.

The foreign-language proficiency requirements for linguistics majors exceed those set by the undergraduate colleges in both breadth and depth.

Language Requirement I: The student must achieve lower-division proficiency in French, German, Spanish, or Russian. Lower-division proficiency is normally established by passing a reading proficiency examination as well as passing an oral interview administered by the UC San Diego Basic Language Program.

Language Requirement II: The student must achieve competence in at least one additional foreign language. Competence is defined as a successful completion of three one-quarter courses or the equivalent in a second language, which need not necessarily be one of the four listed in Language Requirement I.

Independent Study and Directed Group Study in Language and Linguistics for Majors Upon presentation of a written study proposal, linguistics majors with at

least a 3.0 GPA may request permission to undertake directed group study in language and linguistics (Linguistics 198) or independent study in linguistics (Linguistics 199).

The Revelle Major Program

(1) Language Requirements I and II.

(2) Six upper-division courses in linguistics.

(3) A cohesive set of six additonal upper-division courses related to the study of language. These six additonal courses of the linguistics major must be relevant to the study of language but may be taken in departments other than Linguistics: for instance, Mathematics, Applied Physics and Information Science, Philosophy, Psychology, Anthropology, Sociology, or Literature. These courses need not be taken in the same department but they must form a coherent program of study in conjunction with the required core of linguistics courses. The courses to complete the major are selected in consultation with the departmental undergraduate adviser. Because of the great flexibility of the linguistics major, the classification of this major as humanities, natural science or social science must be determined on the basis of each student's specific program. The classification of the major program will in turn determine what areas will be acceptable for the student's noncontiguous minor.

The Revelle Minor Program The linguistics minor consists of six courses, of which at least three must be upper-division; the departmental requirement is Linguistics 1-2 (or their equivalent with permission of the instructor) in addition to one upper-division course in linguistics. The remaining minor courses must be relevant to the study of language but may be taken in departments other than Linguistics: for instance, Mathematics, Applied Physics and Information Science, Philosophy, Psychology, Anthropology, Sociology, or Literature. These courses need not all be taken in the same department, but they must form a coherent program of study. The courses to complete the minor are selected in consultation with the departmental undergraduate adviser. The content of these courses will determine whether the linguistics minor is classified as humanities, natural science, or social science.

The Muir and Fourth College Major Program

(1) Language Requirements I and II.

(2) Six upper-division courses in linguistics.

(3) Six additonal upper-division courses from linguistics or from the list of related courses. Muir majors must take at least one course (not necessarily upper-division) from each of the four areas of related courses.

Related Courses for Muir and Fourth College Majors

Formal Linguistics Area:
Phil 110; Math 80, 111, 160, 161, 180, APIS 119, 151A, B, 161, 162, 165, 167, 173, Anthro 112; Psych 148.

Psycholinguistic Area:
Psych 10, 11, 107, 108, 110, 111, 112, 120, 121, 123, 130, 132, 135, 136, 137, 138, 145, 147.

Sociolinguistic Area:
Anthro 105, 106, 118, 121, 152, 156; Soc 103, 106, 107, 108, 116, 181.

General Semiotic Area:
Lit 191; Phil 104, 112, 130; Commun 132, 152, 154, 183, 190; Vis Arts 131; Hist 190; Anthro 147; Lit X (an upper-division literature course taught in a foreign language).

The Third College Major Program

(1) Language Requirement I and either Language Requirement II or a paper demonstrating the student's knowledge of the structural characteristics of a non-standard dialect.

(2) Six upper-division courses in linguistics.

(3) Six additional upper-division courses in linguistics or from the list of related courses. Third College majors must take at least one course (not necessarily upper-division) from each of the four areas of related courses.

Related Courses for Third College Majors

Historical Background to Sociolinguistics Area:
His 137, 146, 175, 178, 179, 180, 182, 183, 184; Soc 128, 145.

Applied and Non-Experimental Social Science Area:
Literature 195, Anthro 105, 106, 118, 121, 152, 156; Soc 103, 106, 107, 108, 116, 181.

Psychology of Language and Quantitative Analysis Area:
Psych 10, 11, 107, 108, 110, 111, 112, 120, 121, 123, 130, 132, 135, 136, 137, 138, 145, 147, 148; Math 80, 111, 160, 161, 180, 181; Anthro 112; APIS 119, 151A, B, 161, 162, 165, 167, 173; Phil 110.

General Semiotic Area:
Lit 191; Lit/Sp 141, 142, 143; Commun 132, 152, 154, 183, 190; Phil 104, 112, 130; Vis Arts, 131; Hist 190; Anthro 147; Lit X (an upper-division Literature course taught in a foreign language).

The Graduate Program In order to develop scholars capable of original research and effective teaching, the linguistics faculty has planned a graduate program aimed at imparting: *(a)* a thorough understanding of contemporary linguistic theory and linguistic analysis, and *(b)* intensive training in a specialized area of linguistic study, within linguistics itself or in conjunction with related disciplines.

Preparation Since linguistics is a highly technical and analytic field, linguistics students will find their undergraduate training in mathematics and the natural sciences especially valuable. Undergraduate work in certain of the social sciences and humanities, particularly psychology, anthropology, philosophy, and literature, is also good preparation for linguistics. All applicants are expected to have substantial experience with foreign languages. Students may begin their graduate programs here with no previous course work in linguistics proper. However, such students are advised to become acquainted with the fundamentals of contemporary linguistic theory, either by reading on their own or by taking some basic course work during the summer prior to enrollment. Because the basic graduate courses offered by the Department of Linguistics are three-quarter sequences, new graduate students will normally be admitted only in the fall quarter of any academic year. Applicants for admission to graduate status in linguistics are normally required to submit scores on the Graduate Record Examinations Aptitude Test given by the Educational Testing Service of Princeton, New Jersey.

Program of Study The graduate program is aimed essentially towards the Ph.D. in Linguistics, with a provision for granting the M.A. (Plan II) in Linguistics or in Teaching English as a Second Language, and the C. Phil upon completion of certain requisite graduate requirements. In the first two years of graduate study, the student's basic courses will stress linguistic theory, the structure of English (particularly from the point of view of generative grammar) and language analysis. For advanced work, students will choose, subject to the approval of the department's graduate committee, an area of specialization based on individual interests: for example, linguistic theory, Romance linguistics, English linguistics, psycholinguistics, language acquisition, or anthropological linguistics.

Language Requirements A candidate for the M.A. degree must demonstrate (1) an ability to read French, German, or Russian, to be tested by the department, and (2) knowledge of the structure of a non-Indo-European language, either through performance in courses on the structure of the language or in a descriptive paper acceptable to the department's graduate committee.

A candidate for the Ph.D. degree, in addition to meeting language requirements (1) and (2) above, must demonstrate (3) reading knowledge of a second foreign language — French, if it has not been used in fulfilling the M.A. requirements, otherwise German or Russian — and (4) oral fluency in some language other than one's native language. The language chosen for oral fluency may be one of those in which the student has satisfied a reading requirement.

Departmental Examinations Candidates for both the M.A. and Ph.D. degrees must pass the departmental comprehensive examination. This written examination gauges the student's general familiarity with modern descriptive and comparative linguistics. Normally, a student may take the examination no earlier than three quarters and no later than eight quarters after beginning graduate study. To be eligible to take the comprehensive examination, the student must have satisfied language requirement (1) above.

Candidates for the Ph.D. degree must also take a qualifying examination — a two-hour oral examination which tests knowledge in the area of specialization. The qualifying examination, which normally requires from six to nine quarters of course preparation at the graduate level, may be taken only after the student has passed the departmental comprehensive examination and satisfied all language requirements.

Apprentice Teaching and Research As part of their preparation for a future academic career, linguistics students at UC San Diego are given special opportunities to participate in one of the department's teaching and research programs under the supervision of a professor. Depending on qualifications, the students may conduct conversation classes or analysis confer-

ences in the Basic Language Program administered by the department, or they may be asked to assist a professor in the teaching of a graduate or undergraduate linguistics course, or may do research in linguistics under the supervision of the doctoral committee chairperson. Such apprentice training, equivalent to a half-time assistantship for three quarters, is an integral part of the linguistics graduate program at UC San Diego and as such constitutes one of the requirements for the Ph.D.

Dissertation The candidate will write a substantial dissertation incorporating the results of original and independent research carried on under the supervision of the doctoral committee. The candidate will be recommended for the Doctor of Philosophy degree after making a successful oral defense of the dissertation before the doctoral committee.

Courses

Lower Division

1. Language as Communication (4)
A general introduction to language: English dialects; language change; acquisition; human language and animal communication.

2. Language as System (4)
Introduction to syntactic theory and analysis: phonetics, phonological theory and analysis.

3. Language as Object (4)
Special topics in linguistics. Areas of interest may include psycholinguistics, sociolinguistics, anthropological linguistics, neurolinguistics, history of English, orthography. *Prerequisite: Linguistics 2. Language as System.*

Upper Division

101. Introduction to Syntax (4)
Examination of the syntactic structures of natural languages, with special reference to the structure of English. Exercises in syntactic description. The empirical justification of syntactic analyses. Syntactic theory and universals. *Prerequisites: Linguistics 1 and 2; Language Requirement I.*

102A. Articulatory Phonetics (4)
Elementary anatomy and physiology of the speech mechanisms. Extensive practice in producing and transcribing the sounds used in a wide variety of the languages of the world. Discussion of phonological/phonetic feature systems. *Prerequisite: Linguistics 1 and 3, language requirement I.*

102B. Introduction to Phonology (4)
Examination of the phonological structures of natural languages. Exercises in phonological description. The empirical justification of phonological analyses. *Prerequisite: Linguistics 102A.*

111. Fieldwork (4)
Techniques of linguistic analysis and application of these techniques to fieldwork, either in a sociolinguistic setting or in a simulated field situation by elicitation from native informants. *Prerequisites: Linguisitics 101 and 102B or consent of instructor.*

131A. Introduction to Mathematical Linguistics (4)
Basic mathematical concepts and methods useful in the study of formal grammars and the formal study of syntax and semantics of natural languages. Elements of set theory, propositional and predicate calculus, formal grammars and automata theory. *Prerequisites: Linguistics 1 and 2.*

134. Language and the Computer (4)
Basic theory and state of the art of linguistic analysis by computer. What computers can and can't do. Psychological and philosophical implications of automatic language processing. Applications: machine translation, speech recognition, question-answering systems, etc. *Prerequisite: Linquisitcs 1 and 2 or equivalent, or consent of instructor.*

151. Introduction to Historical Linguistics (4)
Language change. Genetic and aereal relationships. The comparative method. Internal reconstruction. *Prerequisites: Linguistics 102B and Language Requirements I and II.*

152. History of the English Language (4)
General trends in the historical development of the English language, its sounds and its grammar. *Prerequisites: Linguistics 1 and 2.*

161. French Linguistics (4)
A survey of some major syntactic and semantic processes in the French language which have been largely ignored by traditional grammarians but prove to be extremely interesting in the framework of modern linguistics. Although the problems discussed stem from work in transformational generative grammar, no previous knowledge of this theory will be assumed: new concepts will be introduced as they apply to the material studied.

164. Language Structures (4)
Detailed investigation of the structure of one or several non-Indo-European languages. *Prerequisites: Linguistics 101 and Linguistics 102B. Language Requirements I and II.* May be repeated for credit with consent of instructor.

165. Native American Languages (4)
A survey of Native American languages, their genetic relationships and area groupings. Specific languages and families are selected for more detailed discussion, illustrating questions of relevance to linguistic theory and analysis, sociolinguistics, and applied linguistics.

174. Sociolinguistics (4)
Introduction to the study of the social dimension in linguistics. Topics covered may include: bilingualism, code switching, pidgins, creole language, social factors affecting linguistic change, languages in contact, language in context. *Prerequisites: Linguistics 1 and 2.*

175. Bilingual Education in the U.S. (4)
Bilingual education as currently practiced in the U.S. Special concern with two basic questions: 1. assumptions underlying theory of bilingual education; 2. comparison of theory with its realization in specific ethnic communities. Objective is view of bilingual education which takes into account different needs of various ethnic groups. *Prerequisites: Linguistics 1 and 2 or consent of instructor.*

179. Linguistics and Poetics (4)
Formal poetics, a linguistic approach to various forms of literature. Fundamentals of linguistics will be related to various current theories of literature. Special attention will be given to structuralist analyses of literature including those by Jakobson and the generative grammarians. *Prerequisites: Linguistics 1 and 2.*

181. Psycholinguistics (4)
The study of models of language acquisition from the point of view of modern linguistics and psychology. Basic experimental method as applied to language. *Prerequisites: Linguistics 1 and 2 or equivalent; or Psychology 110 or 105 or equivalent.*

182. Language and the Brain (4)
The course explores the neuroanatomical and neuropsychological aspects of normal and abnormal language. Topics to be covered include cerebral lateralization of the language functions, aphasias and other disorders, and animal communication as contrasted with human language. *Prerequisites: Linguistics 102A-B; Linguistics 101 or consent of instructor.*

185. Theories and Methods of Foreign Language Acquisition (4)
This course will examine linguistic, psychological, and pedagogical arguments that underlie various language teaching programs. *Prerequisites: speaking and reading competence in a foreign language.*

198. Directed Group Study in Language and Linguistics (2 or 4)
Study of specific language structures or linguistic topics not covered in regular course work, under the direction of an undergraduate major adviser in the linguistics department. *Prerequisite: consent of instructor.* (See description under *Major Program* above.) (May be repeated for credit.)

199. Independent Study of Linguistics (2 or 4)
The student will undertake a program of research or advanced reading in linguistics under the supervision of a faculty member of the linguistics department. *Prerequisite: consent of instructor.* (See description under *Major Program* above.) (May be repeated for credit.)

See also: **Chinese Studies /163: Introduction to Chinese Linguistics.**

Graduate

201A. Linguistic Theory (3)
Introduction to the theory of generative grammar; transformational rules and other rules schemata. Models for syntactic description: formalization of grammars.

201B. Linguistic Theory (3)
Advanced problems in syntactic theory: deep and surface grammar; semantic considerations in syntax. *Prerequisite: Linguistics 201A or equivalent.*

202A. Articulatory Phonetics (3)
Elementary anatomy and physiology of the speech mechanisms. Extensive practice in producing and transcribing the sounds used in wide variety of the languages of the world. Discussion of phonological/phonetic feature systems.

202B. Elementary Phonology (3)
Introduction to phonological theory. Theoretical constructs and formalism. General problems in phonological analysis. *Prerequisite: Linguistics 202A or equivalent. Linguistics 202A and 202B may be taken concurrently.*

202C. Advanced Phonology (4)
Advanced problems in generative phonology. Phonological processes, universal constraints and naturalness conditions. Emphasis on some selected current theoretical issues. *Prerequisite: Linguistics 202B or equivalent.*

211A-B. Linguistic Analysis (3-3)
Techniques of linguistic analysis (phonetics, phonemics, morphology, syntax). Application of these techniques under simulated field conditions to the recording and analysis of a language by direct elicitation from native informants. May be repeated for credit.

224A-B. Modern English (3-3)
A detailed study of the syntax, phonology, and semantics of modern English, with particular emphasis on current research on the general theory of grammars, as developed through the study of English.

225. Topics in Syntactic Theory (3)
Theoretical and descriptive problems in the analysis of the syntactic and semantic structure of English and other languages. May be repeated for credit.

231A-B. Formal Linguistics (3-3)
Theory of formal grammars, with particular emphasis on context-free grammars. Aspects of theories of automata and computation related to grammatical systems. Relationship of the hierarchies of automata and grammars.

234. Computational Linguistics (3)
Parsing algorithms for formalized grammars. Approaches to natural-language processing. The computer as a linguist's tool.

235. Topics in Formal Linguistics (3)
Advanced material in special areas of the study of formal grammars to be selected by the instructor. May be repeated for credit. *Prerequisites: 231A-B or consent of instructor.*

245. Topics in Phonological Theory (3)
Current theoretical issues in phonological theory. Since the topic can change from year to year, course may be repeated for credit.

247. Topics in Experimental Phonetics (3)
Detailed study of the acoustic structure of speech and of the basic anatomy and physiology of normal speech production. Laboratory techniques in these areas will be covered. Relations between experimental phonetics research and phonological theory will be discussed. May be repeated for credit. *Prerequisite: consent of instructor.*

251. Historical Linguistics (3)
Topics offered on regular basis will include: Indo-European phonology and morphology; the techniques of linguistic reconstruction; theory of language change; advanced problems of historical linguistics.

252. History of the English Language (3)
The general history of English phonology and syntax; and special selected topics in the history of the English languages. *Prerequisite: consent of instructor.*

261. Romance Linguistics (3)
The history and structure of the Romance languages in the context of generative grammar. Topics offered on a regular basis will include: historical French syntax, historical French phonology, modern French syntax, modern French phonology, historical Romance phonology, historical Romance syntax.

262. Albanian Linguistics (3)
Grammatical analysis of Albanian—its phonology, morphology, and syntax.

263. Topics in Chinese Linguistics (3)
Synchronic and diachronic descriptions of Chinese. Survey of some of the following areas: phonology, syntax, dialectology, phonological change, syntactic change, semantic structure, history of Chinese linguistics. Since the topic can change from year to year, course may be repeated for credit.

264. Language Structures (3)
Grammatical analysis of a specific language. Language considered in a given quarter may be Sanskrit, Japanese, Albanian, Diegueno, Hungarian, Old Norse, Tongan or Uto-Aztecan. May be repeated for credit.

265. Topics in American Indian Linguistics (3)
Subjects covered may include: the genetic classification of American Indian languages; the structure of individual languages; change and reconstruction; areal relationships; survey of individual language families. Since the topic can change from year to year, course may be repeated for credit.

267. Topics in Contrastive Linguistics (3)
A comparison of the phonological, morphological, and syntactic structures of English and selected foreign languages with special reference to language teaching. May be repeated for credit.

268. Topics in Japanese Linguistics (3)
Selected topics from special areas of Japanese syntax and phonology to be selected by the instructor. Since the topic can change from year to year, course may be repeated for credit.

269. Topics in Polynesian Linguistics (3)
Current problems in comparative Polynesian linguistics, reconstruction of Proto-Polynesian, external relationships of Polynesian. May be repeated for credit.

271. Anthropological Linguistics (3)
In a given quarter the topic may be: language and culture; the interrelationships of language and other aspects of human behavior; Indian languages of North America; Oceanic languages; or advanced problems in anthropological linguistics.

274. Sociolinguistics (3)
Introduction to the study of the social dimension in linguistics. Topics covered may include: bilingualism, code switching, pidgins, creole language, social factors affecting linguistic change, languages in contact, language in context.

275. Topics in Semantics (3)
Advanced material in special areas of the study of meaning and its relation to formal aspects of human language. Since the topic can be changed from year to year, course may be repeated for credit.

279. Literary Studies and Linguistics (4)
Fundamentals of linguistics. The relationship of literary theories and current linguistic theories. Examination of formalist and structuralist analyses of literary texts. The contribution of various literary theorists (Jakobson, Ingarden, Spitzer, etc.) to poetics. Structural analysis of selected texts, mostly in English.

280. Topics in Historical Change (3)
Selected topics in syntactic, semantic, and phonological change in one or more languages; discussion of theories accounting for linguistic change. The content of the course will vary from year to year, so the course may be repeated for credit.

281. Psycholinguistics (3)
The study of models of language and of language acquisition from the point of view of modern linguistics and psychology.

282. Language and the Brain (3)
The course explores the neuroanatomical and neuropsychological aspects of normal and abnormal language. Topics to be covered include cerebral lateralization of the language functions, aphasias and other disorders, and animal communication as contrasted with human language. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted).

285. Topics in Foreign Language Acquisition (3)
Seminar will investigate the theories that underlie the teaching of foreign languages, with particular concentration on contemporary statements claiming a basis in modern psychology and linguistics. May be repeated for credit.

286. Topics in the Language of the Deaf (3)
The structure of American sign language and other gestural languages of the deaf. Perception of language in the visual mode. Since the topic can change from year to year, course may be repeated for credit.

287. Topics in Orthography (3)
The relationship of orthographic systems to structural linguistics. Since the topic can change from year to year, course may be repeated for credit.

288. Topics in Psycholinguistics (3)
Selected topics in experimental psycholinguistics and applications to language acquisition and pathology. *Prerequisite: consent of instructor.*

290. Issues in Contemporary Linguistics (3)
Discussion of a selected topic drawn from the history of linguistics and general linguistics.

291. Topics in History of Linguistics (3)
Salient features in the development of the various aspects of linguistic theory will be surveyed, and the contributions of principal schools, such as the Neogrammarian, Prague, Structuralist traditions, will be assessed. Since the topic can change from year to year, course may be repeated for credit.

292. Seminar in Language Universals (3)
The methods and concepts of universal grammar. Discussion and evaluation of proposed universals. Original research into universal semantic, syntactic, and phonological tendencies. Since the topic can change from year to year, course may be repeated for credit.

296. Directed Research (1-6)
Individual research (Satisfactory/Unsatisfactory grades permitted.) May be repeated for credit.

298. Fieldwork (1-6)
Linguistic analysis of language in the field. May be repeated for credit.

299. Doctoral Research (1-9)
Directed research in/on dissertation topic for students who have been addmitted to candidacy for the Ph.D. degree. *Prerequisite: admission to candidacy.* (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching Linguistics (1-4)
The course, designed to meet the needs of graduate students who serve as LA's and TA's, includes analyses of texts and materials, discussion of teaching techniques and theories, conducting discussion sections, preparation and grading of routine examinations, under the supervision of the instructor assigned to the course. As a requirement for the Ph.D. degree a student must serve as an apprentice teacher for the equivalent of 50% time for three academic quarters. Enrollment in this course for a total of 12 units (1-4 units per quarter) documents the fulfillment of this requirement. (Satisfactory/Unsatisfactory grades only.)

505. Apprentice Teaching in Third College Programs (1-4)
A course designed to meet the needs of graduate students who serve as TA's in Third College. Planning of courses, analysis of texts and materials related to the courses, discussion of teaching techniques, formulation of paper and examination topics and consultation with instructor(s). (Satisfactory/Unsatisfactory grades only.)

Literature

OFFICE: 1003 Humanities-Library Building

Professors:
Jaime Alazraki, Ph.D. *(Spanish Literature)*
*Ronald S. Berman, Ph.D. *(English Literature)*
Bernhard Blume, Ph.D. *(German Literature, Emeritus)*
*Carlos Blanco Aguinaga, Ph.D. *(Spanish Literature)*
Joaquin Casalduero, Ph.D. *(Spanish Litera-*

ture, Emeritus)
Diego Catalan, Ph.D. *(Spanish Literature)*
Robert C. Elliot, Ph.D. *(English Literature)*
Edwin S. Fussell, Ph.D. *(American Literature)*
†Claudio Guillen, Ph.D. *(Spanish and Comparative Literature)*
†-Fredric R. Jameson, Ph.D. *(French and Comparative Literature)*
Reinhard Lettau, Ph.D. *(German Literature)*
James K. Lyon, Ph.D. *(German Literature)*
Roy Harvey Pearce, Ph.D. *(American Literature)*
†Joseph Sommers, Ph.D. *(Latin-American Literature)*
John L. Stewart, Ph.D. *(English and American Literature, Provost of John Muir College)*
Martin W. Wierschin, Ph.D. *(German Literature and Germanic Philology)*
Andrew H. Wright, Ph.D., F.R.S.L. *(English Literature)*
Sylvia Wynter, M.A., *(Spanish and Comparative Literature)*

Associate Professors:
Jack Behar, Ph.D. *(American Literature)*
Alain J. J. Cohen, Ph.D. *(French Literature)*
David K. Crowne, Ph.D. *(English and Comparative Literature)*
Abraham J. Dijkstra, Ph.D. *(American and Comparative Literature)*
Thomas K. Dunseath, Ph.D. *(English Literature)*
Jonathan Saville, Ph.D. *(Russian and Comparative Literature)*
Donald T. Wesling, Ph.D. *(English Literature)*
Sherley Anne Williams, M.A. *(American and Afro-American Literature)*
Wai-Lim Yip, Ph.D. *(Chinese and Comparative Literature)*

Assistant Professors:
Jeffrey Barnouw, Ph.D. *(English and Comparative Literature)*
—• Page Ann duBois, Ph.D. *(Classics)*
Jerome H. Katsell, Ph.D.*(Russian and Comparative Literature)*
Susan Kirkpatrick, Ph.D. *(Spanish and Comparative Literature)*
†Louis Adrian Montrose, Ph.D. *(English Literature)*
Lowry Cheng-Wu Pei, Ph.,D. *(English Literature)*
Mary Jean Pfaelzer, Ph.D. *(English and American Literature)*
Fred V. Randel, Ph.D. *(English Literature)*
Rosaura A. Sanchez, Ph.D. *(Spanish Literature)*
Saul Steier, Ph.D. *(English and Comparative Literature)*
Cynthia Walk, Ph.D. *(German Literature)*
John Waterhouse, Ph.D. *(English Literature and Language Acquisition)*
Don Edward Wayne, Ph.D. *(English Literature)*

Acting Assistant Professors:
Sandra E. Drake *(Caribbean and Comparative Literature)*
Richard E. Friedman *(Hebrew and Comparative Literature)*
Gerald N. Ginsburg *(Classics and Comparative Literature)*
Ronald L. Martinez *(Italian and Comparative Literature)*
Wanda McCaddon *(English Literature)*
Juan Rodriguez, M.A. *(Latin American Literature)*

Lecturers:
Raymond R. Fleming, M.A. *(Italian and Comparative Literature)*
Sam Hinton, A.B. *(General Literature)*
Helene Laperrousaz, Ph.D. *(French Literature)*
Lawrence Waddy, M.A. *(Classics)*

* On leave 1976-77
†On leave fall quarter
—On leave winter quarter
• On leave spring quarter

* * *

All literature courses at UC San Diego are offered by a single Department of Literature. The department brings together teacher-scholars and students who would elsewhere be separated by the languages in which the national literatures are written. Here they are united by the nature of the studies they pursue. This lends a general and comparatist aspect to both undergraduate and graduate programs, which lead to the Bachelor of Arts, the Candidate in Philosophy, and Doctor of Philosophy degrees. All students must show knowledge of a foreign literature by doing upper-division or graduate work in that literature in the original language. Courses are offered not only in the literatures themselves but in the theoretical aspects of literature and—often in cooperation with other departments—in the relation of literary study with other disciplines; for instance, philosophy, visual arts, music, sociology, history, psychology, linguistics, and communications.

With special permission, undergraduates may take graduate courses for credit and graduate students may also take undergraduate courses for credit.

The Undergraduate Program

Lower-Division Preparation The only prerequisite to upper-division courses is completion of the college freshman-sophomore requirements. However, literature majors who do not elect to take Literature 10, 11 or Lit/German 51, 52, 53, 54 as part of their lower-division program may find that, before enrolling in upper-division courses in a foreign literature, they must bring their language proficiency up to the appropriate level by taking such lower-division courses during their junior year. Literature/English 21,22,23 is recommended for students planning to major in literature with English as their primary or secondary literature. Lower-division students may take advanced courses with permission of the instructor.

The Major in Literature Seven programs are open to those majoring in literature: English-American, French, German, Literature and Society: Third World Literatures, Russian, Spanish, and General Literature. In each case, whatever the primary field of concentration, a student is expected to study a second literature. The range of second literatures includes Chinese, Classical Greek, Hebrew, Italian, and Latin, and also the previously mentioned French, German, Russian, Spanish, and (for those concentrating in a foreigh literature) English-American.

A major consists of:

1. nine upper-division courses in a primary literature. In the case of a General Literature program, any combination of nine upper-division courses offered by the department;
2. three courses in a second literature, given substantially in the native language. In the foreign literatures, the three may include two quarters of courses numbered 11 or Lit/German 51, 52, 53, 54 and must include at least one upper-division course. For Italian, the appropriate Latin or Greek, Lit/1 and 2 are acceptable as lower division components of the second literature requirement. For Hebrew, Lit/Heb 9, 10 and 11 are acceptable as lower division components of the second literature requirement. For English as the second literature the acceptable lower division courses are any two quarters of the sequence Lit/En 21, 22, 23. Courses numbered 10 or 25, as well as courses of literature in translation, may not be used to meet this requirement. For students declaring their major in 1975 and subsequently, the three courses may not include tutorials (Lit 199), except in the case of Latin and Greek;
3. enough other upper-division courses to make a total of 14 courses in the Department of Literature. No more than two lower-division courses may be counted towards the total of 14 courses; the only acceptable lower-division courses are those used to satisfy the second literature requirement.

Regularly scheduled departmental courses taken to satisfy the requirements for the literature major must be taken for a letter grade. Only in independent study courses (Lit 199) and in UC San Diego Extension courses with numbers between Lit 100 and Lit 199 is a "P" grade acceptable toward the literature major.

Other than the obligation to study a foreign literature, the major has no requirements of specific courses. The student's major program should be worked out with the help of a departmental adviser and must be approved by the adviser each quarter.

The department also offers the opportunity of interdepartmental majors under the Muir College Special Projects and under the Literature and Society: Third World Literatures concentration in Third College. The major requires four lower-division courses; fifteen upper-division courses: eleven upper-division literature courses (of these nine must be from Literature and Society) and four upper-division courses selected from other disciplines in the humanities, fine arts, the social sciences and Third World Studies. Literature and Society: Third World literatures blends interpretation of the texts with an appreciation of the cultural and historical milieu in which it was created. The historic experience of colonization, oppression or slavery underlies a large portion of these literatures, all of which, for convenience, we call Third World. Because of these experiences there are organic rela-

tionships between literary themes and styles, on the one hand, and generative social circumstances, on the other. The program is designed to study these organic relationships from a range of academic perspectives, which, as in all literature programs, begins with the literary text itself. Third World literatures share in certain historical experiences and relationships, but differ in many ways. Thus a comparative approach is especially illuminating. Students are required to avail themselves of appropriate courses in First World literatures currently being offered by the department in order to broaden their familiarity with the larger framework of world literature. The area and precise number of courses in literature and its complementary disciplines is determined by each student in consultation with the major advisers. As with all majors in the Department of Literature, students must show a knowledge of a literature, other than English/American, by doing upper-division work in that literature in the original language.

The Department of Literature offers three alternative programs of concentration in Fourth College: (1) a foreign language and its literature studied in the original language; (2) English and American literature; (3) General literature (which includes literature from various nations studied in English translation). For detailed information on the requirements, students should consult a Fourth College or Department of Literature adviser.

The Minor in Literature The department offers a wide range of possibilities for a noncontiguous minor in the Revelle College major program. The options include courses in a single national literature, courses in more than one literature, and a combination of lower- and upper-division Department of Literature courses in languages and literature. Revelle College students who wish to pursue a noncontiguous minor involving literature are required to consult with the department's adviser and to obtain his or her signature on their proposed program.

The minor in Literature and Society: Third World Literatures consists of six upper-division literature courses chosen from the literature and society offerings. A student may select courses which provide a deeper knowledge of a particular geographical, political or literary area, a particular thematic or cultural concern or a given historical period. The flexibility of the minor is especially valuable for students majoring in history, political science, Third World studies and related disciplines, for each student can create a minor which suits the needs of his or her particular field and interest.

The Graduate Program

Doctoral Degree Program Doctoral programs are offered in English and American literature, French literature, German literature, Spanish literature, and comparative literature. The department presently does not offer the M.A., but the C.Phil. degree is conferred upon all students advanced to candidacy for the Ph.D.

Preparation The following are requirements for admission to graduate study in literature:

1. a baccalaureate degree with a major in one of the literatures offered by the department, or in another field approved by the departmental committee on graduate studies;
2. satisfactory scores on the Graduate Record Examination, including the advanced examination in the literature of the student's field;
3. a working knowledge of one foreign language.

Course of Study Although most students will choose to concentrate in a national literature, there will necessarily be a distinctly comparatist emphasis in their studies. Each student will undertake a comparatist project-course work and guided independent study in a literature other than, but related to, the one in which he or she is specializing. The program of study makes explicit provision for a significant amount of independent work. Tutorial work and interdisciplinary study are encouraged; in addition, all graduate students work in close association with an adviser who directs their independent study preparatory to the qualifying examination. No specific courses are required. To the contrary, graduate students take those seminars best suited to their individual needs and interests. Students are expected to take two seminars each quarter in their first two years. Since topics change from year to year, all graduate courses are offered for repeated registration. Students must successfully complete 12 graduate seminars, or their equivalent, as part of their course of study.

Teaching The department requires for the completion of the Ph.D. degree that graduate students do apprentice teaching as an integral part of their training. The minimum amount required is equivalent to the duties expected of a quarter-time teaching assistant for three academic quarters. The duties of a teaching assistant normally entail grading papers and examinations, conducting discussion sections, and related activities. Each teaching assistant is expected to attend the lectures for the course in which he or she participates.

Language Requirements Graduate students in literature are required to develop the ability to read literary and secondary texts and to follow seminar discussions or lectures in a second language, a language other than the one in which the literature of their primary specialization is written. Each student must demonstrate language proficiency through regular enrollment in and completion of a seminar in the literature of the second language. Only seminars conducted in the language in question can be considered toward fulfillment of the language requirement. Seminars taken to fulfill the language requirement count toward the 12 seminars required for advancement to candidacy. Students should contact the graduate secretary for further details.

The Ph.D. program in Spanish literature requires, in addition to the above, a reading knowledge of Latin, to be tested by an examination conducted by the department. A student in this program is expected to minor in another romance literature and to choose a second minor (the comparatist project) in a non-romance literature relevant to the field of specialization.

The Ph.D. program in German literature requires that a student who concentrates research in a period before 1700 know or learn Latin. Each student will be required to take a two-course sequence consisting of a cultural history of the German language and an introduction to Middle High German. Equivalent work done elsewhere will be counted toward a fulfillment of the requirement.

The Ph.D. program in Comparative literature requires (a) knowledge in depth of two foreign languages, (b) a reading ability in French, German or Italian, (c) when the student's field of concentration demands it, a reading ability in a classical or non-Western language (Greek, Latin, Chinese, Arabic, etc.). A student in the program is expected to attend graduate seminars or undertake guided independent study in three literatures, one of which can be English or American.

Advancement to Candidacy Students are expected to complete, by the end of their third year of study, the course work which forms the first step of graduate study and begin preparation for the final stages of graduate work: advancement to candidacy and completion of a suitable doctoral thesis.

The requirements for advancement to candidacy are:

1. successful completion of 12 graduate seminars (or their equivalent) including a seminar which fulfills the student's language requirement;
2. submission of three papers, one long paper and two in-depth research reports, for approval by the student's doctoral committee;
3. an oral examination centered on the areas discussed in the three papers and covering also the broader areas of literary study which form the context for the specific topics which are the subjects of the papers.

The Dissertation A suitable dissertation is required for the Ph.D. degree. The student concentrates on the dissertation after passing the qualifying examination.

Courses

General Literature In both lower- and upper-division general literature courses, texts may be read in English translation when necessary, and lectures and discussions are conducted in English.

Lower Division

Lit/Gen 1A-B-C. The Interpretation of Literature (4-4-4)
A study of masterpieces from various cultures and periods, emphasizing ways of relating literature to human life. Persistent literary themes, centering on the concept of "Man," are treated systematically. At the same time, the works are studied as models of the variety and complexity of literary art. (Open only to Muir College students.)

1A Man and His Imagination *Mr. Dijkstra* (F)

1B Man and His Nature *Staff* (W)

1C Man and Society *Ms. Williams* (S)

Lit/Gen 3A-B-C. Literature and Society (4-4-4)
The Interaction of Art and Culture. The course will provide an approach both to the nature of literature, and to that of national culture itself. (Open only to Muir College students.)

3A France *Mr. Cohen* (F)

3B Italy *Mr. Martinez* (W)

3C Germany *Mr. Lyon* (S)

Lit/Gen 19A-B-C. The Greco-Roman World (4-4-4)
(Not to be offered 1976-77)

Lit/Gen 51. The Theater of Change (4)
Plays by authors mainly of the twentieth century, including Brecht, Ionesco, Eliot, Beckett, and others. Mr. Steier (F)

Lit/Gen 52. The Contemporary Voice in Poetry (4)
Lyric and longer poems by major authors mainly of the twentieth century, including Yeats, T.S. Eliot, Ezra Pound, Robert Lowell, Ted Hughes, and others. Mr. Wesling (W)

Lit/Gen 53. Fiction in Our Time (4)
Fiction by major authors mainly of the twentieth century, including Conrad, Chekhov, Joyce, Lawrence, Hemingway, Faulkner, Borges, McGullers, and Mailer. Mr. Waterhouse (S)

Lit/Gen 61. Conflict and Resolution in Modern Literature of the Americas (4)
(Not to be offered 1976-77)

Lit/Gen 63. Literature of the New World (4)
(Not to be offered 1976-77)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Gen 110,111,112,113,114,115,116. Writing Workshop (4-4-4-4-4-4-4)
A workshop for students seriously interested in writing. Intensive study of the means of expression provided by the different literary forms. Discussion and scrutiny of original works of students. Three hour seminar.

110 Creative Writing (Not to be offered 1976-77.)

111 Fiction *Mr. Lettau* (F)

112 Expository Writing *Ms. Karliner* (W)

113 Drama (Not to be offered 1976-77)

114 Poetry *Mr. Fussell* (F); *Mr. Wesling* (W); *Mr. Dijkstra* (S)

115 Short Story (Not to be offered 1976-77)

116 Long Narrative (Not to be offered 1976-77)

Lit/Gen 120. The Classical Tradition (4)
Greek and Roman literature in translation. May be repeated for credit as topics vary.

Women, Slaves and Barbarians in Classical Athens
Ms. duBois (F)

Lit/Gen 124. Studies in European Romanticism (4)
In translation. May be repeated as topics vary. Attention given to historical and cultural contexts. Topics to be considered include the concept of nature, the reaction to science, the role of the imagination.

18th Century French Enlightenment & Revolution
Mr. Barnouw (W)

Lit/Gen 126. Epic Poetry (4)
A study of major epics, in translation if their original language is not English. May be repeated for credit as topics vary.

The Medieval Epic *Mr. Crowne* (F)

The Renaissance Epic *Mr. Dunseath* (W)

Lit/Gen 127. The Novel (4)
Aspects of the novel, not confined to a single national literature. Texts may be read in English. May be repeated for credit as topics vary.

Crazy Books *Mr. Steier* (W)

Women and the Novel *Ms. McCaddon* (S)

Lit/Gen 128. The Drama (4)
Aspects of the drama, not confined to a single national literature. Texts may be read in English. May be repeated for credit as topics vary.

Post WW II Continental Drama *Mr. Steier* (S)

Lit/Gen. 129. Lyric Poetry (4)
Studies in lyric poetry, not confined to a single national literature. Texts may be read in English. May be repeated for credit as topics vary. Mr. Yip (S)

Lit/Gen 130. Introduction to Criticism (4)
Theories of criticism and the role and function of critic and artist in society. Mr. Wayne (W)

Lit/Gen 145. French Literature in Translation (4)
One or more periods of authors in French literature. Texts may be read in English. Staff

Lit/Gen 146. Latin American Literature in Translation (4)
(Formerly Lit/Gen 41) Reading of representative works in Latin American literature with a view to literary analysis (form, theme, meaning) the developmental processes of the literature and the many contexts: historical, social, cultural. Texts may be read in English.

TBA *Mr. Rodriquez* (F)

Lit/Gen 147. Romantic Poetry (4)
(Not to be offered 1976-77)

Lit/Gen 148. Italian Literature in Translation (4)
(Not to be offered 1976-77)

Lit/Gen 149. German Literature in Translation (4)
(Not to be offered 1976-77)

Lit/Gen 150. Masterpieces of Chinese Literature in Translation (4)
The course will focus on a few representative masterpieces of Chinese literature in its classical age, with emphasis on the formal conventions and the social or intellectual presuppositions that are indispensable to their understanding.

Chinese Poetry *Mr. Yip* (F)

Lit/Gen 151. Hebrew Literature in Translation (4)
One or more aspects of Hebrew literature. Texts to be read in English. May be repeated as topics vary.

Topics TBA *Staff* (F,W,S)

Lit/Gen 152. Men, Literature, and Ideas (4)
This course will center on writers or movements of international literary, cultural, or ideological significance. The texts studied, if foreign, may be read either in the original language or in English. May be repeated for credit three times as topics vary.

Borges *Mr. Alazraki* (W)

Kafka *Mr. Lettau* (W) (Also offered as Lit/GE 152)

Literature and Ideology *Mr. Wayne* (S)

Literature of the Asian Peoples of the Soviet Union
Ms. Drake (S) (Also offered as Lit/RU 152)

Freud *Mr. Barnow* (S)

Lit/Gen 161. The Forms of Folklore (4)
A survey of the range of folkloristic phenomena as exemplified by major and minor forms—narrative, legend, myth, superstition, speech, custom, games, and music. Examples will be considered both as artistic entities and as social documents. Mr. Hinton (W)

Lit/Gen 171. Pushkin (4)
(Not to be offered 1976-77)

Lit/Gen 172. Short Masterpieces of Russian Fiction (4)
(Not to be offered 1976-77)

Lit/Gen 173. Chekhov (4)
(Not to be offered 1976-77)

Lit/Gen 174. Solzhenitsyn (4)
(Not to be offered 1976-77)

Lit/Gen 175. Nineteenth Century Russian Prose (4)
(Not to be offered 1976-77)

Lit/Gen 176. Russian Drama (4)
(Not to be offered 1976-77)

Lit/Gen 177. Russian Drama (4)
A continuation of 176, emphasizing the dramas of Russian and Soviet writers not studied in the first course. Lit/Gen 176 is not a prerequisite. All readings will be in English. (Also offered as Lit/RU 177) Mr. Katsell (W)

Lit/Gen 178. Russian Poetry (4)
(Not to be offered 1976-77)

Lit/Gen 179. Tolstoy (4)
(Not to be offered 1976-77)

Lit/Gen 180. Dostoevsky (4)
(Not to be offered 1976-77)

Lit/Gen 181. Twentieth Century Prose (4)
(Not to be offered 1976-77)

Lit/Gen 182. Russian Autobiography (4)
(Not to be offered 1976-77)

Lit/Gen 183. Russian Literature from the Beginnings through the Eighteenth Century (4)
(Not to be offered 1976-77)

Lit/Gen 190. Seminars (4)
These seminars are devoted to a variety of special topics, including the works of single authors, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society and the like. The student may enroll in more than one seminar in a single quarter. *Prerequisites: upper-division standing, consent of instructor and permission of department.*

Fictional Utopias *Mr. Elliott* (F)

Lit/Gen 194. The Teaching of Writing (4)
This course prepares students to become tutors in the Lit/En 10 Composition program through readings, lectures and discussions about the teaching of writing, and practice in the methodology of tutoring both within the class and in Lit/En 10 section. *Prerequisites: upper-division standing, 3.0 GPA and approval of instructor.* No more than two tutoring courses may be counted toward the Literature major. Ms. Karliner (F,W)

Lit/Gen 195. Apprentice Teaching of Writing (4)
Emphasis on practical aspects of teaching, but students will also conduct a seminar on the principles of teaching in these areas, practical use of classic notions of rhetoric, setting practical and individualized goals for each student and separating the single writing task into stages. No more than two tutoring courses may be counted toward the Literature major. May be repeated for credit two times. *Prerequisites: upper-division standing and consent of instructor.* Ms. Karliner (F,W,S)

Lit/Gen 198. Directed Group Study (4)
Research seminars and research, under the direction of a member of the staff. May be repeated for credit three times. *Prerequisites: upper-division standing and consent of department.* Staff (F,W,S)

Lit/Gen 199. Special Studies (4)
Tutorial; individual guided reading in areas of literature (in translation) not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and consent of department.* Staff (F,W,S)

Graduate

Lit/Gen 500. Apprentice Teaching in Literature (1-4)
This course, designed to meet the needs of graduate students who serve as TA's, includes analyses of texts and materials, discussion of teaching techniques, conducting discussion and/or laboratory sections, formulation of topics and questions for papers and examinations, and grading papers and examinations under the supervision of the instructor assigned to the course. Participation in the undergraduate teaching program is required for the Ph.D. degree. The amount of teaching required is equivalent to the duties expected of a .25 FTE Teaching Assistant for three academic quarters. Enrollment for two units in this course documents the requirement for each quarter. (Satisfactory/Unsatisfactory grade permitted.) Staff (F,W,S)

Lit/Gen 501. Apprentice Teaching in Humanities (1-4)
Consideration of pedagogical methods appropriate to the teaching of literary, historical, and philosophical texts at the undergraduate level. Pedagogical aids for the teaching of composition. Supervised teaching in sections of the undergraduate Humanities sequence. *Prerequisite: student must be a Teaching Assistant.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Gen 505. Apprentice Teaching in Third College (1-4)
Consideration of pedagogical methods appropriate to the teaching of Third College programs. Supervised teaching in Third College. *Prerequisite: student must be a Teaching Assistant.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Gen 507. Apprentice Teaching in Fourth College (1-4)
Consideration of pedagogical methods appropriate to the teaching of Fourth College programs. Supervised teaching in Fourth College. *Prerequisite: student must be a Teaching Assistant.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Chinese Literature

Upper Division

Prerequisite: upper-divison standing or consent of the instructor. Additional prerequisites may be specified below.

Lit/Ch 101. Readings in Contemporary Chinese Literature (4)
(Not to be offered in 1976-77)

Lit/Ch 198. Directed Group Study (4)
Directed group study in areas of Chinese literature not normally covered in courses. *Prerequisites: upper-division standing and permission of department.* Mr. Yip (F,W,S)

Lit/Ch 199. Special Studies (4)
Tutorial; individual guided reading in areas not normally covered in courses. *Prerequisites: upper-division standing and consent of department.* Mr. Yip (F,W,S)

Comparative Literature
Graduate

Lit/CO 210. Classical Studies (4)
Analysis of significant works of the Greek and Roman tradition, with attention to their interest for later European literature.

Classical Poetics *Staff* (W)

Lit/CO 215. Medieval Studies (4)
(Not to be offered 1976-77)

Lit/CO 221. Renaissance Studies (4)
One or more major writers, texts or trends of European Renaissance literature.

Renaissance Epic I *Mr. Martinez* (F)

Renaissance Epic II *Mr. Martinez* (W)

Renaissance Poetics *Mr. Dunseath* (S)

Lit/CO 224. Seventeenth Century Studies (4)
(Not to be offered 1976-77.)

Lit/CO 231. Eighteenth Century Studies (4)
One or more major writers, texts, or trends of eighteenth century European literature.

Development of Esthetics *Mr. Barnouw* (S)

Lit/CO 241. Romanticism (4)
(Not to be offered 1976-77)

Lit/CO 242. Nineteenth Century Studies (4)
(Not to be offered 1976-77)

Lit/CO 243. Symbolism (4)
(Not to be offered 1976-77)

Lit/CO 252. Modernism (4)
A sample investigation into the concept of period, and will deal with the question of the existence of modernism, the description of the phenomena and the causes to which it is to be attributed.

French, Italian, German and English Poetry *Mr. Saville* (S)

Lit/CO 253. The New Literatures (4)
(Not to be offered 1976-77)

Lit/CO 261. Comparative Literature: History and Theory (4)
Introduction to Comparative Literature. Staff (W)

Lit/CO 262. Comparative Prosody (4)
(Not to be offered 1976-77)

Lit/CO 263. Theory and Practice of Translation (4)
(Not to be offered 1976-77)

Lit/CO 271. Critical Theory (4)
Problems of literary analysis; competing schools and major figures in literary criticism.

Introduction to Comtemporary Theory *Mr. Wayne* (W)

Chinese Poetics *Mr. Yip* (S)

Russian Formalism *Mr. Katsell* (S)

Lit/CO 272. Literature and Social History (4)
Special topics in practical criticism involving social and economic historical perspectives.

Literature of Caribbean Home and Heart *Ms. Drake* (W)

Lit/CO 273. Art and Literature (4)
An investigation into themes and styles common to literature and visual arts.

Art and Literature, Part I *Mr. Dijkstra* (F)

Art and Literature, Part II *Mr. Dijkstra* (W)

Lit/CO 274. Genre Studies (4)
A consideration of a representative selection of works relating to a theme, form, or literary genre.

Landscape Poetry: Chinese and American *Mr. Yip* (F)

Theories of the Novel: First/Third World *Ms. Wynter* (W)

Moral Allegory: Dante, Mann, Ellison *Mr. Fleming* (S)

The Elegiac Mode *Mr. Guillen* (S)

Lit/CO 275. Literature and Music
(Not to be offered 1976-77)

Lit/CO 276. The Modern Theatre (4)
A study of plays and dramatic theory from the 18th century to the present.

Post WW II English and Continental Drama *Mr. Steier* (S)

Lit/CO 277. Psychoanalytic Approaches to Literature (4-4)
(Not to be offered 1976-77)

Lit/CO 278. Communications and Literature (4)
The study of literary texts from the twin vantage points of communications theory and literary theory. The examination of how qualities of a text such as those of message, symbol, and image have related significance in accordance with the evaluative categories of both these disciplinary areas. (This seminar offered annually in spring qtr. and topic will vary from year to year. Staff (S)

Lit/CO 279. Literary Studies and Linguistics (4)
(Not to be offered 1976-77)

Lit/CO 297. Directed Studies (1-12)
Guided and supervised reading in a broad area of literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/CO 298. Special Projects (4)
Treatment of a special topic in comparative literature. Offered for repeated registration. (Satisfactory/-Unsatisfactory grades only.) Staff (F,W,S)

Lit/CO 299. Thesis (1-12)
Reseach for the dissertation. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

English and American Literature
Lower Division

Lit/En 10. Composition (2)
A workshop course in writing for students at all levels. At least one quarter required of students who must fulfill Subject A requirement. Ms. Karliner (F,W,S)

Lit/En 21-22-23. The English Literary Imagination (4-4-4)
Major figures and works in English literature from the Middle Ages to the present day including *Beowulf*, Chaucer, Spenser, Shakespeare, Milton, Swift, Pope, the Romantics, Tennyson, Browning, Yeats, T.S. Eliot; together with novels by such authors as Fielding, Jane Austen, Dickens, Thackeray, Hardy, and Joyce.

NOTE: 21R, 22R, and 23R may be taken in sequence in partial fulfillment of the Revelle Humanities requirement.

21 The Middle Ages and the Renaissance *Mr. Wayne* (F)

22 Neoclassicism and Romanticism *Mr. Elliott* (W)

23 The Rise of Modernism *Mr. Randel* (S)

Lit/En 24. The American Literary Imagination (4)
Representative figures of American literature, such as Emerson, Thoreau, Whitman, Hawthorne, and Melville. Mr. Pearce (W)

Lit/En 40. Poetics (4)
An introductory course in what makes "poetry" different from "prose." This will involve some discussion of theories of poetry, but will also include pragmatic examination of the mechanics of poetry: meter, stanza, rhyme, "poetic diction," poetic conventions. This course will prepare students for more advanced poetry courses. Students who write poetry may add that dimension to the course, but at the same time use it as a poetry writing workshop. Mr. Fussell (S)

Lit/En 50. Shakespeare and the Nature of Man (4)
Close reading of seven or eight plays, probably two or three each of the histories, comedies and tragedies. Mr. Dunseath (F)

Lit/En 90. Freshman Seminar (0)
(Not to be offered 1976-77)

Upper Division

Prerequisite: upper-division standing or consent of the instructor. Additional prerequisites may be specified below.

Lit/En 101. English Literary Prose (4)
The development of major forms and modes of English and literary prose, including the novel, the essay, biography and other genres. May be repeated for credit as topics vary.

The Familiar Essay *Mr. Randel* (F)

Lit/En 102. English Dramatic Literature (4)
(Not to be offered 1976-77)

Lit/En 121. The Medieval Period (4)
Major English literary works of the Middle Ages as seen against the historical and intellectual background of the period. May be repeated for credit as topics vary.

The Age of Chaucer *Mr. Crowne* (W)

Lit/En 122. The Renaissance (4)
Major literary works of the Renaissance as seen against the historical and intellectual background of the period. May be repeated for credit as topics vary.

Donne and the Metaphysical Poets *Mr. Dunseath* (S)

Themes of Invention and Discovery *Mr. Wayne* (F)

Lit/En 123. The Eighteenth Century (4)
Major literary works of the eighteenth century. May be repeated for credit as topics vary.

The American Enlightenment and Revolution *Mr. Barnouw* (F)

The Novel (I): Defoe to Austen *Mr. Wright* (F)
NOTE: *Part (I) of a connected series of three courses which includes Lit/En 124* (W), *and Lit/En 126* (S)

Major Writers *Mr. Elliott* (W)

Lit/En 124. The Nineteenth Century (4)
Readings in the Romantics of Victorians: the intellectual background of the age. May be repeated for credit as topics vary.

Keats to Shelley *Mr. Randel* (F)

Social Themes in Victorian Literature *Mr. Wesling* (F)

The Novel (II): Scott to G. Eliot *Mr. Wright* (W)
NOTE: *Part (II) of a connected series of three courses which includes Lit/En 123* (F), *Lit/En 126* (S)

The Escape from Victorianism 1880-1914 *Ms. McCaddon* (S)

Lit/En 125. American Literature of the Nineteenth Century (4)
A critical study of major American writers of the nineteenth century. May be repeated for credit as topics vary.

The American Renaissance, 1820-1860 *Mr. Fussell* (W)
Lecture-discussion course in the creation of an American Literature, while, politically, the U.S. was headed for the Civil War, because of Black slavery. An unusual opportunity to observe American schizophrenia at its most blatant. The course will concentrate on *The Scarlet Letter, Moby Dick, Walden,* and *Leaves of Grass.*

Ideology of Capitalism and the American Novel, 1880-1920 *Mr. Dijkstra* (S)

Lit/En 126. The Modern Period (4)
A critical study of major American and English writers of our period. May be repeated for credit as topics vary.

Women in American Literature *Ms. Pfaelzer* (W)

The Novel (III): Meredith to Forster *Mr. Wright* (S)
NOTE: *Part (III) of a connected series of three courses which includes Lit/En 123* (F), *and Lit/En 125* (W).

Lit/En 150. Shakespeare I: The Elizabethan Period (4)
A survey of Shakespeare's dramatic development from the early plays to his mid career. Recommended for majors in literature whose primary literature is English. Mr. Montrose (W)

NOTE: Lit/En 150 and 151 form a sequence and it is *strongly recommended* that they be taken as a sequence.

Lit/En 151. Shakespeare II: The Jacobean Period (4)
A survey of Shakespeare's later plays. Recommended for majors in literature whose primary literature is English. Mr. Montrose (S)

Lit/En 190. Seminars (4)
These seminars are devoted to a variety of special topics, including the works of single authors, genre studies, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society, and the like. The student may enroll in more than one section in a single quarter. *Prerequisite: upper-division standing and permission of department.*

Origins of American Literary Imagination *Mr. Pearce* (F)

The Harlem Renaissance *Ms. Williams* (F)
(Also offered as Lit/Soc 144)

Doris Lessing *Mr. Pei* (W)

Autobiography *Mr. Randel* (W)

Fielding and Smollett *Mr. Wright* (W)

Wallace Stevens *Mr. Pearce* (S)

Lt/En 198. Directed Group Study (4)
Research seminars and research, under the direction of a member of the staff. May be repeated for credit three times. *Prerequisite: special permission of the department.* Staff (F,W,S)

Lit/En 199. Special Studies (4)
Tutorial; individual guided reading in an area not normally covered in courses. May be repeated for credit one time. *Prerequisites: special permission of the department and upper-division standing.* Staff (F,W,S)

Graduate

Lit/En 211A-B. Old English Literature (4-4)
(Not to be offered 1976-77)

Lit/En 214. Middle English Literature (4)
Consideration of one or more major figures, texts, or trends in Middle English Literature.

Pre-Shakespearean Drama *Mr. Crowne* (S)

Lit/En 221. Sixteenth Century English Literature (4)
(Not to be offered 1976-77)

Lit/En 224. Seventeenth Century English Literature (4)
Consideration of one or more major figures, texts, or trends in 17th century English literature, including the metaphysical poets and Jacobean drama.

Milton *Mr. Dunseath.* (F)

Lit/En 226. Shakespeare (4)
Shakespeare's plays in relation to the Elizabethan background; selected major texts. Mr. Montrose (S)

Lit/En 231. Restoration and Eighteenth Century English Literature (4)
Consideration of one or more figures, texts, or trends in Restoration and eighteenth-century English literature, including Dryden, Pope, Swift, the early novel, satire. Topic varies from year to year.

Pope *Mr. Elliott* (F)

The Age of Johnson *Mr. Barnouw* (W)

Lit/En 241. English Literature of the Romantic Period (4)
A study of the major poetry and related prose of early nineteenth-century literature.

Wordsworth and Coleridge *Mr. Randel* (W)

Jane Austen *Mr. Wright* (S)

Lit/En 245. Nineteenth Century American Studies (4)
Consideration of some of the principal writers and movements in nineteenth century American literature. Topic varies from year to year.

Hawthorne *Mr. Pearce* (F)

Origins of American Literary Realism
Ms. Pfaelzer (S)

Lit/En 246. Victorian Literature (4)
Consideration of one or more major figures, texts, or trends in the Victorian Period.

Six Victorian Novels *Mr. Pei* (F)

Lit/En 251. Twentieth Century English Literature (4)
Consideration of one or more major figures, texts, or trends in twentieth century English literature.

James Joyce and the Limits of the Novel, Part I & II
Mr. Fussell (F,W)
A two-quarter sequence. The first quarter begins with the beginning and ends with *Ulysses*. Second quarter, *Finnegans Wake*. No permission required for first quarter, and qualified undergraduates may take the course with the permission of the instructor, but only until the class is full. For second quarter no permission is required for students who took the first quarter and did well, however, permission is required for those who did not do well or did not take the first quarter.

Lit/En 252. Studies in Modern American Literature and Culture (4)
Consideration of one or more major figures, texts, or trends in American literature, in particular the relationship between literature and culture.

Development of Afro-American Poetry
Ms. Williams (F)

Whitman and the Long Poem Since Paterson *Mr. Pearce* (S)

Lit/En 271. Genres in English (4)
Consideration of one or more genres present in English and/or American literature; for instance, the ballad, landscape poetry, comedy, satire, the familiar essay.

Theory of Fiction: Narrative Voice
Mr. Waterhouse (S)

Issues in Poetic Form *Mr. Wesling* (S)

Lit/En 297. Directed Studies (1-12)
Guided, supervised reading in a broad area of English and American literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/En 298. Special Projects (4)
Treatment of a special topic in English and American literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/En 299. Thesis (1-12)
Research for the dissertation. Offered for repeated registration. *Prerequisite: advancement to candidacy for the Ph.D. degree.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

French Literature

Lower Division

Lit/Fr 10. Readings and Interpretations (4)
The course is taught entirely in French and emphasizes the development of reading ability, listening comprehension and writing skills. It includes grammar review, lectures and class discussions. Approximately half of the reading selections are from modern and classical authors, half from non-literary disciplines—humanities, social sciences, pure and applied sciences. The course is designed to prepare students for Literature 11 and Literature 25. *Prerequisite: Basic Language Proficiency (550 plus oral interview) or completion of Language 4, 5, or 6 with grade of A.* Staff (F,W,S)

Lit/Fr 11. Readings in French Literature and Culture (4)
An introduction to French literature. May be taken for three quarters starting with any quarter. Reading and discussion of selections from French literature, scholarship and science. *Prerequisite: score of 650 or higher on CEEB test or completion of Literature 10.* Staff (F,W,S)

Lit/Fr 25. Composition and Conversation (4)
A course designed for students who wish to improve their ability to speak and write French. *Prerequisite: completion of Revelle or Muir language requirement.* Ms. Laperrousaz (F,W,S)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Fr 122. Seventeenth Century (4)
Major literary works of the seventeenth century. May be repeated for credit as topics vary. Staff (Topics TBA)

Lit/Fr 124. Nineteenth Century (4)
Major literary works of the nineteenth century. May be repeated for credit, as topics vary. Staff (Topics TBA).

Lit/Fr 130A-B-C. Themes in French Intellectual and Literary History (4-4-4)
This three-quarter sequence is designed as an introduction to French literature and literary history. Each quarter will center on a specific theme or problem, giving a chronological picture of French literature from the beginning to modern times. It is recommended that majors whose primary literature is French take this sequence as early as possible. *Prerequisites: 130A for 130B, 130B for 130C.* Courses may be taken out of normal order only by permission of the instructor. Staff (F,W,S)

Lit/Fr 140. Composition and Stylistics (4)
Analysis of classical and modern French literary texts to increase the student's sensitivity to style and improve his or her ability to write and speak French. *Prerequisite: Lit/Fr 25.* Staff (W)

Lit/Fr 151. Major French Authors (4)
A study in depth of the works of a major French writer. Recommended for students whose primary literature is French. Staff (Topics TBA).

Lit/Fr 190. Seminars (4)
These seminars are devoted to a variety of special topics, including the works of single authors, genre studies, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society, and the like. The student may enroll in more than one section in a single quarter. *Prerequisites: upper-division standing and permission of department.*

Modern Literature of the French-Speaking Caribbean *Ms. Drake* (F)
Includes readings by Jacques Roumain and Pierre and Philippe Thoby-Marcelin (Haiti) and Aimé Césaire (Martinique). Readings in English.

Lit/Fr 198. Directed Group Study (4)
Research seminars and research, under the direction of a member of the staff. *Prerequisites: upper-division standing and special permission of department.* Staff (F,W,S)

Lit/Fr 199. Special Studies (4)
Tutorial; individual guided reading in areas of French literature not normally covered in courses. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Graduate

Lit/Fr 211. Introduction to Old French Language and Literature (4)
(Not to be offered 1976-77.)

Lit/Fr 221. Sixteenth Century French Literature (4)
Critical study of one or more major figures, texts, or literary trends of the French Renaissance. Staff (Topics TBA).

Lit/Fr 224. Seventeenth Century French Literature (4)
Consideration of one or more major figures, texts, or trends in the 17th century French literature. Staff (Topics TBA).

Lit/Fr 231. Eighteenth Century French Literature (4)
Consideration of one or more major figures, texts, or trends in eighteenth century French literature. Staff (Topics TBA).

Lit/Fr 241. Ninteenth Century French Literature (4)
Consideration of one or more major figures, texts, or trends in nineteenth-century French literature. Staff (Topics TBA).

Lit/Fr 251. Twentieth Century French Literature (4)
Selected topics in modern French literature and thought. Staff (Topics TBA).

Lit/Fr 297. Directed Studies (1-12)
Guided and supervised reading in a broad area of French literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S).

Lit/Fr 298. Special Projects (4)
Treatment of a special topic in French literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S).

Lit/Fr 299. Thesis (1-12)
Research for the dissertation. Offered for repeated registration. *Prerequisite: student must be advanced to candidacy for the Ph.D. degree.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

German Literature

Lower Division

Lit/Ge 10. Readings and Interpretations (4)
This course is taught entirely in German and emphasizes the development of reading ability, listening comprehension and writing skills. It includes grammar review, lectures and class discussions. Approximately half of the reading selections are from modern and classical authors, half from nonliterary disciplines—humanities, social sciences, pure and applied sciences. The course is designed to prepare students for Literature 11 and Literature 25. *Prerequisite: Basic Language Proficiency (550 plus oral interview) or completion of Language 4, 5 or 6 with grade of A.* Successful completion of Literature 10 satisfies the requirement for language proficiency in Revelle College. Ms. Walk (F,W,S)

Lit/Ge 15. Advanced Readings and Interpretations (4)
Continuation of German 10 for those students who intend to pratice their reading abilities, listening comprehension and writing skills on a more advanced level. Ms. Walk (F,W,S)

Lit/Ge 25. Composition and Conversation (4)
A course designed for students who wish to improve their ability to speak and write German. *Prerequisite: Lit/German 10 or equivalent.* Mr. Lettau (F), Ms. Walk (W)

Lit/Ge 51-52-53-54.. Readings in German Literature and Culture (4) *(formerly Lit/Ge 11)*
An introduction to German literature. May be taken for three quarters, starting with any quarter. The instructor will advise students when they have achieved sufficient proficiency to proceed to upper-division courses which call for an ability to read extensive texts in German. *Prerequisite: proficiency in German.*

51. Middle Ages and Renaissance *Mr. Wierschin* (F)

52. Criticism and Romanticism (W)

53. The Twentieth Century (S)

54. Baroque and Enlightenment (Not to be offered 1976-77)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Ge 101. German Literary Prose (4)
The development of major forms and modes of German literary prose. May be repeated for credit as topics vary.

The 18th Century *Mr. Lettau* (S)

Lit/Ge 102. German Dramatic Literature (4)
The development of the drama in German.

The Typology of Women in German Drama from Lessing to Durrenmatt *Ms. Walk* (F)

Lit/Ger 103. German Poetry (4)
The development of major forms and modes of German verse.

Approaching German Lyric Poetry *Mr. Lyon* (W)
A close reading and treatment of the works of six representative poets from the Baroque to the present.

Lit/Ge 123. Eighteenth Century German Literature (4)
(Not to be offered 1976-77)

Lit/Ge 140. Composition and Stylistics (4)
Analysis of classical and modern German literary texts to increase the student's sensitivity to style and improve his or her ability to write and speak German.

Stylistic variations and potentialities will be explored, various classical and modern texts will be analysed to establish stylistic criteria and guiding principles. One composition per week on various subjects. Mr. Wierschin (S)

Lit/Ge 149. German Literature (4)
(Not to be offered 1976-77)

Lit/Ge 151. Goethe (4)
Study of some major works in the context of Goethe's life and milieu. Recommended for literature majors whose primary literature is German. *A survey of major prose, poetic, and dramatic works.* Mr. Lyon (F)

Lit/Ge 152. Major German Authors (4)
A study in depth of the works of a major German author. May be repeated for credit as topics vary.

Kafka *Mr. Lettau* (W)
(Also offered as Lit/Gen 152)

Lit/Ge 190. Seminars (4)
(Not to be offered 1976-77)

Lit/Ge 198. Directed Group Study (4)
Research seminars and research, under the direction of a member of the staff. May be repeated for credit three times. *Prerequisite: special permission of department.* Staff (F,W,S)

Lit/Ge 199. Special Studies (4)
Tutorial; individual guided reading in areas of German literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Graduate

Lit/Ge 202. Methods and Tools of Research (4)
(Not to be offered 1976-77)

Lit/Ge 203. Cultural History of the German Language (4)
(Not to be offered 1976-77)

Lit/Ge 210A-B. Middle High German (4-4)
210A: Introduction to the Middle High German language. Reading of texts with exercises in semantics, grammar, etymology, and syntax.

Introduction *Mr. Wierschin* (F)

210B: Middle High German II. Analysis of texts representing a variety of genres.

Analysis of Texts *Mr. Wierschin* (S)

Lit/Ge 221. Middle High German Classicism (4)
(Not to be offered 1976-77)

Lit/Ge 231. Eighteenth Century German Literature (4)
(Not to be offered 1976-77)

Lit/Ge 238. Goethe (4)
A study of Goethe's work in the context of Goethe's life and milieu and of German classicism.

Goethe's Faust *Mr. Lyon* (F)
An in-depth treatment of Faust I and II.

Lit/Ge 241. German Romantic Prose (4)
(Not to be offered 1976-77)

Lit/Ge 242. Nineteenth Century German Literature (4)
A study of representative works by French and German authors including Stendhal, Balzac, Flaubert, Zola; Stifter, Keller, Fontane, and Thomas Mann.

The Realistic Novel *Ms. Walk* (W)

Lit/Ge 251. The Twentieth Century (4)
(Not to be offered 1976-77)

Lit/Ge 252. Major German Authors (4)
A study in depth of the work of one major German author.

Kleist *Mr. Lettau* (W)

Lit/Ge 271. Theory of Genres (4)
(Not to be offered 1976-77)

Lit/Ge 272. Genres, Trends and Forms (4)
(Not to be offered 1976-77)

Lit/Ge 273. Literature and Art (4)
(Not to be offered 1976-77)

Lit/Ge 297. Directed Studies (1-12)
Guided and supervised reading in a broad area of German literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Ge 298. Special Projects (4)
Treatment of a special topic in German literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Ge 299. Thesis (1-12)
Research for the dissertation. Offered for repeated registration. *Prerequisite: student must be advanced to candidacy for the Ph.D. degree.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Greek Literature

Lower Division

Lit/Gr. 1. Beginning Greek (4)
Fundamentals of Greek grammar, exercises in vocabulary and accidence in reading. Staff (F)

Lit/Gr 2. Intermediate Greek (4)
Continuing instruction in Greek grammar, with reading of single texts. *Prerequisite: Lit/Gr. 1 or equivalent.* Staff (W)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Gr. 100. Introduction Greek Literature (4)
Reading and discussion of selections from representative authors. Review of grammar as needed. Staff (S)

Lit/Gr. 101-102-103. Readings in Greek Literature (4,4,4)
A continuing course in translation of literary, historical and philosophical works. *Prerequisites: upper-division standing; 101 for 102, 102 for 103, or consent of instructor.*

Euripides *Ms. duBois* (F)

TBA *Staff* (W,S)

Lit/Gr. 198. Directed Group Study (4)
Directed group study in areas of Greek literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and consent of department.* Staff (F,W,S)

Lit/Gr. 199. Special Studies (4)
Tutorial; individual guided reading in areas of Greek literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Graduate

Lit/Gr. 297. Directed Study (1-12)
Guided and supervised reading in a broad area of Greek Literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Gr 298. Special Projects (4)
Treatment of a special topic in Greek literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Hebrew Literature

Lower Division

Lit/He 1. Beginning Hebrew (4)
Fundamentals of Hebrew grammar, exercises in vocabulary, accidence and in reading. Language will be studied in the context of the culture. Staff (F)

Lit/He 2. Intermediate Hebrew (4)
Continuing instruction in Hebrew grammar, with reading of basic texts. *Prerequisite: Lit/He 1 or equivalent.* Staff (W)

Lit/He 3. Intermediate Hebrew, Continued (4)
Continuing instruction in Hebrew grammar, with reading of basic texts. *Prerequisite: Lit/He 2 or equivalent.* Staff (S)

Lit/He 9. Introduction to Readings and Interpretations (4)
Second year course in Hebrew language and literature. Conversation, composition, grammar review, and reading of fairly simple literary and non-literary texts. *Prerequisite: Lit/He 3 or equivalent.* Staff

Lit/He 10. Readings and Interpretations (4)
The course is taught entirely in Hebrew and emphasizes the development of reading ability, listening comprehension and writing skills. Includes grammar review, lectures and class discussions. Approximately half of the reading selections are from modern and classical authors, half from nonliterary disciplines — humanities, social sciences, pure and applied sciences. Successful completion of Literature 10 satisfies the requirement for language proficiency in Revelle College. Staff (W)

Lit/He 11. Readings in Hebrew Literature and Culture (4)
An introduction to Hebrew literature, with continuing instruction in grammar. May be taken for 3 quarters starting with any quarter. The instructor will advise students when they have achieved sufficient proficiency to proceed to upper-division courses which call for an ability to read extensive texts in Hebrew. *Prerequisites: Satisfactory completion of Lit/He 9 and Lit/He 10, as indicated by written recommendation from the instructor of those courses or consent of instructor.* Staff (S)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/He 121. Medieval Hebrew Literature (4)
Major literary works of the Middle Ages and Renaissance as seen against the historical and intellectual background of the period. May be repeated for credit as topics vary. (Offered also as Lit/Gen 151.) Staff

Lit/He 126. The Modern Period (4)
Selected topics in modern Hebrew literature. May be repeated for credit as topics vary. (Offered also as Lit/Gen 151.) Staff

Lit/He 190. Seminars (4)
These seminars are devoted to a variety of special topics, including works of single authors, genre studies, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society, and the like. The student may enroll in more than one section in a single quarter. (Offered also as Lit/Gen 151.) Staff

Lit/He 198. Directed Group Study (4)
Directed group study in areas of Hebrew literature not normally covered in courses. *Prerequisite: permission of the instructor.* Staff (F,W,S)

Lit/He 199. Special Studies (4)
Tutorial; individual guided reading in areas of Hebrew literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Italian Literature

Lower Division

See: Language Program Lang/Ital 1-2-3

Lit/It 10. Readings and Interpretations (4)
The course is taught entirely in Italian and emphasizes the development of reading ability, listening comprehension and writing skills. It includes grammar review, lectures and class discussions. Approximately half of the reading selections are from modern and classical authors, half from nonliterary disciplines—humanities, social sciences, pure and applied sciences. Staff

Lit/It 11. Readings in Italian Literature and Culture (4)
An introduction to Italian literature. May be repeated for credit three times. The instructor will advise students when they have achieved sufficient proficiency to proceed to upper-division courses which call for an ability to read extensive texts in Italian. *Prerequisite: completion of Lit/It 10 or consent of instructor.* Staff

Lit/It 25. Composition and Conversation (4)
A course designed for students who wish to improve their ability to speak and write Italian. *Prerequisite: completion of the Literature minor language requirement.* Staff

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/It 100. Introduction to Italian Literature (4)
Reading and discussion of selections from representative authors. Review of grammar as needed. *Prerequisite: Lit/It 2 or equivalent.* Staff (S)

Lit/It 101. Advanced Readings and Conversation in Italian Literature (4)
Advanced course in Italian conversation and literature with an emphasis based on Italian literary texts. *Prerequisites: Satisfactory completion of Lit/It 100 or equivalent, upper-division standing or consent of instructor.* Staff

Lit/It 121. Studies in Medieval Lyric Poetry
Studies in the Italian lyric tradition from the Scuola Siciliana through the Stilnovisti to Dante and Petrarca. Mr. Martinez (S)

Lit/It 122. Italian Renaissance (4)
(Not to be offered 1976-77)

Lit/It 123. Studies in Modern Poetry
A study of the chief modern Italian poets, including Montale, Ungaretti, and Quasimodo, with attention to long, poetic form and contemporary Italian culture. *Prerequisites: Reading knowledge of Italian.* Mr. Saville (S)

Lit/It 147. Romantic Poetry (4)
(Not to be offered 1976-77)

Lit/It 148. Italian Literature (4)
One or more periods or authors in Italian literature. May be repeated for credit as topics vary.

Ariosto *Mr. Martinez* (F)

Lit/It 151. Dante (4)
A critical reading of the *Divina Commedia.* Mr. Fleming (W)

Lit/It 190. Seminars (4)
These seminars are devoted to a variety of special topics, including the works of single authors, genre studies, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society and the like. The student may enroll in more than one seminar in a single quarter. *Prerequisites: upper-division standing, consent of instructor and permission of department.*

Leopardi Prose and Poetry *Mr. Fleming* (W)

Lit/It 196. Directed Group Study (4)
Directed group study in areas of Italian literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Lit/It 199. Special Studies (4)
Tutorial; individual guided reading in areas of Italian literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Graduate

Lit/It 215. Dante (4)
(Not to be offered 1976-77)

Lit/It 297. Directed Studies (1-12)
Guided and supervised reading in a broad area of Italian literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/It 298. Special Projects (4)
Treatment of a special topic in Italian literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Latin Literature

Lower Division

Lit/La 1. Beginning Latin (4)
Fundamentals of Latin grammar, exercises in vocabulary, accidence and in reading. Staff (F)

Lit/La 2. Intermediate Latin (4)
Continuing instruction in Latin grammar, with reading of simple texts. *Prerequisite: Lit/La 1 or equivalent.* Staff (W)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/La 100. Introduction to Latin Literature (4)
Reading and discussion of selections from representative authors of the Augustan age. Review of grammar as needed. *Prerequisite: Lit/La 2 or equivalent.* Staff (S)

Lit/La 101-102-103. Readings in Latin Literature (4,4,4)
A continuing course in translation of literary, historical and philosophical works. *Prerequisites: upper-division standing; 101 for 102, 102 for 103, or consent of instructor.* Staff (F,W,S)

Lit/La 196. Directed Group Study (4)
Directed group study in areas of Latin literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Lit/La 199. Special Studies (4)
Tutorial; individual guided reading in areas of Latin literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Graduate

Lit/La 297. Directed Studies (1-12)
Guided and supervised reading in a broad area of Latin literature. (Satisfactory/Unsatisfactory grades only.) Offered for repeated registration. Staff (F,W,S)

Lit/La 298. Special Projects (4)
Treatment of a special topic in Latin literature. (Satisfactory/Unsatisfactory grades permitted.) Offered for repeated registration. Staff (F,W,S)

Russian Literature

Lower Division

Lit/Ru 9. Intermediate Russian (4)
Second-year course in Russian language and literature. Conversation, composition, grammar review, and reading of fairly simple literary and non-literary texts. *Prerequisites: Lang/Ru 1-2-3, a score of 500-549 on the Russian Language Placement Examination administered by the UCSD Testing Office, or with permission of the instructor.* Staff (F)

Lit/Ru 10. Reading and Interpretation (4)
A continuation of Lit/Ru 9. The course is taught entirely in Russian and emphasizes the development of reading ability, listening comprehension and writing skills. It includes grammar review, lectures and class discussions. Approximately half of the reading selections are from modern and classical authors, half from nonliterary disciplines (humanities and social sciences) and current Soviet newspapers and journals. *Prerequisites: 1. a score of 550 or higher in the Language Placement Examination administered by the UCSD Testing Office; or 2. satisfactory performance in a linguistic proficiency test conducted by the Department of Linguistics; or 3. satisfactory completion of Lit/Ru 9, as indicated by written recommendation from the instructor of that course.* Mr. Katsell (W)

Lit/Ru 11. Readings in Russian Literature (4)
An introduction to Russian literature, with continuing instruction in grammar, conversation and composition. *Prerequisite: 1. satisfactory completion of Lit/Ru 10, as indicated by written recommendation from the instructor of that course or consent of the instructor.* Mr. Katsell (S)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Ru 103. Russian Poetry (4)
(Not to be offered 1976-77)

Lit/Ru 124. Advanced Language and Literature (4)
Short works of classical and modern Russian Literature in prose and verse. Grammar review, and practice in conversation and composition. Mr. Katsell (F)

Lit/Ru 126. Advanced Language and Literature (4)
Continuation of the work in Lit/Ru 124. Staff (W)

Lit/Ru 128. Advanced Language and Literature (4)
Continuation of the work in Lit/Ru 126. Staff (S)

Lit/Ru 152. Literature of the Asian Peoples of the Soviet Union (4)
An examination of the literature, in various genres, of the Asian peoples of the Soviet Union, with special attention to the relation with Russia and Russian culture. Readings in English. (Also offered at Lit/Gen 152) Ms. Drake (S)

Lit/Ru 171. Pushkin (4)
(Not to be offered 1976-77)

Lit/Ru 172. Short Masterpieces of Russian Fiction (4)
(Not to be offered 1976-77)

Lit/Ru 173. Chekhov (4)
(Not to be offered 1976-77)

Lit/Ru 174. Solzhenitsyn (4)
(Not to be offered 1976-77)

Lit/Ru 175. Nineteenth Century Russian Prose (4)
(Not to be offered 1976-77)

Lit/Ru 177. Russian Drama (4)
Masterpieces of Russian drama from the 18th to the 20th century. The reading list varies from year to year, so that the course may be repeated for credit with the consent of the instructor. (Also offered as Lit/Gen 177.) Mr. Katsell (W)

Lit/Ru 178. Russian Poetry (4)
(Not to be offered 1976-77)

Lit/Ru 179. Tolstoy (4)
(Not to be offered 1976-77)

Lit/Ru 180. Dostoevsky (4)
(Not to be offered 1976-77)

Lit/Ru 181. Twentieth Century Russian Prose (4)
(Not to be offered 1976-77)

Lit/Ru 198. Directed Group Study (4)
Directed group study in areas of Russian literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Lit/Ru 199. Special Studies (4)
Tutorial; individual guided reading in areas of Russian literature not normally covered in courses. May be repeated for credit three times. *Prerequisite: upper-division standing and permission of department.* Staff (F,W,S)

Literature and Society: Third World Literatures

Lower Division

Lit/Soc 21-22-23. Literature and History: The Third World (4-4-4)
This sequence deals with the Third World's creation of a modern literature in reaction against and response to its colonial/neo-colonial experience. It will analyze the relation of this new literature to the 'model' literature of the First World, and will explore the ways in which this relation, literary and historical, influences thematic content and artistic form. This sequence will also provide instruction in basic literary skills for the analysis of literature.
NOTE: This sequence satisfies the social science requirement of Third College GE Requirements under Program B.

Major Themes/Forms/Ideas *Ms. Wynter* (F)

Fiction *Ms. Williams* (W)

Poetry/Drama Staff (S)

Lit/Soc 30. Introduction to Criticism & Writing (4)
(Not to be offered 1976-77)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Soc 120. Spanish Language in America (4)
A study of the history, structure and peculiarities of the Spanish language in Latin America with selected readings from Latin American authors utilizing these dialects within their works. (Also offered as Lit/Sp 120.) Ms. Sanchez (W)

Lit/Soc 125. Spanish American Literature (4)
(Not to be offered 1976-77)

Lit/Soc 127. Spanish American Fiction (4)
The development of major forms and modes of Spanish American fiction. The approach will be either historical or topical. (Also offered as Lit/Sp 127)

Topic TBA *Staff* (W)

Lit/Soc 128. Spanish American Poetry (4)
(Not to be offered 1976-77)

Lit/Soc 129. Spanish American Essay (4)
A study of the essay in Spanish American literature from either an historical or a topical point of view. (Also offered as Lit/Sp 129.)

Topic TBA *Staff* (S)

Lit/Soc 131. Literary Criticism and the Third World (4)
(Not to be offered 1976-77)

Lit/Soc 140. Development of Afro-American Literature (4)
A cross-genre survey of major themes in Black literature from its beginnings to the present with primary emphasis on contemporary Black literature. Ms. Williams (W)

Lit/Soc 141. Literary Images of Black Women (4)
(Not to be offered 1976-77)

Lit/Soc 142. Contemporary Black Literature (4)
(Not to be offered 1976-77)

Lit/Soc 143. Black Prose (4)
The analysis and discussion of the novel, the autobiography, the essay and collected short fiction by Afro-American writers with particular emphasis upon the developing prose styles of the writers and the study of the texts in relation to its historical era. Ms. Drake (W)

Lit/Soc 144. Harlem Renaissance (4)
Study of the major works of Afro-American writers who came to prominence during the 20's and 30's: *Home to Harlem, Pine Clothes to the Jew, Passing,* etc. (Also offered as Lit/En 190.) Ms. Williams (F)

Lit/Soc 152. Spanish Language in America: Chicano Dialects (4)
(Not to be offered 1976-77)

Lit/Soc 153. The Development of Chicano Literature (4)
A cross-genre survey of the major works in Chicano literature from its beginnings to the present, with primary emphasis on contemporary works. This course is offered in English. (Also offered as Lit/Sp 153.) Mr. Rodriguez (F)

Lit/Soc 160. Novel and History in the Third World (4)
This course sets out to explore the relation between the novel and the "dependent": history of the Third World, contrasting and comparing the uses of history in the European novel as defined in the theoretical analyses of Lukacs with the uses of History in the Third World novel.
This course will examine both in literary texts and critical studies, the implicit, and explicit theory concept of the novel in its Third World expression. Parallels and divergencies with the form and concept of the Novel in the First World literatures will also be explored. Staff (F)

Lit/Soc 162. Language and Social Context (4)
An examination of the way people talk in institutionally framed social interaction and a comparative analysis of such interaction with its reflection in fictional dialogue and dramatic text. Mr. Waterhouse (W)

Lit/Soc 170. Introduction to Literature of Modern Africa (4)
This course traces the rise of a modern literature in traditional African societies disrupted by the colonial and neocolonial experience. Ms. Wynter (S)

Lit/Soc 175. Contemporary Caribbean Literature (4)
This course will focus mainly on contemporary literature of the English-speaking Caribben as a Third World area of experience. The parallels and contrasts of this literature with that of the Spanish and French speaking Caribbean will also be explored. Ms. Drake (S)

Lit/Soc 190. Seminars (4)
These seminars are devoted to a variety of special topics, including the works of single authors, genre studies, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society, and the like. The student may enroll in more than one section in a single quarter.

Chicano Fiction Mr. Rodriguez (W)
(Also offered as Lit/Sp 190)

Spanish American Drama Staff (W)
(Also offered as Lit/Sp 190)

Lit/Soc 198. Directed Group Study (4)
Directed group study in areas of Literature and Society not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

Lit/Soc 199. Special Studies (4)
Tutorial; individual guided reading in an area normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and permission of department.* Staff (F,W,S)

The following courses are also applicable to this major:

Third World Studies 1A. History and Theory of Imperialism

Third World Studies 1B. Social Change in the Third World

Third World Studies 1C. History and Cultural Development in the Third World

Third World Studies 7A-B-C. Race and Ethnicity in the United States

Third World Studies 101A. History and Theory of Imperialism

Third World Studies 101B. Social Change in the Third World

Third World Studies 101C. History and Cultural Development in the Third World

Third World Studies 133. Contemporary Chicano Issues

Third World Studies 135. Billingualism: Research and Field Studies

Lit/Gen 61: Conflict and Resolution in Modern Literature of the Americas

Lit/Gen 63: Literature of the New World

Lit/Gen. 150. Masterpieces in Chinese Literature

Lit/Gen 152. Men, Literature, and Ideas

Lit/Gen 161. Forms of Folklore

Lit/Chinese 101. Readings in Contemporary Chinese Literature

Lit/En 24: The American Literary Imagination

Lit/En 125. American Literature of the Nineteenth Century

Lit/En 126. The Modern Period

Communications 132. Language and Society

Drama 165A. Development of Chicano Theatre

Drama 165B. Chicano Theatre Production

There are also a wide range of selected courses offered in history, drama, music, etc. Please contact your advisers.

Spanish Literature

Lower Division

Lit/Sp 9. Reading and Interpretations: Spanish for Native Speakers (4)
(Not to be offered 1976-77)

Lit/Sp 10. Readings and Interpretations (4)
The course is taught entirely in Spanish and emphasizes the development of reading ability, listening comprehension and writing skills. It includes grammar review, lectures, and class discussions. Approximately half of the reading selections are from modern and classical authors, half from nonliterary disciplines - humanities, social sciences, pure and applied sciences. The course is designed to prepare students for Literature 11 and Literature 25. *Prerequisite: Basic Language Proficiency (550 plus oral interview) or completion of Language 4, 5, or 6 with grade of A.* Successful completion of Literature 10 satisfies the requirement for language proficiency in Revelle College. Staff (F,W,S)

Lit/Sp 11. Readings in Spanish Literature and Culture (4)
An introduction to Spanish and Spanish-American literature. may be taken for three quarters, starting with any quarter. The instructor will advise students when they have achieved sufficient proficiency to proceed to upper-division courses which calls for an ability to read extensive texts in Spanish. *Prerequisite: Score of 650 or higher on CEEB test or completion of Literature 10.* Staff (F,W,S)

Lit/Sp 24. Composition and Conversation: Spanish for Native Speakers (4)
(Not to be offered 1976/77)

Lit/Sp 25. Composition and Conversation (4)
A course designed for students who wish to improve their ability to speak and write Spanish. *Prerequisite: Lit/Sp 10 or equivalent.* Staff (F,W,S)

Lit/Sp 70. Advanced Composition for Native Speakers (4)
An intensive writing course designed to prepare native Spanish speakers for advanced literature classes. The course will deal with specific composition and grammar difficulties in the writing of short and long papers. *Prerequisites: native Spanish speaking ability and consent of instructor.* Staff

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Sp 101. Spanish Literary Prose (4)
(Not to be offered 1976-77)

Lit/Sp 102. Spanish Dramatic Literature (4)
(Not to be offered 1976-77)

Lit/Sp 103. Spanish Poetry (4)
(Not to be offered 1976-77)

Lit/Sp 104. History of Spanish Language (4)
(Not to be offered 1976-77)

Lit/Sp 120. Spanish Language in America (4)
(Formerly Lit/Sp 105.) A study of the history, structure and peculiarities of the Spanish language in Latin America with selected readings from Latin American authors utilizing these dialects within their works. Ms. Sanchez (W) (Also offered as Lit/Soc 120.)

Lit/Sp 121. The Medieval Period (4)
Major Spanish literary works of the Middle Ages and Renaissance as seen against the historical and intellectual background of the period. May be repeated for credit as topics vary.

Medieval Humor Mr. Catalan (F)

Lit/Sp 122. Renaissance and Baroque (4)
Studies in selected topics in 16th and 17th century Spanish literature. May be repeated for credit as topics vary.

Major Authors except Cervantes Mr. Guillen (S)

Lit/Sp 124. The Nineteenth Century (4)
(Not to be offered 1976-77)

Lit/Sp 125. Spanish-American Literature (4)
(Not to be offered 1976-77)

Lit/Sp 126. The Modern Period (4)
Selected topics in modern Spanish literature. May be repeated for credit as topics vary.

Romanticism Ms. Kirkpatrick (F)

The 20th Century Spanish Novel Ms. Kirkpatrick (W)

Lit/Sp 127. Spanish American Fiction (4)
(Formerly Lit/Sp 130) The development of major forms and modes of Spanish American fiction. The approach will be either historical or topical. May be repeated for credit as topics vary.

Topic TBA Staff (W) (Also offered as Lit/Soc 127)

Lit/Sp 128. Spanish American Poetry (4)
(Formerly Lit/Sp 131.) The development of major forms and modes of Spanish american poetry. The approach will be either historical or topical.

The Post-Modernist Poets Mr. Alazraki (F)

Lit/Sp 129. Spanish American Essay (4)
(Formerly Lit/Sp 132) A study of the essay in Spanish American literature from either an historical or a topical point of view. May be repeated for credit as topics vary.

Topic TBA Staff (S) (Also offered as Lit/Soc 129)

Lit/Sp 140. Composition and Stylistics (4)
(Not to be offered 1976-77)

Lit/Sp 141. Phonetics (4)
(Not to be offered 1976-77)

Lit/Sp 142. Spanish Syntax and Morphology (4)
An analysis of Spanish syntax and morphology to increase the student's ability to speak and write Spanish. Ms. Sanchez (S)

Lit/Sp 143. Spanish Language in America: Dialects in USA (4)
(Not to be offered 1976-77)

Lit/Sp 151. Cervantes (4)
A critical reading of the "Quijote." Required of literature majors whose primary literature is Spanish.

El Coloquio de los perros y Quijote Mr. Catalan (W)

Lit/Sp 153. The Development of Chicano Literature (4)
A cross-genre survey of the major works in Chicano literature from its beginnings to the present, with primary emphasis on contemporary works. This course is offered in English. (Also offered ast Lit/Soc 153.) Mr. Rodriguez (F)

Lit/Sp 190. Seminars (4)
These seminars are devoted to a variety of special topics, including works of single authors, genre studies, problems in literary history, relations between literature and the history of ideas, literary criticism, literature and society, and the like. The student may enroll in more than one section in a single quarter.

Antonio Machado Ms. Kirkpatrick (F)

Chicano Fiction Mr. Rodriguez (W) (Also offered as Lit/Soc 190)

Spanish American Drama Staff (W) (Also offered as Lit/Soc 190)

Cuento Modernista y cuento criollista Mr. Alazraki (S)

Lit/Sp 198. Directed Group Study in Spanish Literature (4)
Research seminars and research, under the direction of a member of the staff. May be repeated for credit three times. *Prerequisites: upper-division standing and special permission of the department.* Staff (F,W,S)

Lit/Sp 199. Special Studies (4)
Tutorial; individual guided reading in areas of Spanish literature not normally covered in courses. May be repeated for credit three times. *Prerequisites: upper-division standing and special permission of the department.* Staff (F,W,S)

Graduate

Lit/Sp 201. Reading Medieval Texts (4)
(Not to be offered 1976-77)

Lit/Sp 202. Spanish Language in America (4)
(Not to be offered 1976-77)

Lit/Sp 203. History of the Spanish Language (4)
(Not to be offered 1976-77)

Lit/Sp 206. Textual Criticism in Spanish (4)
Tools and methods of scholarly research in literature for establishing texts from both manuscript and printed sources. Mr. Catalan (F,W)

Lit/Sp 214. Studies in Medieval Literature (4)
Consideration of one or more major figures, texts, trends, or problems in medieval Spanish literature.

Las Cronicas Mr. Catalan (F)

Lit/Sp 216. Fifteenth Century Spanish Literature and Culture (4)
(Not to be offered 1976-77)

Lit/Sp 224. Golden Age Studies (4)
Consideration of one or more major figures, texts, trends, or problems in Spanish Golden Age studies. May be repeated for credit, as topics vary.

The Outsider as Hero: Towards a Political Reading of the Golden Age Comedia Ms. Wynter (F)

La picaresca Mr. Guillen (W)

Lit/Sp 226. C Cervantes (4)
(Not to be offered 1976-77)

Lit/Sp 231. Eighteenth-Century Spanish Literature (4)
(Not to be offered 1976-77)

Lit/Sp 252. Studies in Modern Hispanic Literature and Culture (4)
Major trends and figures considered in the context of late nineteenth- and twentieth-century Hispanic culture.

Unamuno Mr. Catalan (W)

Romanticismo, España y America Ms. Kirkpatrick (W)

Lit/Sp 253. Chicano Literature (4)
Study of the particular life experience of the Chicano and the unique expression given that experience by Chicano authors, whether in novels, short stories, poetry, or dramatic works. *Topic TBA* Staff (W)

Lit/Sp 254. Modern Spanish Poetry (4)
(Not to be offered 1976-77)

Lit/Sp 255. The Modern Spanish Novel (4)
(Not to be offered 1976-77)

Lit/Sp 258. Spanish-American Prose (4)
Consideration of one or more major figures, texts, trends or problems in Spanish-American prose.

La novela criolla Mr. Alazraki (F)

Lit/Sp 259. Spanish-American Poetry (4)
Consideration of one or more major figures, texts, trends, or problems in Spanish-American poetry.

Post-modernismo Mr. Alazraki (W)

Topic TBA Mr. Rodriguez (S)

Lit/Sp 271. Literary Theory (4)
Problems and approaches in literary theory in the context of Spanish and Spanish American literature.

Literature and Linguistics Ms. Sanchez (F) A study of literary analysis through the insights provided by recent advances in linguistics.

Lit/Sp 272. Literature and Society Studies (4)
(CILAS) Special topics in practical criticism involving social and economic historical perspectives.

Analisis estructural del reportaje periodista Mr. Catalan (S)

Novela y Sociedad en el Siglo XIX Ms. Kirkpatrick (S)

The Colonial Period in Spanish America Staff (S)

Lit/Sp 280. Field Work (4)
Techniques of on-the-spot linguistic and folkloric surveys including the practice of ballad collection in the Spanish Peninsula. Offered for repeated registration. Mr. Catalan (S)

Lit/Sp 296. Research Practicum (1-12)
Laboratory research on specific topics to be developed by a small group of students under the continued direction of individual faculty members. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Sp 297. Directed Studies (1-12)
Guided and supervised reading in a broad area of Spanish literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Sp 298. Special Projects (4)
Treatment of a special topic in Spanish literature. Offered for repeated registration. (Satifactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Sp 299. Thesis (1-12)
Research for the dissertation. Offered for repeated registration. *Prerequisite: advancement to candidacy for the Ph.D. degree.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Materials Science

The materials science program is an interdisciplinary six-course sequence of upper division courses taught by faculty from the Departments of AMES, APIS, Chemistry, and Physics. Different selections from these courses are possible:

1. The whole sequence of six courses serves as a contiguous minor (or program of concentration) for a student in the Fourth College.

2. AMES undergraduate majors in applied mechanics may wish to take the following one-year sequence:
   MS 101 Fall Quarter
   MS 102 Winter Quarter
   MS 103 Spring Quarter

3. Chemistry and chemical engineering majors in particular may wish to take the following one-year sequence:
   MS 101 Fall Quarter
   MS 105 Winter Quarter
   MS 103 Spring Quarter

4. Physics majors at Revelle may wish to take some combination of a one-year sequence such as:
   MS 101 Fall Quarter
   MS 105 Winter Quarter
   MS 106 Spring Quarter

5. MS 101, 102, and 105 can each be elected as single-course electives, because each of them has no materials science prerequisites. AMES applied mechanics majors interested in solid mechanics and structures are to be encouraged to elect MS 102 at a minimum. APIS majors frequently take MS 105.

Courses

101. Properties of Solid State (4)
The binding mechanism of various classes of materials. The periodic table, molecular bonds, free electron theory of metals, band theory, Hume-Rothery and other empirical rules. Properties of ionic, covalent, and metallic solids. Categories of useful materials: metals, alloys, ceramics, composites under diverse conditions. Same as Physics 116. *Prerequisites: Mathematics 2A-2E, and a lower division physics-chemistry sequence.* (F)

102. Mechanical Behavior of Materials (4)
Mechanical tests, elasticity and anelasticity, dislocations and microplasticity of crystals, plastic deformation and creep, fracture and strengthening mechanisms, ceramics and other inorganic nonmetallics, polymers. Laboratory demonstrations of selected topics. Same as AMES 102. *Prerequisites: one year of calculus and completion of a natural sciences sequence, or equivalent, in physics and chemistry, or consent of instructor.* (W)

103. Phase Equilibria (4)
Thermodynamic properties. Multicomponent phase equilibria. Phase transformations, stability and synthesis in alloys. Rate processes, diffusion, nucleation and growth. Same as Chemistry 150. *Prerequisites: One year of calculus and completion of a Natural Science sequence or equivalent, or the consent of the instructor.* (S)

104. Electrical and Magnetic Materials (4)
Dielectrics (including ferroelectrics), conductors, semiconductors, liquid crystals, superconductivity, magnetism. Applications of materials in modern technology. Same as Physics 125. *Prerequisites: MS 101.* (F)

105. Structure of Solids (4)
Atomic structure, properties and growth of ordered and disordered solids. Laboratory work includes generation of x-ray spectra, symmetry determination by Laue-technique, structure determination by single crystal and powder techniques, electron diffraction and radial distribution analysis. Same as APIS 133. *Prerequisites: Consent of instructor.* (F)

106. Solid State Devices (4)
A laboratory course covering principles and usage of semiconductor and superconductor devices. Quantum electronics. Same as APIS 137. *Prerequisites: MS 103, 104, and elements of electronics (such as Physics 120A or Science 4CL), and consent of instructor.* (S)

Mathematics

OFFICE: 7313 Applied Physics and Mathematics Building

Professors;
Donald W. Anderson, Ph.D. *(Chairman)*
Errett A. Bishop, Ph.D.
John W. Evans, M.D., Ph.D.
Theodore T. Frankel, Ph.D.
Adriano M. Garsia, Ph.D.
Ronald K. Getoor, Ph.D.
William B. Gragg, Jr., Ph.D.
Hubert Halkin, Ph.D.
Eric Reissner, Ph.D.
Burton Rodin, Ph.D.
Helmut Röhrl, Ph.D.
Murray Rosenblatt, Ph.D.
Lance W. Small, Ph.D.
Stefan E. Warschawski, Ph.D. *(Emeritus)*
Stanley G. Williamson, Ph.D.

Associate Professors:
Edward A. Bender, Ph.D.
James R. Bunch, Ph.D.
Jay P. Fillmore, Ph.D.
Carl H. FitzGerald, Ph.D.
J. William Helton, Ph.D.
Alfred B. Manaster, Ph.D.
Richard A. Olshen, Ph.D.
Michael J. Sharpe, Ph.D.
Norman A. Shenk, Ph.D.
Donald R. Smith, Ph.D.
John Wavrik, Ph.D.
Daniel E. Wulbert, Ph.D.

Assistant Professors:
Solomon A. de Picciotto, Ph.D.
Ronald J. Evans, Ph.D.
Michael H. Freedman, Ph.D.
Leonard R. Haff, Ph.D.
James P. Lin, Ph.D.
George W. Luna, Ph.D.
Roy H. Ogawa, Ph.D.
Jeffrey B. Remmel, Ph.D.
John A. Rice, Ph.D.
Audrey A. Terras, Ph.D.
John A. Trangenstein, Ph.D.
Adrian R. Wadsworth, Ph.D.
Einar Hille, Ph.D., *(Research Mathematician)*

Lecturers in Mathematics:
Patrick J. Ledden, Ph.D.
Frank B. Thiess, Ph.D.

The Department of Mathematics offers a wide range of courses and programs. These vary in their objectives and levels of required mathematical maturity. In certain courses, the cultural aspects of mathematics are emphasized and the prerequisites are minimal. In others, the scientific and technical aspects are paramount and the prerequisites are considerable. In making selections, students are advised to keep in mind their particular objectives and backgrounds.

First Year Courses Before entering, each freshman student is given an examination to determine his or her grasp of high school mathematics. The object is to advise in the selection of an appropriate freshman mathematics sequence. The possible choices are as follows:

Mathematics 5A, B, C is a liberal arts course in mathematics. It is taken mostly by students with two years of high school mathematics who will not pursue more advanced work. For the first two quarters, topics in geometry are discussed. The third quarter is an introduction to calculus. (This course fulfills the mathematics option of the general education requirements of Muir College and completion of two quarters fulfills the requirement of Third College.)

Mathematics 4A, B, C are separate courses for students with weak backgrounds in high school mathematics.

Mathematics 4B is algebra. Mathematics 4C is trigonometry. (Two quarters fulfills the mathematics requirement of Third College.)

Mathematics 1A, B, C is calculus. The students have completed two years of high school mathematics. This course is acceptable for majors in liberal arts, economics and biology. (It fulfills the mathematics requirements of Revelle College, and the option of the general education requirements of Muir College. Completion of two quarters fulfills the requirement of Third College and the option of Fourth College.)

Mathematics 2A, B, C is calculus. Most of the students have completed four years of high school mathematics. Many have previously taken short, introductory calculus courses. This sequence is required for certain majors including mathematics, physics, chemistry, and APIS. (It fulfills the same College requirements as Mathematics 1A, B, C.)

Students with exceptionally strong backgrounds in mathematics should consider advanced placement or the honors calculus sequence 2AH, BH, CH.

Certain transfers from one sequence to another are possible, but such transfers should be carefully discussed with an adviser. Able students, who begin the Mathematics 1 sequence, and who wish to transfer to the Mathematics 2 sequence, should follow Mathematics 1A with 2A and receive two units of credit for 2A, and may, by petition, follow 1B or 1C with 2B and receive two units credit for 2B. Where there is substantial overlap among courses in different sequences, full credit is given only once. Credit will not be given for courses taken simultaneously from the Mathematics 1 sequence and the Mathematics 2 sequence.

Minor in Mathematics For students in Revelle College with a non-contiguous major and students in Fourth College wishing a concentration in mathematics, the following program is offered: A minor in mathematics consists of six courses including Mathematics 2D and 2E and four upper-division courses. Other comparable combinations may be approved upon prior petition.

To receive a bachelor's degree in Third College with a minor in mathematics, a student must satisfy the following requirements in addition to the Third College requirements for a bachelor's degree:

1. Completion of calculus through Mathematics 2C, with at least a C average.
2. Completion of five courses beyond 2C including
   a. 2D or 2E, and
   b. 100A-B, or 140A-B, and
   c. at least one additional upper division course.
3. A grade-point average of 2.0 for five mathematics courses beyond 2C.
4. Declaration of intent to minor in mathematics before the student's senior year.

Major in Mathematics The upper-division curriculum provides programs for mathematics majors as well as courses for students who will use mathematics as a tool in the physical and behavorial sciences and the humanities. A major is offered in Revelle, Muir, Third and Fourth Colleges. Foreign languages recommended for mathematics majors are French, German and Russian.

All students majoring in mathematics will complete the basic sequence 2A-B-C-D-E and at least 12 one-quarter courses in the upper-division offerings of the department. Six of the 12 courses must be Mathematics 140A-B, 100A-B (or 103A-B), and two courses of a third sequence. Two sequences must be completed. Sequences are any three-quarter course, 103A-B-102, 120-110A-110B, 120-110A-112, 110A-B-112, 170A-B-C, 180A-181A-B, and certain two-quarter courses, e.g. 160A-B. As with all departmental requirements, more advanced courses on the same material may be substituted with the approval of the departmental adviser.

The program of a mathematics major whose main interest is computational mathematics must include Mathematics 103A-B and APIS 161B-C. (The APIS series does not count toward the 12 upper-division course requirement.) For recommended additional courses see the departmental adviser for computational mathematics.

For the B.A. degree, a minimum average of C in the major is required, and in particular a minimum average of C is required in each of the required upper-division se-

quences. To be prepared for a strong major curriculum, students who expect to major in mathematics should complete Mathematics 2D and 2E before the end of their sophomore year. Either Mathematics 140A-B or 100A-B (103A-B) should be taken during the junior year.

The mathematics major in John Muir College is required to take Science 4A-B-C or the equivalent. With the approval of his or her major adviser, the Third College mathematics major may replace some upper-division mathematics courses by courses in related fields in which mathematics plays a basic role.

A mathematics major with specialization in earth sciences is also available for undergraduates. See "Earth Sciences" for description of this program, which may be arranged by consultation with advisers in the Department of Mathematics and Scripps Institution of Oceanography.

The Graduate Program The Department of Mathematics offers a graduate program leading to the M.A. and Ph.D. degrees.

Admission to the graduate program is in accordance with the general requirements of the Graduate Division of the University of California. Students with a bachelor's degree and a background in mathematics comparable to the requirements for the undergraduate major in mathematics at this University may apply for admission. All applicants must present satisfactory scores on the Graduate Record Examination, including the advanced examination in mathematics.

In each quarter a student's program must include at least nine units. At least six of these units must be in graduate mathematics courses. The remaining three units must be in upper-division or graduate courses in mathematics-related subjects. Mathematics 500 (Apprentice Teaching) may not be used to satisfy any part of this requirement. Mathematics 299 (Reading and Research) may only be used by students in the Ph.D. program who have passed all four written qualifying examinations (see Doctoral Degree Program) or who have obtained the approval of the graduate adviser.

Master's Degree Program Requirements for the Master of Arts degree are to be met according to Plan II (Comprehensive Examination). (See Graduate Studies: The Master's Degree.) A total of 36 units of course credit is required.

These must include:

1. at least eighteen units of graduate mathematics courses;
2. not more than nine units of upper-division mathematics courses;
3. not more than nine units of graduate courses in a related field approved by the department;
4. not more than six units of Mathematics 500 (Apprentice Teaching). No units of Mathematics 299 may be used in satisfying the requirements for the Master's degree; Mathematics 500 may not be used under item 1.

The comprehensive examination will cover basic facts in two topics selected from two of the following three groups:

1. algebra or topology;
2. real analysis or complex analysis;
3. any of the other subjects listed in the Ph.D. program below.

A detailed list of the depth requirements in each of these areas, with literature references and approved courses, is available in the office of the Department of Mathematics.

A reading knowledge of one foreign language: French, German, or Russian, is required. (In exceptional cases other languages may be substituted.) The foreign-language examinations, which consist of the translation of selected passages in mathematics, are administered by the department.

Master's Degree Program in Applied Mathematics The Department of Mathematics has initiated a program of graduate studies in applied mathematics for regular or part-time students. The program requires one to two years for completion and may be integrated with the regular program in pure mathematics. A total of thirty-six units of course credit is required. There is no foreign language requirement. Students must take two sequences and pass two qualifying exams (at the M.A. level) from the following applied mathematics courses: 202AB, 210ABC, 211AB, 261ABC, 270ABC, 271ABC, 277ABC, 282ABC, 284ABC. (Not every course is offered each year.) In addition, students will be encouraged to take a one-year sequence in an area outside of the mathematics department (computer science, engineering, physics, economics,

psychometrics, etc.) Twelve units may be at the upper-division level.

Accelerated Master's Degree Program in Applied Mathematics Undergraduate mathematics majors in their junior year who satisfy certain requirements may apply for early admission to the Department of Mathematics M.A. Program in Applied Mathematics. Students accepted into this program become regular graduate students and must complete all of the master's degree requirements within seven quarters after admission. Students may wish to take graduate mathematics courses above and beyond the undergraduate requirements during their junior year in order to finish the program in one year.

The applicant must have satisfied (by the end of the junior year):

(1) all general education requirements of his college,
(2) all mathematics department requirements for the bachelor's degree,
(3) an overall and departmental grade point average of at least 3.5.

Doctoral Degree Program A student acquires a general background in mathematics by preparing for and taking written departmental qualifying examinations in four areas. One of the four areas must be real analysis or complex analysis, another must be algebra or topology. Each of the remaining two examinations may be in any of the four areas already listed or in applied analysis, differential geometry, mathematical logic, numerical mathematics, ordinary or partial differential equations, probability or mathematical statistics, or an approved minor outside the department. The examinations are given near the beginning and end of each academic year. A detailed list of depth requirements in each area, with literature references and approved courses, is available in the office of the Department of Mathematics. Examinations may be repeated, but no more than eight attempts are allowed to pass the examinations in four areas.

Students in the Ph.D. program must pass, by October of their second year, a written qualifying examination in one of the following areas: real analysis, complex analysis, algebra or topology; by October of their third year they must pass written qualifying examinations in three areas (one of the three areas must be real analysis or complex analysis, another must be algebra or topology); by October of their fourth year they must pass all of the written qualifying examinations. Students in the Ph.D. program who do not pass written qualifying examinations according to the above schedule will be transferred to an M.A. program in mathematics.

A student must demonstrate a satisfactory reading knowledge of two foreign languages (chosen from French, German, and Russian; in exceptional circumstances other languages may be substituted).

After a student has met the area and language requirements and has decided upon a field of research under the supervision of a faculty member, a doctoral committee appointed by the Office of Graduate Studies and Research conducts the student's oral qualifying examination. This examination deals primarily with the proposed area of thesis research and may include the project itself. A student must pass this examination by the end of his or her eleventh quarter. Successful completion of this requirement advances the student to candidacy. The student then devotes him or herself to study and research for his or her doctoral dissertation. After completion of his or her research and dissertation, the student takes a final oral examination on the dissertation.

Courses

Lower Division

1A. Elements of Mathematical Analysis (4)
Differentiation and integration of algebraic functions. Fundamental theorem of calculus. Applications. Three lectures, two recitations. (Credit not given if Mathematics 2A previously completed.) *Prerequisite: two years high school mathematics* (F,W)

1B. Elements of Mathematical Analysis (4)
Further applications of the definite integral. Calculus of trigometric, logarithmic and exponential functions. Complex numbers. (Credit not given if Mathematics 2B previously completed.) *Prerequisites: Mathematics 1A* (W,S)

1C. Elements of Mathematical Analysis (4)
Vector geometry, velocity and acceleration vectors. Partial derivatives, multiple integrals. Exact differentials. (Credit not given if Mathematics 2C previously completed.) *Prerequisites: Mathematics 1B.* (F,S)

2A. Calculus and Analytic Geometry (4)
Differential and integral calculus of functions of one variable: limits, continuity; differentiation of algebraic and trigonometric functions; applications. Definite integral, primitive functions, fundamental theorem of the calculus. Elements of analytic geometry as needed in the development of the calculus. Three lectures, two recitations. *Prerequisites: three or more units of high school mathematics; one-half unit of trigonometry is desirable.* (F,W)

2B. Calculus and Analytic Geometry (4)
Applications of the definite integral, calculus of logarithmic, exponential and hyperbolic functions. Methods of integration. Plane analytic geometry, polar coordinates.

Vector geometry, vector functions and their derivatives. Three lectures, two recitations. *Prerequisite: Mathematics 2A.* (F,W,S)

2C. Calculus and Analytic Geometry (4)
Partial differentiation, multiple integration. Gradient, divergence, curl. Theorems of Green, Gauss, and Stokes. Note: Mathematics 2C and Mathematics 2D may be taken in either order. Three lectures, two recitations. *Prerequisite: Mathematics 2B.* (F,W,S)

2D. Calculus and Analytic Geometry (4)
Infinite series. Ordinary differential equations. Note: Mathematics 2C and Mathematics 2D may be taken in either order. Three lectures, two recitations. *Prerequisite: Mathematics 2B* (F,W,S)

2E. Matrices and Linear Transformations (4)
Linear equations, matrices, vector spaces, linear transformations, determinants, eigenvalues, orthogonal and unitary transformations, quadratic forms. Systems of differential equations, exponential of a matrix. Three lectures, two recitations. *Prerequisite: Mathematics 2D.* (F,W,S)

2DA. Calculus and Analytic Geometry (4)
Ordinary linear differential equations; initial, boundary-value and eigenvalue problems for a single differential equation with constant coefficients. Matrices and linear algebraic equations. Systems of linear differential equations with constant coefficients. Applications are directed towards the physical and engineering sciences. Mathematics 2C is not a prerequisite for 2DA; however, the preferred sequence for students taking both courses is 2C, 2DA. Three lectures. *Prerequisite: Mathematics 2B.* (S)

2EA. Matrices and Linear Transorms (4)
Vector spaces and linear transformations. Eigenvalue problems of matrices and of systems of linear differential equations with constant coefficients. Fundamental theorems for ordinary differential equations; solutions by infinite series and other methods. Applications are directed towards the physical and engineering sciences. Three lectures. *Prerequisite: Mathematics 2DA.* (W)

2AH. Calculus and Analytic Geometry (4)
The material covered in Mathematics 2AH is similar to the material covered in Mathematics 2A. However in this honors course there is a greater emphasis on rigor in the lectures and the students are confronted with tougher problems. *Prerequisites: Same as for Mathematics 2A and consent of instructor.*

2BH-2CH-2EH. Calculus and Analytic Geometry (4-4-4)
The material covered in Mathematics 2BH, 2CH and 2EH is similar to the material covered in Mathematics 2B, 2C, and 2E. However, in this honors sequence there is greater emphasis on rigor in the lectures, and the students are confronted with tougher problems. The combination of 2BH, 2CH and 2EH makes a very nice integrated one year honors sequence in calculus. *Prerequisite: Calculus at least equivalent to Mathematics 2A and consent of instructor.*

4A. Discrete Structure and Processes (4)
Elementary theory of graphs with applications to probability, determined games, coloring and labyrinth problems, computer logic. Polyhedra, lattices, crystallography. The instruction will take the form of a three-hour mathematics workshop involving instructor-guuided problem-solving sessions and one hour recitation. *Prerequisite: consent of instructor.* (F)

4B. Continuous Structures and Processes (4)
Coordinate geometry. Vectors, transformations and functions. Rational and irrational numbers, infinite processes. Integrals, derivatives. Course instruction will take the form of a mathematics workshop involving instructor-guided problem-solving sessions. *Prerequisite: Mathematics 4A.* (F,W,S)

4C. Introductory Calculus (4)
Limits, continuity, differentiation and integration of algebraic and trigonometric functions. Applications. *Prerequisites: Mathematics 4A and 4B, or 6A and 6B, or consent of instructor.* (F,W,S)

5A. Introduction to Mathematics (4)
Topics in Euclidean geometry. The theorems of Ceva and Menelaus, Desargues' theorem, Pappus' theorem, harmonic tetrads. An emphasis is placed upon geometry as an archetype for the development of mathematical systems. Three lectures, one recitation. *Prerequisite: two units of high school mathematics.* (F)

5B. Introduction to Mathematics (4)
Projections, projective geometry, conic sections, Pascal's theorem. Three lectures, one recitation. *Prerequisite: Mathematics 5A.* (W)

5C. Introduction to Mathematics (4)
Basic notions of calculus: functions, differentiation of elementary functions, applications. Definite and indefinite integral and applications. Three lectures, one recitation. *Prerequisite: Mathematics 5B.*(S)

6A-B. Introductory Statistics and Mathematical Analysis (4-4)
Descriptive statistics, measures of location and variability, organization of multivariate data, basic applied probability, random sampling, Central Limit Therorem. Sampling distributions, confidence intervals, hypothesis testing, single population problems, comparisons between two populations, supporting concepts from pre-calculus and calculus. Four lecturęs. *Prerequisite: consent of instructor.* (F,W)

80A-B. Basic Statistics (4-4)
Analysis of experimental data. Basic probability models—binomial, Poisson, normal. Expectation and variance, sampling models, normal approximation. Unbiased estimation, regression, correlation. Hypothesis testing, including non-parametric tests. Experimental design. Emphasis on application of methods of statistical inference to experimental data. Three lectures, one recitation. *Prerequisite: Mathematics 1C or 2B or consent of instructor.* (F,W)

Upper Division

(See also course listings: *Earth Sciences)*

100A-B-C. Introduction to Algebra (4-4-4)
An introduction to the methods and basic structures of higher algebra: sets and mappings, the integers, rational, real and complex numbers, groups, rings (especially polynomial rings) and ideals, fields, real and complex vector spaces, linear transformations, inner product spaces, matrices, triangular form, diagonalization. Three lectures, one recitation. *Prerequisite: Mathematics 2E.* (F,W,S)

102. Applied Linear Algebra (4)
A second course in linear algebra from a computational yet geometric point of view. Elementary Hermitian matrices, Schur's theorem, normal matrices and quadratic forms. Moore-Pinrose generalized inverse and least squares problems. Vector and matrix norms. Characteristic and singular values. Canonical forms. Determinants and multilinear algebra. Three lectures. *Prerequisite: Mathematics 2E.* (S)

103A-B. Modern Applied Algebra (4-4)
Abstract algebra with applications to computation. Set algebra and graph theory. Finite state machines. Boolean algebras and switching theory. Lattices. Groups, rings and fields; applications to coding theory. Recurrent sequences. Three lectures, one recitation. *Prerequisite: Mathematics 2E.* (F,W)

104A-B-C. Number Theory (4-4-4)
Topics from elementary and algebraic number theory such as: congruences, reciprocity laws, quadratic forms, prime number theorem, Riemann zeta function, Ferman's conjecture, diophantine equations, Gaussian sums, algebraic integers, unique factorization into prime ideals in algebraic number fields, class number, units, splitting of prime ideals in extensions, quadratic and cyclotomic fields, partitions. Three lectures. *Prerequisite: consent of instructor.* (F,W,S)

109A-B-C. Undergraduate Seminar (4-4-4)
Reports by students on assigned reading material and/or discussion of assigned problems in areas compatible with the student's background. Designed to develop insight and originality as well as mathematical techniques. *Prerequisite: consent of instructor.* (F,W,S)

110A. Introduction to Ordinary and Partial Differential Equations (4)
Bessel, Hermite, Legendre and other special functions. Orthogonal expansions, eigenvalue problems. Sturm-Liouville theory. Some partial differential equations of mathematical physics. Boundary value problems, separation of variables. Three lectures, one recitation. *Prerequisites: Mathematics 2C-D-E or consent of instructor.* (W)

110B. Integral Transforms (4)
Additional topics on Fourier series. Fourier, Laplace and other transforms. Applications to ordinary and partial differential equations. Three lectures, one recitation. *Prerequisites: Mathematics 110A, 120.* (S)

111A-B. Mathematical Model Building (4)
This course is intended to acquaint students with mathematical model building in fields such as natural science, engineering science, economics. Instructors from various departments will mathematize specific problems in their fields by extracting the pertinent data and structures from the available information. Three lectures. *Prerequisites: Mathematics 2C-D-E or consent of instructor.* (F,W) (111B not offered in 1976-77. See 211A-B instead.)

112. Vector Analysis (4)
Topics in vector analysis. Possible topics: Curvilinear motion. Kepler's laws. Motion of a rigid body. Curves and surfaces in space. Frenet-Serret formulas. Fundamental forms. Line and surface integrals. Level curves and surfaces. Conservative fields. Stokes' theorem, Green's theorem, the divergence theorem. Harmonic functions. Potential theory. Applications. Three lectures, one recitation. *Prerequisites: Mathematics 2C, 2E.* (S)

120. Complex Variables (4)
Complex numbers, complex valued functions, analytic functions. Cauchy-Riemann equations, elementary functions and conformal mapping, basic concepts of two-dimensional potential theory, complex integration. Cauchy's theorem, Cauchy's formula, power series, residue theory and applications. Three lectures, one recitation. *Prerequisites or co-registration: Mathematics 2C-D.* (F,W,S)

130A-B. Ordinary Differential Equations (4-4)
Existence and uniqueness of solutions of differential equations and of systems. Linear systems with constant and variable coefficients; solutions in matrix form. Local and global theorems of continuity and differentiability. Autonomous systems. Stability: Lyapounov's theorem. Three lectures. *Prerequisties: Mathematics 2C-D-E.* (F,W)

131. Variational Methods in Optimization (4)
Maximum-minimum problems. Normed vector spaces, functionals, Gateaux variations. Euler-Lagrange multiplier theorem for an extremum with constraints. Calculus of variations via the multiplier theorem. Applications may be taken from a variety of areas such as the following: applied mechanics; elasticity; economics; production planning and resource allocation; astronautics; rocket control; physics; Fermat's principle and Hamilton's principle; geometry; geodesic curves; control theory; elementary bang-bang problems. Three lectures, one recitation. *Prerequisites: Mathematics 2D-E or consent of instructor.* (F)

132A. Elements of Partial Differential Equations and Integral Equations (4)
Basic concepts and classification of partial differential equations. First order equations, characteristics. Hamilton-Jacobi theory, Laplace's equation, wave equation, heat equation. Separation of variables, eigenfunction expansions, existence and uniqueness of solutions. Three lectures, one recitation. *Prerequisites: Mathematics 110A, 131 or consent of instructor.*

132B. Elements of Partial Differential Equations and Integral Equations (4)
Relations between differential and integral equations, some classical integral equations. Volterra integral equation, integral equations of the second kind, degenerate kernels. Fredholm alternative, Neumann-Liouville series, the resolvent kernel. Three lectures. *Prerequisite: Mathematics 132A.*

140A-B-C. Foundations of Analysis (4-4-4)
Axioms, the real number system, topology of the real line, metric spaces, continuous functions, sequences of functions, differentiation, Riemann-Stieltjes integration, partial differentiation, multiple integration, Jacobians. Additional topics at the discretion of the instructor: power series, Fourier series, successive approximations or other infinite processes. Three lectures, one recitation. *Prerequisites: Mathematics 2C-D.* (F,W,S)

150A-B-C. Calculus on Manifolds (4-4-4)
Differentiable functions, implicit and inverse function theorems. Integration in Euclidean n-space. Manifolds, exterior differential forms, and their integrals. Stokes' theorem. Three lectures. *Prerequisites: Mathematics 2E, 140A.* (F,W,S)

151. Topics in Geometry (4)
A topic to be chosen from among differential geometry, linear geometry, projective geometry, algebraic geometry, topology of surfaces. May be repeated for credit with a different topic. Three lectures. *Prerequisite: consent of instructor.* (S)

160A-B. Elementary Mathematical Logic (4-4)
Propositional and predicate calculi. Interpretations and formal theories. Completeness theorems. Some decision procedures. An introduction to recursion theory. Undecidability of the predicate calculus. Incompleteness of elementary number theory. Three lectures. *Prerequisites: Mathematics 2C.* (W,S)

161. Theory of Computability (4)
Introduction to Turing and other machines. Godel numbering and unsolvability results; the halting problem. Relative uncomputability. Recursive function theory and complexity classification. Models of computation. Three lectures. *Prerequisite: Mathematics 100A-B or 103A-B* (F)

170A. Numerical Linear Algebra (4)
Anlysis of numerical methods for linear algebraic systems and least squares problems. Orthogonalization methods. Ill-conditioned problems. Eigenvalue and singular value computations. Statistical computations. Linear programming. Three lectures. *Prerequisites: programming experience and Mathematics 2E.* (F)

170B. Numerical Analysis (4)
Rounding and discretization errors. Interpolation and approximation of functions. Numerical differentiation and integration. Solution of polynomial and single nonlinear equations. Three lectures. *Prerequisites: programming experience and Mathematics 2E.* (W)

170C. Numerical Analysis (4)
Ordinary differential equations and their numerical solution. Basic existence and stability theory. Difference equations, numerical methods and error propagation. Boundary value problems. Three lectures. *Prequisite: Mathematics 170B.* (S)

171A-B. Mathematical Programming (4-4)
Elementary topological properties of Euclidean spaces. Convex sets, separation theorems. Simplexes, Sperner lemma, Brouwer fixed-point theorem, linear programming, duality. Constrained maxima, Kuhn-Tucker theorem, mathematical programming. Three lectures. *Prerequisites: Mathematics 2C-D-E.* (W,S)

180A. Introduction to Probability (4)
Probability spaces, independence, conditional probability, random variables, distributions, expectations, joint distributions, central-limit theorem. *Prerequisite: Mathematics 2C-D.* (F)

180B. Introduction to Probability (4)
Random vectors, multivariate densities, covariance matrix, multivariate normal distribution, Poisson process. Other topics if time permits. *Prerequisites: Mathematics 180A and 2E.* (W)

180C. Introduction to Probability (4)
Markov chains in discrete and continuous time, random walk, recurrent events. If time permits, topics chosen from stationary normal processes, queuing theory. *Prerequisite: Mathematics 180B.* (S)

181A. Introduction to Statistics (4)
Random samples, linear regression, least squares, testing hypotheses and estimation. Neyman-Pearson lemma, likelihood ratios. Three lectures, one recitation. *Prerequisite: Mathematics 180A and 2E.* (W)

181B. Introduction to Statistics (4)
Goodness of fit, special small sample distribution and use, non-parametric methods, Kolmogorov-Smirnov statistics, sequential analysis. Three lectures. *Prerequisite: Mathematics 181A.* (S)

182. Introduction to Combinatorics (4)
Combinatorial methods and their computer implementation. Permutations and combinations; generating functions; partitions; principle of inclusion and exclusion; Polya's theory of counting; Hall's theorem; assignment problem; backtrack technique; error-correcting codes; combinatorial optimization problems. Three lectures, one recitation. *Prerequisite: programming experience.* (W)

190A-B. Introduction to Topology with Applications to Analysis (4-4)
Set theory, Zorn's lemma, cardinal and ordinal numbers. Metric spaces. General topological spaces. Metrizability. Function spaces. Ascoli's theorem. Three lectures. *Prerequisite: Mathematics 140A-B.* (F,W)

190C. Introduction to Topology with Applications to Analysis (4)
The course will develop Euler Characteristics and the classification of 2-manifolds. This will be followed by the construction and applications of the Fundamental Group, through Van Kampen's Theorem, covering spaces, Borsuk-Ulam Theory and the Kurosh Subgroup Theorem. Three lectures. *Prerequisite: Mathematics 190A-B.* (S)

198. Directed Group Studies in Mathematics (4)
Group study course in some topic not covered in the undergraduate curriculum. *Prerequisite: consent of instructor.* (F,W,S)

199. Independent Study for Undergraduates (2 or 4)
Independent reading in advanced mathematics by individual students. Three Periods. *Prerequisite: permission of department.* (F,W,S)

Graduate

200A-B-C. Algebra (3-3-3)
Algebraic structures, Jordan-Holder theorem. Sylow theorems, rings and ideals, principal ideal rings, algebraic field extensions, Galois theory, transcendental field extensions, simple and semisimple modules, Webberburn theory, representation of finite groups, places and valuations, polynominal and power series rings. *Prerequisites: Mathematics 100A-B-C or consent of instructor.*

202A-B. Applied Algebra (4-4)
Selected topics in applied mathematics that are principally algebraic in nature, Boolean algebras, group codes, polynomial rings and polynomial codes, selected applications of finite fields, recurrent sequences, switching theory, finite state machines. *Prerequisites: Mathematics 103A-B or Mathematics 100A-B.*

203A-B-C. Algebraic Geometry (3-3-3)
Places, Hilbert nullstellensatz, Varieties, product of varieties; correspondences, normal varieties. Divisors and linear systems; Riemann-Roch theorem; resolution of singularities of curves. Grothendieck schemes; cohomology, Hilbert schemes; Picard schemes. *Prerequisites: Mathematics 200A-B-C.*

204A-B-C. Number Theory (3-3-3)
Topics in number theory such as: *algebraic number theory:* cyclotomic and Kummer extensions, class number, units, splitting of primes in extensions, zeta and L-functions, Tchebotarev density theorem, prime ideal theorem, Brauer-Siegel theorem, class field theory (abelian extensions, reciprocity laws), p-adic numbers, adeles, number theory of simple algebras. *diophantine equations and approximation; quadratic forms:* Hasse-Minkowski theorem, Siegel theorem; *automorphic forms and applications to number theory:* Hecke theory of the relation between Dirichlet series and modular forms, special automorphic forms such as theta functions, Eisenstein series and applications such as Kronecker limit formula, Rademacher's result on the partition function. *Prerequisite: consent of instructor.* (F,W,S)

207A-B-C. Topics in Algebra (3-3-3)
In recent years, topics have included number theory, commutative algebra, non-communitative rings, homological algebra, and Lie groups. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

208. Seminar in Algebra (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

210A. Mathematical Methods in Physics and Engineering (4)
Vector spaces and linear transformations, eigenvalue problems, tensor algebra, Matrices, norms, completeness, the spaces L^p and C, Distributions, Delta sequences. Properties of Lebesgue, Stieltjes, line integrals. Analytic functions. *Prerequisites: Mathematics 2D-E and 140A, or advanced calculus.* (F)

210B. Mathematical Methods in Physics and Engineering (4)
Scalar products, orthogonal series in Hilbert space, best approximation. Compact symmetric operators, expansions in eigenvectors. Applications to matrices, quadratic forms, integral equations. Regular and singular Sturm-Liouville problems, Green's functions. *Prerequisites: Mathematics 210A or consent of instructor.* (W)

210C. Mathematical Methods in Physics and Engineering (4)
Fourier transforms of functions and distributions, Laplace transforms, applications to boundary value problems. Simple second order elliptic, hyperbolic and parabolic par-

tial differential equations. Uniqueness theorems, maximum principles. Spherical harmonics. Wave Propagations. *Prerequisites: Mathematics 210B or consent of instructor.* (S)

211A-B. Mathematical Model Building (4-4)
Topics to include arguments from scale, dimensional analysis, graphical methods, techniques of optimization, continuous, discrete, and stochastic models, local stability theory, principles of systems analysis, models and data collection. *Prerequisites: Mathematics 2D-E, Mathematics 180A.* (W-S)

215A-B-C. Mathematical Theory of Process Optimization (3-3-3)
Optimal control problems for systems described by nonlinear differential equations, necessary conditions, sufficient conditions; existence theorems, applications to classical calculus of variations and to problems in electrical and aerospace engineering. Optimal control problems for systems described by nonlinear difference equations, applications to the theory of optimal economic growth. *Prerequisites: Mathematics 241A-B-C, or consent of instructor.*

217A-B-C. Topics in Applied Mathematics (3-3-3)
In recent years, topics have included applied complex analysis, special functions, and asymptotic methods. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

218. Seminar in Applied Mathematics (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

220A-B-C. Complex Analysis (3-3-3)
Complex numbers and functions. Cauchy theorem and its applications, calculus of residues, expansions of analytic functions, analytic continuation, conformal mapping and Riemann mapping theorem, harmonic functions. Dirichlet principle, Riemann surfaces. *Prerequisites: Mathematics 140A-B, or consent of instructor.*

221A-B-C. Several Complex Variables (3-3-3)
Formal and convergent power series, Weierstrass preparation theorem; Cartan-Ruckert Theorem, analytic sets; mapping theorems; domains of holomorphy; proper holomorphic mappings; complex manifolds; modifications. *Prerequisites: Mathematics 200A, 220A-B-C, or consent of instructor.*

227A-B-C. Topics in Complex Analysis (3-3-3)
In recent years, topics have included conformal mapping, Riemann surfaces, value distribution theory, extremal length. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

228. Seminar in Complex Analysis (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

230A-B-C. Ordinary Differential Equations (3-3-3)
Existence and uniqueness theorems. Linear systems with constant and periodic coefficients. Sturm-Liouville theory. Eigenfunction expansions. Stability and asymptotic behavior of nonlinear systems. Poincare-Bendixon theorem. Perturbation theory. Linear systems in the complex domain and their singularities. Control theory. Equations in Banach space. *Prerequisites: Mathematics 130A-B and 220A-B or consent of instructor.*

231A-B-C. Partial Differential Equations (3-3-3)
Existence and uniqueness theorems, Cauchy-Kowalewski theorem, first order systems, Hamilton-Jacobi theory, initial value problems for hyperbolic and parabolic systems, boundary value problems for elliptic systems. Green's function, eigenvalue problems, perturbation theory. *Prerequisites: Mathematics 132A-B, or consent of instructor.*

232A-B-C. Calculus of Variations (3-3-3)
Euler-Lagrange equation, theory of fields, Hamilton-Jacobi theory, sufficient conditions, Weierstrass E test. Mayer, Lagrange and Bolza problems. Optimal control, Pontryagin's Maximum Principle, existence theorems, sufficient conditions. Carathéodory's approach to calculus of variations. *Prerequisites: Mathematics 240A-B-C, or Mathematics 210A-B-C.*

233. Singular Perturbation Theory for Differential Equations (3)
Multivariable techniques, matching techniques, and averaging techniques, including various approaches to proofs of asymptotic correctness, for singular perturbation problems including initial value problems with nonuniformities at infinity, initial value problems with initial nonuniformities, two-point boundary value problems, and problems for partial differential equations. Applications taken from celestial mechanics, oscillation problems, fluid dynamics, elasticity, and applied mechanics. *Prerequisites: Mathematics 130A-B; 132A-B; or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

237A-B-C. Topics in Differential Equations (3-3-3)
May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

238. Seminar in Differential Equations (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

240A-B-C. Real Analysis (3-3-3)
Lebesgue integral and Lebesgue measure; Fubini theorems; functions of bounded variations; Stieltjes integral, derivatives and indefinite integrals; the spaces L and C; equi-continuous families; continuous linear functionals; general measures and integrations. *Prerequisites: Mathematics 140A-B-C.*

241A-B-C. Functional Analysis (3-3-3)
Metric spaces and contraction mapping theorem; closed graph theorem; uniform boundedness principle; Hahn-Banach theorem; representation of continuous linear functionals; conjugate space, weak topologies; extreme points; Krein-Milman theorem; fixed-point theorems; Riesz convexity theorem; Banach algebras. *Prerequisites: Mathematics 240A-B-C, or consent of instructor.*

247A-B-C. Topics in Real Analysis (3-3-3)
In recent years, topics have included Fourier analysis, distribution theory, martingale theory, operator theory. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

248. Seminar in Real Analysis (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

250A-B-C. Differential Geometry (3-3-3)
Differential manifolds, Sard theorem, tensor bundles, Lie derivatives, DeRham theorem, connections, geodesics, Riemannian metrics, curvature tensor and sectional curvature, completeness, characteristic classes. Differential manifolds immersed in Euclidean Space. *Prerequisites: Mathematics 100A-B-C.*

251A-B-C. Lie Groups (3-3-3)
Lie groups, Lie algebras, exponential map, subgroup-subalgebra correspondence, adjoint group, universal enveloping algebra. Structure theory of semi-simple Lie groups, global decompositions, Weyl group. Geometry and analysis on symmetric spaces. *Prerequisites: Mathematics 200 and Mathematics 250, or consent of instructor.*

257A-B-C. Topics in Differential Geometry (3-3-3)
In recent years, topics have included Morse theory and general relativity. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

258. Seminar in Differential Geometry (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

260A-B-C. Mathematical Logic (3-3-3)
Propositional calculus and quantification theory. Completeness theorem; theory of equality; compactness theorem. Skolem-Lowenheim theorems; Vaught's test: Craig's lemma. Elementary number theory and recursive function theory. Undecidability of true arithmetic and of Peano's axioms. Church's thesis; set theory; Zermelo-Frankel axiomatic formulation. Cardinal and ordinal numbers. The axiom of choice and the generalized continuum hypothesis. Incompleteness and undecidability of set theory. Relative consistency proofs. *Prerequisite: Mathematics 100A-B-C or consent of instructor.*

261A-B-C. Combinatorial Analysis (3-3-3)
This course is an introduction to the computational and theoretical aspects of discrete mathematics. Topics include counting and listing, analysis of algorithms, graphs and trees, discrete max-min theory, error correcting codes and designs. *Prerequisites: (may be taken concurrently): ability to program BASIC, ALGOL, or FORTRAN: Mathematics 100A-B or Mathematics 103A-B.*

262. Topics in Combinatorial Mathematics (3)
Development of a topic in combinatiorial mathematics starting from basic principles. Problems of enumeration, existence, construction, and optimization with regard to finite sets. Some familiarity with computer programming desirable but not required. *Prerequisites: Mathematics 100A-B-C.*

267A-B-C. Topics in Mathematical Logic (3-3-3)
Topics chosen from recusion theory, model theory, and set theory. May be repeated with consent of adviser. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

268. Seminar in Logic (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

270A-B-C. Numerical Mathematics (4-4-4)
Accuracy of numerical calculations; interpolation; numerical quadrature; continued fractions in numerical analysis; determination of the zeros of a polynomial; elimination methods for linear equations; eigenvalue problem for Hermitian matrices; eigenvalue problem for general matrices; iterative methods of linear equations. *Prerequisites: Mathematics 2D, 2E, 140A, or advanced calculus and programming experience.*

271A-B-C. Complexity of Computational Algorithms (4-4-4)
Recent research on the analysis of the complexity of computational algorithms will be explored: high-precision multiplication, manipulation of graphs, matrix multiplication, inversion, linear equations, sparse matrices, polynomial evaluation, discrete Fourier transforms, algebraic manipulation, lower bounds of computations, polynomial complete problems. *Prerequisite: Mathematics 102 or Mathematics 100. Some familiarity with computer science or numerical analysis desirable but not required.*

277A-B-C. Topics in Numerical Mathematics (3-3-3)
In recent years, topics have included numerical aspects of complex analysis and ordinary and partial differential equations. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

278. Seminar in Numerical Mathematics (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

280A-B-C. Probability Theory (3-3-3)
Probability measures; Borel fields; conditional probabilities, sums of independent random variables; limit theorems; zero-one laws; stochastic processes. *Prerequisites: advanced calculus and consent of instructor.*

281A-B-C. Mathematical Statistics (3-3-3)
Testing and estimation; sufficiency; regression analysis; sequential analysis; statistical decision theory; nonparametric inference. *Prerequisite: advanced calculus and consent of instructor.*

282A-B-C. Applied Statistics (4-4-4)
Sequence in applied statistics. First quarter: General theory of linear models with applications to regression analysis. Second quarter: Analysis of variance and covariance and experimental design. Third quarter: Further topics to be selected by instructor. Emphasis throughout is on the analysis of actual data. *Prerequisites: Mathematics 181B or equivalent or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

284A-B-C. Applied Probability (4-4-4)
Random variables, random number generation, distribution functions, Markov chains, Poisson processes, Brownian motion, branching and queueing processes, stationary processes, Fourier analysis, and related topics. *Prerequisites: Mathematics 140C or equivalent.*

285. Statistical Inference in the Medical Sciences (3)
A first course in statistical procedures for the medical sciences. Topics will be chosen from among paired comparisons, experimental design, quantal data, bioassay, counts, regression and correlation, analysis of variance, survivorship. Some emphasis will be given to computational techniques. *Prerequisites: high school algebra and some familiarity with the medical sciences. (This course offered only through School of Medicine).* (W)

287A-B-C. Topics in Probability and Statistics (3-3-3)
In recent years, topics have included Markov processes, martingale theory, stochastic processes, stationary and Gaussian processes, ergodic theory, May be repeated for credit with consent of adviser. *Prerequisite; consent of instructor.*

288. Seminar in Probability and Statistics (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

290A-B-C. Topology (3-3-3)
Point set topology, including separation axioms, compactness, connectedness. Algebraic topology, including the fundamental group, covering spaces, homology and cohomology. Homotopy or applications to manifolds as time permits. *Prerequisites: Mathematics 100A-B-C, Mathematics 140A-B-C.*

297A-B-C. Topics in Topology (3-3-3)
In recent years, topics have included generalized cohomology theory, spectral sequences, K-theory, homotopy theory. May be repeated for credit with consent of adviser. *Prerequisite: consent of instructor.*

298. Seminar in Topology (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.)

299. Reading and Research (1 to 9)
Independent study and research for the doctoral dissertation. One to three credits will be given for independent study (reading) and one to nine for research. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

Teaching of Mathematics

500. Apprentice Teaching (1 to 3)
Supervised teaching as part of the mathematics instructional program on campus (or, in special cases such as the CTF program, off campus). *Prerequisite: consent of adviser.* (Satisfactory/Unsatisfactory grades only.)

Muir

OFFICE: Provost, Muir College
2126 Humanities and Social Science Building

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Courses

199. Muir Special Project (4-16)
A course of independent work on a research or creative project to satisfy a Muir graduation requirement. Students wishing to enroll must submit a written request with a description of the project. (For information on other requirements, consult the Provost's Office, Muir College.)*Prerequisites: upper-division status, approval by project adviser and by provost.*

Music

B-026

OFFICE: 111 Mandeville Center for the Arts

Professors:
Thomas Nee, M.A., *(Chairman)*
Rafael Druian, Dip. Mus.
Robert Erickson, M.A.
Peter Farrell, M.M.
Wilbur Ogdon, Ph.D.
Roger Reynolds, M.M.
John Silber, Ph.D.

Associate Professors:
Pauline Oliveros, B.A.
Bertram J. Turetzky, M.A.

Assistant Professors:
William F. Brooks, Ph.D.
Jean Charles Francois, Ier Prix
John W. Large, D.Mus., Ph.D.
Cecil Lytle, B.A.

Lecturer:
James L. Campbell, M.S.

The Department of Music is dedicated to: Exploring and performing the widest scope of music from all times and places with an on-going emphasis on contemporary materials.

Creative scholarship; experimental research and its applications in electronics, computers, acoustics, extended instrumental techniques and possible social contexts for music.

Continually renewing our educational approaches, curriculum and subject matter in an attempt to achieve an integrated progression from the undergraduate to the graduate level.

The broadest possible range of student action and participation in departmental affairs -- whether in performing, educational or organizational situations.

The Graduate Program The department offers the degree of Master of Arts in Music and the degree of Doctor of Philosophy in Music.

In addition to fulfilling the University's general requirements for admission to graduate studies, the student, during the first quarter of residence, will be asked to confirm appropriate levels of musicianship and of theoretical-historical knowledge of the field through advisory examinations. The department requires all graduate students to take music examinations administered by the department the week prior to the start of classes. Students will be retested near the end of the year to determine if any deficiencies that appeared in the advisory exam have been remedied. All deficiencies must be remedied before the student may advance to candidacy.

Students applying for admission to music graduate programs must submit, along with their application, tapes demonstrating their level of performance, a repertory sheet of works performed during the past year, and when applicable, tapes and scores of their compositions, as well as undergraduate papers illustrating their ability in musical analysis.

All graduate students are required to approve their course schedule with their adviser prior to registering for classes. The graduate coordinator will assign each graduate student an adviser after the advisory examination. Any significant change in schedule should be reviewed with the adviser.

One year of 201A-B-C, Advanced Problems and Projects in Conducting and Performance, for 1 unit, is required of all graduate students. The year in which this requirement is fulfilled will be at the discretion of the music faculty. It is suggested that those music students with a performance ability maintain a continuous commitment to this course during residency.

A minimum of three quarters of participation in undergraduate teaching is required of all graduate students. This requirement must be completed by enrolling in one quarter of Music 240, Experimental Instruction, during the first year of residence and a minimum of three quarters of Music 500,

Apprentice Teaching, while the student is actually teaching.

The department requires reading ability in one or more foreign languages if the research area calls for such proficiency.

Master's Degree Program The M.A. degree in music is awarded according to Plan I: thirty-six course units and a research thesis. The candidate for the M.A. degree elects a minimum of three categories of study, each category consisting of a minimum of three courses. Approved groups of courses are selected from the department's seven categories of study. Remaining requirements, beyond any remedial course work, determined by the department or the graduate division, include the thesis; the candidate's tutorial, taken during the winter and spring quarters of the first year; and when the student is functioning as a teaching assistant, the Apprentice Teaching course, Music 500.

The master's curriculum includes the following categories of study:

I. *Experimental Studies.* Experimental Studies Seminars treat areas of present faculty research, such as timbre research, time perception, odology, etc.

II. *Composition.* Studies in composition are pursued through seminars and individual instruction. Students are expected to expand their experimental, theoretical and technical knowledge and to incorporate it into their compositions.

III. *Performance.* Performance Seminars are exploratory seminars focusing on the performance practice of new and old ensemble music.

IV. *Technology.* Seminars exploring areas of technology as applied to performance, composition, and research.

V. *Theoretical Studies.* Seminars in structural analysis, notation, twentieth century music systems, instrumentation, etc.

VI. *Music Literature, Special Studies.* Special studies focusing on analytical, critical and interpretive aspects of music of selected historical periods, cultures and media.

VII. *Complementary Disciplines.* Studies pertinent to the student's needs and/or desires (psychology, linguistics, physics, electronics, visual arts, drama, etc.).

Doctoral Degree Program The student entering graduate studies leading to the Ph.D. degree in music will be expected to have reached a superior level of musical competence and to have accomplished a program of master's study acceptable to the department.

The requirements for the Ph.D. include (1) successful completion of requirements leading to a Master of Arts degree, in accord with degree Plan I of the University of California and the Department of Music, UC San Diego, (2) a minimum of eight approved courses beyond the M.A., (3) demonstration through qualifying written and oral examinations of a comprehensive understanding of the literature and theory of the field, (4) an acceptable dissertation, and (5) a final public defense of the dissertation.

The required eight courses beyond requirements for the M.A. are assigned by an advisory committee after review of the student's academic background and abilities, as confirmed by appropriate departmental testing. However, the student should not expect these eight courses, alone, to prepare him or her for doctoral examinations. The student is expected to choose other electives in music and electives in other disciplines such as history, literature, art history, philosophy and physics when useful. The student will also undertake independent studies, supervised by an appropriate member of the faculty and prepare himself or herself in the library and laboratory for qualifying examinations.

The Undergraduate Program Serving various purposes, undergraduate courses offered by the Department of Music:

1. enable students to undertake a major according to the students' previous preparation and abilities;

2. enable Muir College students to incorporate music courses into a special project undertaken in lieu of a major;

3. provide a sequence of courses acceptable as a noncontiguous minor in Revelle College;

4. enable students to satisfy the fine arts sequence of Muir College and the fine arts and humanities requirement of Revelle College;
5. enable students to satisfy the humanities and arts requirement of Third College's general education requirement under Program B;
6. allow a choice of elective courses to all students, with or without prior music training.

Electives Available to the Non-Music Major The following courses are available without prerequisites: Music IA, 2A, 10A and 11A.

The following courses are available after the student has demonstrated performing proficiency through audition (held prior to the beginning of class by arrangement with faculty): Music 130, 135, 136, 140, 141, and 145.

The following courses are offered to satisfy lower-division college requirements: Music 1A-B-C (Muir), 10A-B (Revelle), 11A-B-C (Muir, Revelle).

Six-course sequences for satisfying the Revelle noncontiguous minor requirement are to be worked out with the music department adviser. Suggested possibilities follow: 2A-B-C/104A-B-C; (if 11A-B-C has been taken as a humanities sequence) 2A-B-C/three music literature courses such as 114, 113, 116; (if musicianship proficiency allows) 20A-B-C/103A-B-C or 20A-B-C/101A-B-C.

The Major Program in Music Performing auditions and an interview are required of all persons considering an undergraduate major. Auditions are held the week before school, at the end of each quarter, and usually during the summer. Information on these auditions is available through the music office. Students with sufficient background in music may pass any required course by examination. Such proficiency examinations may be taken by arrangement with the instructor of the respective course at the regular final examination time or by passing an entrance examination given on the first day of the course.

The following courses are required as lower division prerequisites to the major:

1. Music 1A-B, *or* Music 10A-B, or equivalent experience;
2. Music 2A-B-C, Basic Musicianship, or proficiency testing;
3. Music 20A-B-C, Music Theory and Practice I, or proficiency testing;
4. Music 22A-B-C, Laboratory Survey of Music Literature, or proficiency testing;
5. Music 30, Seminar in Chamber Music Performance, or performance proficiency audition;
6. One of the six-quarter laboratory sequences in directed ensemble performance: Music 135, 136, 140, 141 or 145.

The following upper division courses are required for a major in music:

1. Music 101A-B-C and Music 102A-B-C, the music theory and practice sequence;
2. the two-year laboratory sequence in chamber music performance: Music 130;
3. an approved collection of six electives in one of the following areas: composition, performance, literature, or recording and editing techniques.

Courses

Lower Division

1A-B-C. The Nature of Music (4-4-4)
Development of music perception and discrimination through participation in tape music composition and small-group improvisation, and through critical observation of the preparation and performance of selected ensemble literature by experienced musicians. *Prerequisites: 1A for 1B; 1B for 1C; or consent of course committee.* (F,W,S)

2A-B-C. Basic Musicianship (4-4-4)
An intensive review of the fundamental skills, information and terminology one needs in order to read, write and understand music. The notation system scales, intervals, and triads are approached through programmed text, library materials, exercises in editing and composition. Class time is devoted to analysis and performance of graded melodies, individual and group exercises in pitch recognition and reproduction, tempo, rhythm, interpretation, dictation and sight singing. A laboratory for drill in sight singing, dictation, and notation is provided. This course is preparatory for the theory sequence Music 20, 101, and 102. It may be passed by proficiency examination.
2A. Primarily descriptive. All skills are introduced with emphasis on pitch recognition and thythm. Notation and terminology are reviewed.
2B. Emphasizes analysis and interpretation of melodies, interval studies, elementary scoring, and conducting projects, utilizing available instrumentation from the class. Prerequisite: Music 2A.
2C. Emphasizes intensive performance and composition of a variety of melodic forms. Prerequisite: Music 2B.
All skills are continually developed throughout the course sequence. Three hours of class and two one-hour labs weekly.

10A-B. Projects and Studies in Music (4-4)
This two-quarter sequence, the intent of which is to increase aural awareness and understanding of the musical process through analytical studies of old and new music as

well as through creative projects in time, texture and timbre, may be used to help satisfy Revelle's humanities and fine arts requirement and lower division prerequisites to the major in music. *Prerequisite: 10A is prerequisite to 10B.*

11A-B-C. Understanding Western Music (4-4-4)
An overview of Western Musical styles, both historical and present, having as its goal an increase in the breadth and depth of the students' understanding and appreciation of the music of Western culture. Three hours of listening/lecture and two one-hour labs weekly. Occasional papers or reports. Not upen to music majors. Will satisfy Muir College fine arts requirements and Revelle College humanities requirement. *Prerequisites: 11A for 11B, 11B for 11C.* (F,W,S)

20A-B-C. Music Theory and Practice I (4-4-4)
An integrated approach to the study of music through hearing, writing, analyzing, conducting and performing. *Prerequisite: Music 2 sequence or proficiency testing. May be passed by examination.* (F,W,S)

22A-B-C. Laboratory Survey of Music Literature (4-4-4)
A three-quarter survey of the extant music repertory in recorded and live performance. Two to four hours of assigned listening weekly with score, plus one two-hour discussion each week with a faculty member. Occasional readings, papers, and reports. This course is prerequisite to all upper division music literature courses. May be passed by examination. *Prerequisites: restricted to declared music majors, with departmental approval.* (F,W,S)

30A-B-C. Performance Skills (2-2-2)
Class instruction in piano and vocal performance skills for those who need to improve their proficiency. May be passed by examination. May be repeated for credit. (Limited to students preparing as music majors.)

Upper Division

101A-B-C. Music Theory and Practice II (4-4-4)
A study of the structure of homophonic tonal music. Representative examples of music literature are studied for an understanding of pitch relationships, temporal relationships, form, pattern, etc. Class time is devoted to hearing, singing, analysis and writing. Individual drills in aural comprehension are provided in Central University Library. *Prerequisites: Music 2 and Music 20. This course prepares for Music 102. It may be passed by proficiency examination.*
101A. Analysis: Bach Chorales. Writing: Diatonic harmony in four part vocal style. Dictation: Melodic. Laboratory: THE ART OF LISTENING.
101B. Analysis: Small forms. Writing: Realization of figured bass, keyboard style. Dictation: Harmonic. Laboratory: THE ART OF LISTENING.
101C. Analysis: Large forms. Writing: Harmonization of melodies, melodic elaboration on harmonic background, scoring. Dictation: Small forms. Laboratory: THE ART OF LISTENING and/or rhythmic reading.

102A-B-C. Music Theory and Practice III (4-4-4)
Advanced study of the materials of music. Wagner through Cage. Aural discrimination, analysis, exercises, short compositions. *Prerequisites: 101C for 102A or proficiency by examination.* (F,W,S)

103A-B-C. Seminar in Composition (4-4-4)
Individual projects in composition critically reviewed in seminar with fellow student and faculty composers. *Prerequisites: Music 20A-B-C, or consent of instructor.* (F,W,S)

104A-B-C-D-E-F Sound Sources and Receivers (4)
An introduction to the physical properties associated with the production, transmission and reception of sound as musical events. Three one-hour class and one two-hour laboratory meetings per week. *Prerequisite: Music 20 or consent of instructor. (F)*

105A. Electronics in Music (4)
Exercises in electronic sound generation and processing with emphasis on voltage-controlled systems. *Prerequisite: Music 20 and consent of instructor.*

105B. Projects Seminar in Electronics in Music (4)
Continuation of 105A. *Prerequisite: 105A and consent of instructor.*

111. Non-Western Music (4)
A critical study of specific musical elements in certain non-Western cultures, such as West African drumming, music of South India, etc. Music majors are required to take an additional project seminar for course credit. *Prerequisite: consent of instructor.*

112. Studies in Vocal and Choral Literature (4)
A critical study of representative works for solo voice (with piano or other accompaniment and/or for choral ensemble. Since the selected literature will vary from year to year, the course can be repeated for elective credit. Music majors are required to take additional project seminar sessions. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or consent of instructor.*

113. Studies in Opera (4)
A critical study of representative operas. At least one opera discussed will be selected because of the opportunity to see it in staged performance. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or consent of instructor.*

114. Studies in Music of the 20th Century (4)
An exploration of materials and methods used in the music of our time. There will be an extra discussion group for music majors. May be repeated for credit. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or consent of instructor.*

115. Seminar in Bach Studies (4)
A study of the art of J. S. Bach, with particular attention to problems of style and structure. Music majors are required to take an additional projects seminar session for course credit. *Prerequisite: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or ability to read music and consent of instructor.*

116. Seminar in Medieval and Early Renaissance Music (4)
The development of an operational and intellectual account of medieval and early Renaissance music. Music majors are required to take an additional projects seminar for course credit. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or consent of instructor.*

117. Seminar in Late Renaissance and Early Baroque Music (4)
Functional performance problems and realizations of music of the sixteenth and seventeenth centuries. Majors are required to take an additional projects seminar for course credit. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or consent of instructor.*

118. Music of the 19th Century
A critical study of European Art Music produced during the Romantic period. Stress will be placed on the rise of nationalism and its effects upon the music. *Prerequisite: 11A-B-C for non-majors; 22A-B-C for music majors, or consent of instructor.*

123. The Orchestra and Its Literature (4)
A study of the instruments of the orchestra: their resources, tonal effects; their use by major composers; methods of writing for modern instruments; analysis of

representative scores. Music majors are required to take an additional projects seminar session. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or ability to read music and consent of instructor.*

124. Studies in Chamber Music (4)
A critical study of representative works for small ensemble. The literature studied is selected and may vary from course to course. The course can be repeated for elective credit. *Prerequisites: Music 11A-B-C for non-music majors, Music 22A-B-C for music majors, or consent of instructor.*

125A-B-C. Black Music in America (4-4-4)
A sequence of three courses entailing a topical study of the music produced by Black Americans. In each section of this course sequence, particular attention will be placed on the political, social and economic developments in America as they affect, and are affected by, the evolution of Black music. (Offered in alternate years.)
125A. An investigation of the retention of West African musical customs and practices in America during and after slavery. Emphasis will be placed on the development and character of the spiritual and particular stress on oral tradition, slave trade, polyrhythmic percussion techniques, melodic techniques, and socio-religious meanings in music and dance.
125B. A critical study of Black secular and art music, i.e. worksongs, classic and rural blues, and the major works by Black composers of classical persuasion. Worksongs and blues will be viewed from the perspectives of geographical styles, the twelve-bar structure and as literature of folk expression. The composers to be studied include Nathaniel Dett, William Dawson, William Grant Still, and Samuel Coleridge-Taylor.
125C. An intensive investigation of the evolution of jazz beginning with the brass bands of the 1880's ragtime and the syncopated orchestras and continuing through the 20th century to the current thoughts and musical practices of the major Black artists today. This course will include a detailed consideration of the careers of Louis Armstrong, Duke Ellington, Charlie Parker, Miles Davis, and John Coltrane.

128. Principles and Practice of Conducting (4)
The theory and practice of conducting as related to the study of instrumental and choral literature. *Prerequisite: consent of instructor.*

130A-B-C. Seminar in Chamber Music Performance (2-2-2)
Performance of representative instrumental, vocal and jazz chamber music literature. May be repeated for credit. *Prerequisite: consent of instructor through audition.* (F,W,S)

131. Projects Course in Chamber Music Performance (2-2-2)
Individual projects in the preparation of chamber music for performance. *Prerequisite: consent of instructor through audition.* (F,W,S)

132. Pro-Seminar in Music Performance (4)
These seminars are devoted to workshops in instrumental/vocal performance with special attention to technique and style, as well as the interpretation of representative literature. The seminars meet two hours a week, with a maximum enrollment of six. A high standard of performance and analytic insight must be demonstrated. Continued private study outside of class is expected with department-approved teachers. Seminars may be repeated for credit. *Prerequisites: consent of instructor through audition. Limited to music majors.*

135. Symphony Orchestra (2)
Study and performance of orchestral literature. *Prerequisite: permission of instructor through audution.*

136. Chamber Orchestra (2)
Study of standard chamber orchestral literature in coached rehearsal sessions. *Prerequisite: consent of instructor through audution.*

137A-B. Opera Studio (2,2)
Study and performance of scenes from standard, classic operas, experimental music theatre and chamber operas. *Prerequisites: Drama 12 or its equivalent; consent of the instructor through audition.*

140. Civic/University Chorus (2)
Study and performance of choral literature for large ensemble. *Prerequisite: consent of instructor through audition.*

141. Concert Choir (2)
Study and performance of literature for choral ensemble. *Prerequisite: consent of instructor through audition.*

143. Departmental Seminar (1)
The departmental seminar serves both as a general department meeting and as a forum for the presentation of research and performances by visitors, faculty and students.

144. Gospel Choir (2)
The study and performance of Afro-American sacred choral music. Each participant must attend two rehearsals a week and regularly scheduled performances in the San Diego area, as well as on campus. *Prerequisite: consent of instructor through audition.*

145. Directed Jazz Ensemble (2)
Devoted to the active preparation and performance of large ensemble jazz. Requirements include at least one public performance each quarter and the preparation of scores for the band. Each participant is required to make two rehearsals per week and all performances. *Prerequisite: consent of instructor through audition.*

195. Instructional Assistance (2)
Observation and critiques of classroom procedures and content. Assisting in the instruction of an undergraduate music class under the supervision of a faculty member. *Prerequisites: permission of the instructor and departmental approval.*

199. Independent Study (2 or 4)
Independent reading, research, or creative work under the direction of a faculty member, provided no course covering the material to be studied already exists, and that the study area derives from previous coursework. *Prerequisites: consent of instructor and departmental approval.*

Graduate

201A-B-C. Advanced Problems and Projects in Conducting and Performance (1)
(Performance, Technology) Acts as a performer pool of graduates, undergraduates, faculty and staff for departmental productions.

202. Problems and Projects in the Specialized Use of Electronics in Performance (3)
(Performance, Technology) (Satisfactory/Unsatisfactory grades permitted.) *Prerequisite: 205 and consent of instructor.*

203A-B-C. Advanced Projects in Composition (3-3-3)
(Composition) Seminar and laboratory sessions arranged with instructor at which new works by students are rehearsed and coached. (Satisfactory/Unsatisfactory grades permitted.)

204. Projects Seminar in Electroacoustic Transmission of Music Information (3)
(Technology) An investigation into experimental use of electronic instruments relating to the storing and retrieving

of aural information and applied to the multi-varying conditions caused by complex sound events. *Prerequisites: Music 104A and consent of instructor.*

205. Advanced Use of Electronics in Music (3)
(Technology) Seminar in theoretical and applied research in the generation and processing of electronic sound for composition and performance. *Prerequisite: consent of instructor.*

206A-B-C. Experimental Studies Seminar (3-3-3)
(Experimental Studies) Seminars offered by faculty within areas of present research interests, such as odology, experimental odology, extended vocal techniques, mixed media and theatre pieces.

207A-B-C. Theoretical Studies Seminar (3-3-3)
(Theoretical Studies) Seminars offered by faculty within areas of present research interests, such as: structural analysis, notation, twentieth-century music systems, contemporary structural analysis. *Prerequisite: consent of instructor.*

208A-B. Seminar in New Instrumental Resources (3-3)
(Experimental Studies) Extensions of conventional instrumental technique and tone production and their application to music composition, notation and performance. Must be taken in sequence or may be taken separately with instructor's consent.

209A-B. Advanced Music Theory and Practice (3-3)
(Theoretical Studies). Advanced integrated studies in music theory and composition and styles study through analysis and performance. *Prerequisite: consent of instructor.*

211. Non-Western Music (4)
(Music Literature, Special Studies) a critical study of specific musical elements in certain non-Western cultures, such as West African drumming, music of South India, etc. *Prerequisite: consent of instructor.*

212. Seminar in Vocal and Choral Literature (3)
(Music Literature, Special Studies) A critical and historical study of selected works and repertory.

213. Opera Studies (3)
(Music Literature, Special Studies) a detailed analytical study of selected operas in production in San Diego, Los Angeles, or San Francisco. *Prerequisite: consent of instructor.*

214. Seminar in 20th Century Music (3)
(Music Literature, Special Studies) Detailed study of selected literature through the study of scores and writings, supplemented when possible by performance participation.

215. Seminar in Bach and Related Studies (3)
(Music Literature, Special Studies) A study of content and structure in selected compositions of J. S. Bach. *Prerequisite: consent of instructor.*

216. Seminar Studies in Late Medieval and Early Renaissance Music (3)
(Music Literature, Special Studies) Problems of style and performance in selected music of the 13th, 14th and 15th centuries.

217. Seminar Studies in Late Renaissance and Early Baroque Music (3)
(Music Literature, Special Studies) The study of early music as it has to do with theoretical systems, critical analyses, music and documentary source materials.

218. Topics in Performance Practices (3)
An examination of issues involved in performance of selected composers.

220A. Critical Studies (3)
Music Literature. An examination of issues involved in writing about music: the nature of critical thinking; verbal and non-verbal languages; research techniques and methodology; implications of other disciplines for the study of music. Extensive readings. Graduate students from other fields welcome.

220B. Music Criticism. (3)
Music Literature. An examination of contemporary music criticism, with emphasis on the practical application of materials covered in 220A. Extensive listening and writing, as well as a systematic review of journals. A thorough knowledge of music literature is essential.

223. Seminar Studies in Orchestral Literature (3)
(Music Literature, Special Studies) Problems of performance and interpretation in representative works of orchestral music, including works for chamber orchestra, opera scenes and choral works. Students will be responsible for problems of editing, bowings and conducting.

224. Seminar Studies in Chamber Literature (3)
(Music Literature, Special Studies) A critical and historical study of selected works and repertory.

230. Advanced Seminar in Performance of Music for Small Ensemble (3)
(Performance) Performance of representative chamber music literature, instrumental and/or vocal, through coached rehearsal and seminar studies. Course may be repeated for credit since the literature studied varies from quarter to quarter. *Prerequisite: consent of instructor.*

232. Pro-Seminar in Music Performance (3)
(Performance) These seminars are devoted to workshops in instrumental/vocal performance with special attention to technique, style and interpretation. The seminars meet two hours a week, with maximum enrollment of six. A high standard of performance must be demonstrated. May be repeated for credit.

236. Chamber Orchestra (3)
(Performance) Study and performance of standard orchestral literature in coached rehearsal sessions. A high standard of performance must be demonstrated. This course may be repeated for credit any number of times. The literature performed varies from year to year and quarter to quarter. *Prerequisites: consent of instructor through audition.*

237. Opera Studio (3)
Advanced study and performance of scenes from standard, classic operas, experimental music theatre and chamber operas. *Prerequisite: consent of instructor through audition.*

240. Experimental Instruction (1)
A graduate teaching seminar in experimental approaches to music learning. Required of all graduate students during the spring quarter of the first year.

243. Seminar on Contemporary Issues in Music (1)
Seminars on contemporary issues in music. (Satisfactory/Unsatisfactory grades only.)

297. Candidates Tutorial (1)
(Literature, Special Studies) Research methods in music. A course requirement for all perspective M.A. and Ph.D. candidates to be taken during winter and spring quarters of the first year.

299. Advanced Research Projects and Independent Study (1-12)
(All Categories) Individual research projects relevant to the student's selected area of graduate interest conducted in continuing relationship to a faculty adviser. (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching (1-4)
Regular meetings with the course instructor while the student is functioning as a teaching assistant. Required of all graduate students at the equivalent to 25%-time for three quarters.

Natural Sciences

OFFICE: Provost, Revelle College

* * *

The two sequences of courses described below are given jointly by the Departments of Physics, Chemistry, and Biology. They are to be used by Revelle College students in fulfilling the natural science requirement of the college. The courses contain material equivalent to traditional lower-division chemistry, biology, and physics courses, but are organized in such a way as to eliminate unnecessary overlap of content.

The sequence Natural Science 1A-B-C-D-E is intended for students whose mathematics proficiency is at the level of the Mathematics 1 sequence. The material of this sequence is presented in a manner which minimizes the dependence on mathematics in the early quarters. Students who are enrolled in Mathematics 2A-B-C or have advanced mathematics standing will usually take the sequence Natural Science 2A-B-C-D-E. In either case, the courses are intended to be taken in the given order. Individual departments may recommend that the above sequences be supplemented with Natural Science 2F or 2FL.

Students who enter with advanced standing in calculus may take Physics 3A-B-C-D instead of Natural Science 2A-B-C. The Physics 3 sequence provides a solid foundation in physics; it is particularly recommended for students majoring in physical science or engineering. The sequence begins a quarter earlier than the regular Natural Science 2 sequence but merges with it at the beginning of Natural Science 2D (chemistry). Revelle students may also take the Physics 2 or Physics 3 sequences instead of Natural Science 2A-B-C; see Physics section of the catalog.

Courses

1A. Natural Science: Chemistry (4)
The rudiments of chemistry including the chemical bond are covered from the point of view of atomic structure and the periodic table. Three hours lecture, one hour recitation. (F)

1B. Natural Science: Chemistry (4)
Thermochemistry and electrochemistry are developed on a description level. An introduction to organic chemistry is provided in order to form a basis for the biology taught in Natural Science 1C. Three hours lecture, one hour recitation. *Prerequisite: one quarter or one semester of any college level introductory chemistry course, but preferably Natural Science 1A.* (W)

1BL. Natural Science: Chemistry (4)
A laboratory course designed to demonstrate various concepts discussed in Natural Science 1A-B, as well as to acquaint students with simple laboratory techniques. Lecture portion to be taught concurrently with Natural Science 1B. Three hours lecture, one hour recitation, and one three hour laboratory. *Prerequisite: one quarter or one semester of any college level introductory chemistry course, but preferably Natural Science 1A.* (W)

1C. Natural Science: Biology (4)
An introduction to the general principles of biology with emphasis on the cell, heredity, and the chemical and physical bases of living processes. Three hours lecture, one hour recitation. (F)

1D. Natural Science: Physics (4)
A lecture course with demonstrations, dealing with the principles of mechanics, kinetic theory of gases, and electrostatics. Applications to technology, such as energy conservation, and to biology. Four hours lecture. *Prerequisites: elementary trigonometry, vectors, and calculus.* (W)

1DL. Natural Science: Physics (4)
A lecture and laboratory course dealing with the principles of mechanics, kinetic theory of gases, and electrostatics. Applications to technolgoy, such as energy resources, and to biology. The lecture portion of the course is identical with Natural Science 1D. Four hours lecture; four laboratory exercises during the quarter. *Prerequisites: elementary trigonometry, vectors, and calculus.* (W)

1E. Natural Science: Physics (4)
A lecture course, with demonstrations, dealing with electrical, optical, and quantum phenomena with applications to biology and technology. Four hours lecture. *Prerequisites: elementary trigonometry, vectors, calculus, and Natural Science 1D.* (S)

1EL. Natural Science: Physics (4)
A lecture and laboratory course dealing with electrical, optical, and quantum phenomena with applications to biology and technology. The lecture portion of this course is concurrent with Natural Science 1E, four hours lecture, and four laboratory exercises during the quarter. *Prerequisites: elementary trigonometry, vectors, calculus and Natural Science 1D or the equivalent.* (S)

2A. Natural Sciences: Physics (4)
An introduction to natural phenomena which can be understood in terms of the physical sciences is followed by the study of particle motion. Applications are made to astronomy and to the structure of matter. Four hours lecture, or six hours of self-paced study. *Prerequisites: Mathematics 2A and concurrent registration in Mathematics 2B.* (W)

2B. Natural Science: Physics (4)
A continuation of Natural Science 2A to the electrical effects of stationary and moving charges, time-dependent fields, and waves. Four hours lecture, or six hours of self-paced study. *Prerequisites: Mathematics 2B and concurrent registration in Mathematics 2C.* (S)

2C. Natural Science: Atomic Physics (4)
The study of waves is followed by an introduction to the quantum theory as applied to atoms and their radiation. The exclusion principle is used to study the chemistry and physics of atoms. Four hours lecture and two hours laboratory; or six hours of self-paced study and two hours laboratory. Laboratory work covers the physics of 2A, 2B, and 2C. *Prerequisite: Mathematics 2C.* (F)

2D. Natural Science: Chemistry (4)
The properties of atomic and molecular matter and collections of elementary particles. Thermodynamics, kinetic theory of gases, liquids, and structure of molecules. Three

hours lecture, one hour discussion. Registration in 2D is usually accompanied by registration in either 2DL or 2DS. *Prerequisites: Natural Sciences 2A-B-C recommended.* (W)

2DL. Natural Science: Quantitative Chemical Analysis (2)
A laboratory course that introduces the student to laboratory techniques, analytical procedures and physical measurements. Includes gravimetric, volumetric and instrumental methods of chemical analysis. Emphasis is on accuracy and precision. One hour lecture and two three-hour laboratories. Registration is usually concurrent with registration in Natural Science 2D. Interchangeable with Science 3AL in Muir and Chemistry 4AL in Fourth College. (W)

2DS. Natural Science: Chemistry (0)
A laboratory course that introduces the student to concepts of chemical practice. The course is designed for students not intending to major in physical or biological sciences. One three-hour laboratory. Registration must be concurrent with 2D. (W)

2E. Natural Science: Biology (4)
An introduction to the general principles of biology, with emphasis on the cell, heredity, and the chemical and physical bases of living processes. Three hours lecture, one hour recitation. (S)

2F. Natural Science: Chemistry (4)
A further development of the chemical properties of matter; acids and bases; complex ions; oxidation-reduction; electrochemistry; rates of chemical reactions. Three lectures, one recitation. *Prerequisite: Natural Science 2D.* (S)

2FL. Natural Science: Quantitative Chemical Analysis (2)
A continuation of Natural Science 2DL. One hour lecture and two three-hour laboratories. Registration is usually concurrent with registration in Natural Science 2F. Interchangeable with Science 3BL in Muir and Chemistry 4BL in Fourth College. *Prerequisite: Natural Science 2DL.* (S)

Neurosciences

OFFICE: 3034 Basic Science Building

Professors:
Samuel H. Barondes, M.D. *(Psychiatry)*
Reginald G. Bickford, M.D.
Theodore H. Bullock, Ph.D.
J. Anthony Deutsch, D. Phil. *(Psychology)*
John W. Evans, M.D., Ph.D. *(Mathematics)*
Edmund J. Fantino, Ph.D. *(Psychology)*
Robert Galambos, M.D., Ph.D.
Youssef Hatefi, Ph.D. *(Adjunct, Neurochemistry)*
Robert B. Livingston, .D.
Arnold J. Mandell, M.D. *(Psychiatry)*
Robert Y. Moore, M.D.
John S. O'Brien, M.D. *(Chairman of the Group)*
George S. Reynolds, Ph.D. *(Psychology)*
Charles E. Spooner, Ph.D.
Robert Tschirgi, M.D., Ph.D.
Silvio Varon, M.D. *(Biology)*
Wigbert C. Wiederholt, M.D.

Associate Professors:
Walter F. Heiligenberg, Ph.D. *(Behavioral Physiology, SIO)*
Steven A. Hillyard, Ph.D.
G. David Lange, Ph.D.
James R. Nelson, M.D. *(Adjunct)*
Davis S. Segal, Ph.D. *(Psychiatry)*
Allen I. Selverston, Ph.D. *(Biology)*
Marjorie E. Seybold, M.D. *(in Residence)*
Palmer W. Taylor, Ph.D. *(Medicine)*
Juan Yguerabide, Ph.D. *(Biology)*

Assistant Professors:
Jack A. Alhadeff, Ph.D. *(in Residence)*
Darwin K. Berg, Ph.D. *(Biology)*
Hannah Friedman, Ph.D. *(Biology)*
Daniel K. Hartline, Ph.D. *(Biology)*
Ronald M. Kobayashi, M.D. *(in Residence)*
William B. Kristan Jr., Ph.D. *(Biology)*
E. Roger Marchand, Ph.D. *(Adjunct)*
Arnold L. Miller, Ph.D. *(in Residence)*
Larry R. Squire, Ph.D. *(in Res., Psyc.)*
Jack C. Sipe, M.D.
Nicholas Spitzer, Ph.D. *(Biology)*

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The Graduate Program The group in the neurosciences accepts for the Ph.D. degree candidates with undergraduate majors in such disciplines as biology, chemistry, engineering, microbiology, mathematics, physics, psychology, and zoology. A desire and competence to understand how the nervous system functions is more important than previous background and training.

Doctoral Degree Program This program receives guidance from a campus-wide group of faculty interested in nervous system mechanisms. No specific course requirements exist. Each student, in consultation with a faculty committee, selects from the courses offered those relevant to his or her interests and goals so as to provide a good grounding in several disciplines of pre-clinical neurosciences. The student's program will include formal courses selected from the UC San Diego *General Catalog* and informal seminars offered by the department. A regular schedule of rotation through the laboratories of faculty members is a feature of the first year; the student works on research projects and is exposed to the various approaches, techniques, and disciplines represented on the campus. Students may work under the preceptorship of appropriate faculty members anywhere on the campus. Close association among the students, faculty, and other research personnel is encouraged in order to achieve an informal, tutorial type of instruction. A period of study at one of the other campuses of the University of California can be arranged by mutual agreement between

the neurosciences department and neuroscientists in those locations.

Dissertation During the second year each student is expected to propose and initiate work on a thesis problem under the guidance of a faculty preceptor. The department is presently conducting animal research and clinical studies in fields of neuroanatomy, neurochemistry, neuropharmacology, neurophysiology, comparative neurology, physiology of excitable membranes, synaptic transmission, neuronol integration and coding, nervous system tissue culture, application of immunological techniques to nervous-tissue brain function, sensory physiology, motor mechanism and systems analysis as applied to neurological problems and neurological disorders. Facilities for research on marine forms, vertebrate and invertebrate, are available.

Examinations Frequent oral and written exercises and defense of propositions in laboratory and seminar settings can be expected; the aim is to sharpen student skills in the presentation of scientific material. The oral examination to qualify for candidacy for the Ph.D. degree is taken before the end of the second year. Following the preparation of the dissertation in a form adaptable for publication, an oral defense of the thesis completes the requirement.

Teaching The department provides experience in instruction. Generally, this involves assisting in laboratory exercises and demonstrations in relation to teaching basic neurology. Other types of teaching opportunities also exist because the department is deeply committed to innovation in education. Students are encouraged to develop their own talents for the creation and evaluation of learning resources.

Courses

Undergraduate

198. Neurosciences Direct Group Study (2-4)
Directed group studies in areas not presently offered by the Department *Prerequisite: consent of department.* (F,W,S)

199. Neurosciences Independent Research (4)
Laboratory research under the supervision of individual members of the faculty of the Neurosciences Department in one or a combination of neurosciences disciplines, e.g., neuroanatomy, neurophysiology, neurochemistry, neuropharmacology. *Prerequisite: approval of department chairman.* (F,W,S)

Graduate

221. Computer Applications in the Study of the Nervous System (3)
Seminars in techniques of experimental control and data processing using small and medium sized digital computers. Laboratory experience programming and operating such machines, including exercises illustrating principles of digit logic. *Prerequisistes: consent of instructor; minimal knowledge of computer applications.* (Satisfactory/Unsatisfactory grades permitted.) (W)

222. Selected Topics in Neurosciences (1)
Each year a different frontier topic will be studied. Reading assignments involve current literature evaluations in respect to that topic. Students write a library research paper reinforced by consultation with local campus experts in that field. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (F)

223. Quantitative Theories of Nervous-System Function (3)
Lectures on linear and non-linear interactive models and linear and non-linear system identification techniques as applied to neurophysiology. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (S)

224. Biogenic Amines and Brain Function (2)
A lecture course presenting an introduction to the study of synaptic transmission in the central nervous system and to the organization, function and pathology of central neuron systems which utilize biogenic amines and amino acids as synaptic transmitters. *Prerequisites: medical student status or graduate student status in Biology, Marine Biology, Psychology, Neurosciences or consent of instructor.* (Satisfactory/Unsatisfactory grades only. (S)

226. Neuropharmacology (2)
This course is designed to meet the needs of those medical students desiring further knowledge of the actions of CNS therapeutic agents beyond that covered in the Basic Neurology SM205 course of the Core Curriculum. *Prerequisites: Basic Neurology SM 205, Organ Physiology, and Pharmacology SM206.* (Satisfactory/Unsatisfactory grades permitted.) (W)

227. Neurosciences Concepts (1)
Analytical, critical, and creative discussions of neurosciences phenomena and concepts. Entire quarter is devoted to one problem area, e.g., brain mechanisms involved in perception, memory, visceral regulation, development, etc., with attempt to establish improved theoretical and experimental approaches. (Satisfactory/Unsatisfactory grades only.) (W)

228. Physiological Basis of Audition (2)
Based on examinations of the recent literature, lectures and student reports will cover the physiological correlates of pitch, loudness, localization, and other aspects of hearing. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (S)

229. Problems in Auditory Physiology (1)
Review and exploration of mechanisms and physiological and behavioral consequences of centrifugal projections going to sensory relay nuclei and receptor organs. *Prerequisite: Basic Neurology SM205.* (Satisfactory/Unsatisfactory grades only.) (F)

230. Neurosciences Graduate Seminar (1)
Weekly seminars by students of the Neurosciences Graduate Group on topics of recent advances in the Neurosciences. *Prerequisite: student status in the Neurosciences Graduate Group.* (Satisfactory/Unsatisfactory grades only.) (F,W,S)

233. Comparative Neurology (4)
Survey of structure and function of nervous systems of invertebrates and vertebrates. Two hours lectures, three hours laboratory, and two hours discussion. *Prerequisite:*

Neurobiology or Basic Neurology, Physiological Psychology or other introduction to the nervous system. (Satisfactory/Unsatisfactory grades only.) (F)

234. Neurochemistry (4)
A survey of the chemistry, metabolism, and pharmacology of the nervous system. *Prerequisite: undergraduate biochemistry.* (Satisfactory/Unsatisfactory grades only.) (W)

236. Introduction to Neuropharmacology (2)
An introduction to the principles of pharmacology and a survey of the neuropharmacological agents utilized in the neuroscience research areas. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (S)

238. Systems Neurophysiology and Functional Neuroanatomy (5)
Advanced structure and function of nervous systems, especially of mammals and other vertebrates. Three lectures and two four-hour laboratories per week. Enrollment limited. *Prerequisite: graduate standing in the Neurosciences doctoral program or permission of instructor.* (Satisfactory/Unsatisfactory grades only.) (E)

242. Mathematics in Biology (3)
Use of linear algebra, differential equations and transform methods in physiology, biophysics, and ecology. Plane techniques and computer simulation will be applied to classical non-linear problems (for instance, the various forms of the Volterra equation). *Prerequisites: calculus.* (Satisfactory/Unsatisfactory grades only.) (F,W)

243. Physiological Basis of Human Information Processing (3)
Psychological processes including attention, perception, and memory will be studied in connection with event-related potentials of the human brain. The interrelations among psychological and physiological events will be explored in order to arrive at unified concepts of human-information processing. (F)

244. EEG Clinical Seminars (1)
Presentation of interesting case histories of EEG patients and EEG's recorded in the previous week. Study of movies of seizure patients, integration of EEG findings with behavior. Review of research projects in clinical neurology, depth recording, computer techniques in automation of EEG. (Satisfactory/Unsatisfactory grades only.) (F)

245. EEG Research Seminars (1)
Presentation of research topics by students and staff. Research projects are discussed in the phase of design and after completion. In addition to research, students are assigned topics for essays and discussion. Emphasis will be on EEG analysis and computer techniques. (Satisfactory/Unsatisfactory grades only.) (F)

246. Advanced Neuroanatomy (2)
The purpose of this course is to present selected advanced topics in the anatomy of the nervous system. It will emphasize the organization of functional systems but consideration of neural ultrastructure and growth and development will be included. *Prerequisites: Neurophysiology-Neuroanatomy; or Neurology 238; or Basic Neurology (SM205); or Comparative Neurology or Neurology 233.* (Satisfactory/Unsatisfactory grades only.) (W)

247. Fundamentals of Neuro-Ophthalmology
(Anatomy and physiology of the visual and ocular motility systems will be examined. Disorders of these systems will be discussed with emphasis on localizing abnormality by understanding normal function. *Prerequisites: medical graduates; neurosciences graduate students; or consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (W)

248. Neuropsychological Development in Infancy (2)
Traces the development of sensory and central processes from prematurity through the first year of life. Topics will include vision, audition, speech perception, EEG, sleep/wakefulness cycles, cognitive function. Research experience available to selected students. *Prerequisite: neurosciences graduate students or consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (F)

249. History of Medicine (1)
The course examines the causes of conceptual progress and advances in medicine as well as the historical relations between medicine and society. (Satisfactory/Unsatisfactory grades only.) (S)

250. Introduction to Diseases of the Nervous System (2)
Lectures and discussions providing an introduction to the recognition of the manifestations of neurological illness and to an understanding of pathogenetic mechanisms in the major categories of neurological disease. Intended for graduate students and medical students in the preclinical years. *Prerequisite: Basic Neurology 205 or Neurosciences 238 or consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (F)

251. Scientific Communication (2)
Forms of scientific communication, practical exercise in scientific writing and short oral communication and in criticism and editing; Preparation of illustrations, preparation of proposals; Scientific societies and the history of scientific communication emphasis on examples from neuroscience. *Prerequisite: permission of instructor.* (Satisfactory/Unsatisfactory grades only.) (F)

252. Information Processing in Man (1)
Reports of current research into human information processing with emphasis on electrophysiological changes during attention to, and perception and comprehension of visual, auditory and somatic stimuli. *Prerequisites: consent of instructor* (Satisfactory/Unsatisfactory grades only.) (F,W,S)

253. Clinical Neuroanatomy (1)
Review of neuroanatomy with emphasis on clinical information will be included and functional organization will be stressed. It is essential that students are familiar with neuroanatomical nomenclature. *Prerequisites: medical student, graduate student, intern, resident or permission of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F)

296. Neurosciences Independent Research (1-12)
Independent study. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

299. Neurosciences Thesis Research (1-12)
Independent study. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

496. Clinical Independent Study (1-12)
Independent clinical study for medical students. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

500. Apprentice Teaching (1-4)
Participation in the departmental teaching program is required of all students working toward a Ph.D. degree. In general, students are not required to teach in the first year, but are expected to serve as teaching assistants and/or tutors for at least one quarter of the three subsequent years. *Prerequisite: must be neurosciences graduate students.* (Satisfactory/Unsatisfactory grades only.) (F,W,S)

Philosophy

OFFICE: 3112 Humanities-Library Building

Professors:
Henry E. Allison, Ph.D.
Edward N. Lee, Ph.D. *(Graduate Adviser)*
Frederick A. Olafson, Ph.D. *(Chairman)*
Arvum Stroll, Ph.D.
Zeno Vendler, Ph.D.

Honorar Professor:
Herbert Marcuse, Ph.D.

Associate Professors:
Georgios H. Anagnostopoulos, Ph.D.

Assistant Professors:
Richard J. Arneson, Ph.D.
Gerald D. Doppelt, Ph.D.
Thomas C. Mark, Ph.D.
Robert B. Pippin, Ph.D.
Ronald D. Scales, Ph.D.
Barbara A. Winters, A.B., *Acting Assistant Professor (Undergraduate Adviser)*

The Undergraduate Program Students who wish to major in philosophy are advised to undertake some lower-division work in the field before attempting to satisfy the upper-division requirements. The introductory sequences Philosophy 13, 14 and 15, and Philosophy 23, 24 and 25 are especially useful.

The following courses are required of philosophy majors:

1. Philosophy 101-106 (History of Philosophy)
2. Philosophy 110A (Symbolic Logic)
3. One of the following sequences:
   (a) Philosophy 112A-112B (Philosophy of Science)
   (b) Philosophy 120A-120B (Political Philosophy)
   (c) Philosophy 123A-123B (Ethics)
   (d) Philosophy 150A-150B (Aesthetics)
   (e) Philosophy 130A-130B (Contemporary Anglo-American Philosophy)
   (f) Philosophy 140A-140B (Contemporary European Philosophy)
   (g) Philosophy 160A-160B (Philosophy of Religion)
4. Five additional upper-division courses in philosophy (may include courses listed in 3 which are not used in satisfaction of 3). With the approval of the undergraduate adviser, up to two upper-division courses from outside the Department of Philosophy but in the fields of study that are closely related to the student's philosophical interests may be used to count towards satisfaction of this requirement.

The total is fourteen courses. Special and independent studies courses (including courses numbered 199) may not be used to satisfy major requirements, nor may Philosophy 180 be used to satisfy major requirements. Courses taken at another institution or in University Extension which are accredited by the Office of Admissions may be used in satisfaction of major requirements, with the approval of the department. Major requirements may be met by examination. It is required that a passing grade and an over-all average of 2.0 must be obtained in courses taken at UC San Diego fulfilling the major requirements before certification of completion will be granted.

Major Program in Philosophy (Recommended Schedule)

FALL	WINTER	SPRING
Junior Year		
Philosophy 101	Philosophy 102	Philosophy 103
Philosophy 110A	Additional Phil.	Additional Phil.
_____	Course (Sect. 4)	Course (Sect. 4)
_____	Additional Phil.	Additional Phil.
_____	Course (Sect. 4)	Course (Sect. 4)
Senior Year		
Philosophy 104	Philosophy 105	Philosophy 106
Sequence Course	Sequence Course	Additional Phil.
(Sect. 3)	(Sect. 3)	Course (Sect. 4)
or	or	or
Additional Phil.	Sequence Course	Sequence Course
Course (Sect. 4)	(Sect. 3)	(Sect. 3)
_____	_____	_____
_____	_____	_____

Undergraduate courses offered by the Department of Philosophy enable students to satisfy the humanities requirement of Third College's general education requirement under Program B.

The Graduate Program The Department of Philosophy offers programs leading to the M.A. and Ph.D. There is no sequence of required courses in either program. Courses of study are arranged according to the need, interest and experience of the individual student.

It is the intention of the graduate program to enable the student to obtain an understanding of divergent philosophical traditions and to develop as a philosopher in his or her own right. To this end, the department offers courses and seminars in

the history of philosophy and in the study, from a variety of perspectives, of traditional and contemporary philosophical issues.

Master's Degree Program An M.A. is offered under the Comprehensive Examination Plan. Under this plan, credit must be obtained for thirty-six quarter units; at least fourteen units must be from graduate courses in philosophy; no more than nine units may be from upper-division courses. In addition, a comprehensive written examination must be passed prior to the conclusion of the seventh quarter in residence. This examination is identical to the written examination required of Ph.D. candidates.

Candidates for an M.A. degree must demonstrate reading proficiency in one foreign language (Classical Greek, Latin, French or German) before the comprehensive examination is attempted and before the beginning of the fourth quarter in residence.

Doctoral Degree Program From the time of initial enrollment until advancement to candidacy, the student will be expected to take in each year of residence at least twelve units in graduate philosophy courses (specifically, those numbered 201-295). The balance of the student's course work, which will normally total thirty-six units per year, may be made up from upper-division courses in philosophy, upper-division and graduate courses in other departments and, if the student is a teaching assistant, Philosophy 200.

All graduate students must demonstrate at least an elementary knowledge of logic. A satisfactory grade in the final examination for Philosophy 110A will meet this requirement, as will passing the logic portion of the comprehensive examinations.

Prior to the conclusion of the ninth quarter in residence, all students must pass a written comprehensive examination administered by the department. The examination serves to determine (a) whether the student qualifies for an M.A. in Philosophy and (b) whether the student shall be encouraged to continue work for a Ph.D. The examination is in three parts:

I. Metaphysics and Epistemology
II. Ethics and Social Philosophy
III. For their third examination, students will have a choice between examinations in:
   A. Logic, Philosophy of Language, and Philosophy of Science
   B. Philosophy of History, Aesthetics and Philosophy of Religion

In parts III-A and III-B, the student will be required to answer questions relating to at least two of the three fields included. If a student wishes to be examined in fields some of which are in III-A and some in III-B, e.g., in logic and aesthetics, he or she may petition the department for such an examination. This should be done well before the date when the examinations are to be taken.

The examination will have a strongly historical character. It is understood that twentieth-century philosophy counts as part of the history of philosophy. A list of readings will be issued to students to help them in preparation. Students are allowed four hours to complete each part (I, II and III).

The comprehensive examination is offered twice a year, in September and in March. The first attempt at a given part of the examination should be made in September; the March examination period serves to provide for a second attempt in case a student does not pass in September.

The three parts of the examination may be taken separately and in any order. Every student must take at least one part of the examination no later than the second examination period following his or her first enrollment in the graduate program; thus, a student entering in September will take at least one part of the examination no later than the following September. All three parts of the examination must be successfully completed within nine quarters after the student's first enrollment (not counting summer session), that is, by the end of the third year of graduate study.

A student who fails any part of the examination may take that part a second time, but not a third. However, the second attempt must be made in the examination period immediately following the one in which the failure occurs; thus, if a student fails a part of the examination in September, his or her second attempt at that part must be made the following March. Failing any part of the examination a second time disqualifies a student from the doctoral program.

After passing the written comprehensive examination, the student must submit a prospectus of the dissertation to his or her doctoral committee. This committee will then orally examine the student on the intended subject of research. This examination will seek to establish that the thesis proposed is a satisfactory subject of research and that the student has the preparation and abilities necessary to complete the research. This oral qualifying examination must be passed before the beginning of the tenth quarter in residence. Students who are passed will be advanced to candidacy for the Ph.D.

Under the supervision of the doctoral committee, each candidate will write a dissertation demonstrating a capacity to engage in original and independent research. The candidate will defend the thesis in an oral examination by the doctoral committee. (See "Graduate Studies, The Doctor of Philosophy Degree".)

Participation in undergraduate teaching is one of the requirements for a Ph.D. in Philosophy. The student is required to serve as a teaching assistant for the equivalent of one-quarter time for three academic quarters. The duties of a teaching assistant normally entail grading papers and examinations, conducting discussion sections and related activities, including attendance at lectures for the course in which he or she is assisting.

Candidates for a Ph.D. degree must demonstrate reading proficiency in one foreign language before the comprehensive examination is attempted and before the beginning of the fourth quarter in residence. Reading proficiency in a second foreign language must be demonstrated before the oral qualifying examination is attempted and before the end of the ninth quarter in residence.

Courses

Lower Division

The Department of Philosophy cooperates in the teaching and administration of the humanities sequence for Revelle College students. *(See Interdisciplinary Courses: Humanities.)*

12. Introduction to Logic (4)
An inquiry into the nature of argument, inference and proof, fallacies, etc. Two hours lecture; one hour discussion. (Not to be offered 1976-77.)

13. Introduction to Philosophy (4)
An inquiry into the nature of morality and its role in personal and social life. (Students who have received credit for Philosophy 11 may not take Philosophy 13 for credit.) (May be used in fulfilling the Muir College breadth requirement.)

14. Introduction to Philosophy (4)
An introduction to metaphysical thought, especially as it relates to topics such as freedom, mind and God. (Students who have received credit for Philosophy 10 may not take Philosophy 14 for credit.) (May be used in fulfilling the Muir College breadth requirement.)

15. Introduction to Philosophy (4)
A study of the scope and nature of human knowledge in both its everyday and scientific forms. (May be used in fulfilling the Muir College breadth requirement.)

23, 24, 25. Man and Society (4-4-4)
A course dealing with the historical and systematic development of social and political thought and institutions. Analysis and critical examination of representative texts drawn from classical and contemporary sources. (Philosophy 23, 24, 25 may be used in fulfilling the Revelle College humanities requirement.) (Students may not take these courses for credit if they previously had credit for Philosophy 20-21-22.)

30A-30B-30C. Judaic Studies (4-4-4)
A three-quarter sequence involving the study of the deep and surface structures of the life styles of one specific culture. The approach from several disciplines addresses itself to analysis of the social, political and economic institutions, the aesthetic structuring through formal artistic expression and the cultural forms of everyday living.

40A. The Nature of Scientific Theories (4)
This is a course designed to introduce students to some logical and epistemological issues raised by science, including the nature of laws and their role in explanation, the distinction between observational and theoretical terms, the truth of scientific theories. (Not to be offered in 1976-77.)

40B. The Nature of Scientific Theories (4)
Topics in the development and justification of scientific theories, including the nature of discovery, probability theory and the problem of induction and the nature of scientific change. (Not to be offered in 1976-77.)

Upper Division

101. History of Philosophy: Greek Philosophy (4)
A study of Greek philosophy from the Pre-Socratic philosophers through Plato.

102. History of Philosophy: Hellenistic and Roman Philosophy (4)
Greek philosophy from Aristotle to Plotinus including the major schools of Hellenistic philosophy: Stoicism, Epicureanism, Skepticism, and Neo-Platonism. *Prerequisite: Philosophy 101.*

103. History of Philosophy: Medieval Philosophy (4)
An examination of the major trends of medieval philosophy through the study of selected texts by such authors as St. Augustine, Aquinas, Scotus, and Ockham. *Prerequisite: Philosophy 102.*

104. History of Philosophy: Early Modern Philosophy (4)
Sixteenth and seventeenth century philosophy with emphasis on the rationalists (Hobbes, Descartes, Spinoza, Leibniz) and with some attention to major intellectual currents of the 16th and 17th centuries.

105. History of Philosophy: 18th Century Philosophy (4)
An examination of the works of eighteenth century philosophers such as Locke, Berkeley, Hume and Kant. *Prerequisite: Philosophy 104.*

106. History of Philosophy: 19th Century Philosophy (4)
A study of the development of German idealism with special attention to Hegel and to the reaction his thought provoked on the part of thinkers such as Kierkegaard and Marx. *Prerequisite: Philosophy 105.* (Not to be offered in 1976-77.)

108. Mythology and Philosophy (4)
Study of various ancient Near Eastern mythologies in relation to early Greek philosophy.

110A. Symbolic Logic (4)
Introduction to mathematical logic; consistency and completeness results for propositional and predicate calculi and identity theory.

110B. Symbolic Logic (4)
First order theories, recursive functions, arithmetic models, Godel results.

112A. Philosophy of Science (4)
An introductory examination of the nature, import and procedures of science in the light of its historical development.

112B. Philosophy of Science (4)
An examination of the nature and historical development of some of the major conceptions of science, such as time, space, motion, causality, determinism. Three hours lecture-discussion. *Prerequisite: Philosophy 112A.*

115. Philosophy of Logic (4)
Topics in philosophy of logic. Subjects covered vary from year to year. Typical topics include the problem of non-denoting terms (free logic), intensional contexts (Leibniz's law, identity, necessity, belief sentences). *Prerequisite: Philosophy 110.*

120A. Political Philosophy (4)
An examination of problems and theories concerning the nature of the state, society and government. Two or three lecture-discussions.

120B. Political Philosophy (4)
An advanced course in some of the fundamental questions and theories concerning state, society and government. Three hour lecture-discussion. *Prerequisite: Philosophy 120A.* (Not to be offered in 1976-77.)

123A. Ethics (4)
An examination of issues in ethical philosophy with emphasis on the works of major historical figures in this area.

123B. Ethics (4)
A more advanced course dealing with contemporary issues in ethics. *Prerequisite: Philosophy 123A.*

124. Philosophical Psychology (4)
An examination of issues in the philosophy of mind and philosophy of action, such as the nature of beliefs, emotions and actions and the inter-relationships between them; the nature of the mental and conceptual issues arising in psychology.

125. Technology and Human Values (4)
Traditional ideas of Nature and the rise of Science and Technology on political ideals, on human life, on freedom, education, and on warfare.

130A-B. Philosophy of Language (4)
The pragmatic, syntactic and semantic dimensions of language function. The concepts of extension and intension; presupposing. Speech act theory. A discussion of the relevance of formal models, appeals to ordinary use, and modern linguistic theory with regard to philosophical problems. Selected writings from the works of Frege, Russell, Wittgenstein, Morris, Ryle, Quine, Austin, Tarski, among others.

140A. Contemporary European Philosophy (4)
A study of the thought of Nietzsche, Husserl and Heidegger with emphasis on the development of the phenomenological movement.

140B. Contemporary European Philosophy (4)
A study of existential phenomenology, through the works of its major representatives such as Sartre, Merleau-Ponty and others, as well as of other recent philosophical movements on the European continent. *Prerequisite: 140A.*

150A. Aesthetics (4)
A study of the relations of aesthetic experience to ordinary experience and the problems of relating the different arts by such general concepts as expression and artistic form.

150B. Aesthetics (4)
An examination of some special aesthetic problems, such as the cultural relevance of art, the nature of critical evaluation and the understanding of styles. Two or three lecture-discussions. *Prerequisite: Philosophy 150A.* (Not to be offered in 1976-77.)

152. Philosophy and Literature (4)
A study of philosophical themes as presented in selected fiction, drama, or poetry, as well as an inquiry into philosophical puzzles that arise in the appreciation and criticism of literature.

160A. Philosophy of Religion (4)
An examination of the classical treatments, within the Judeo-Christian tradition, of issues such as the nature and existence of God, the possibility of miracles, and the relation between reason and revelation. (Not to be offered in 1976-77.)

160B. Philosophy of Religion (4)
An examination of some of the major recent and contemporary discussions of the nature, logic, and existential significance of religious belief. *Prerequisite: Philosophy 160A or consent of instructor.* (Not to be offered in 1976-77.)

162. Philosophy of Law (4)
An introduction to some major topics and problems. The nature of law and legal systems, the relationship of law to morality and of legal obligation to moral and political obligation; natural law theory and civil disobedience; theories of punishment, responsibility and legal reasoning. (Will not be offered in 1976-77.)

164. Philosophy of History (4)
A study of classical and contemporary conceptions of history and historical knowledge. (Not to be offered in 1976-77.)

166. Philosophy of Social Science (4)
An examination of problems arising out of the concepts, methods and goals characteristic of the social sciences, incorporating current materials from these disciplines; problems such as causal vs. rational explanation; the individual vs. the social whole as unit of study, the meaning and possibility of objectivity, freedom or determinism as a pre-supposition or consequence of theory, the role of values, etc. (Not to be offered in 1976-77).

170. Metaphysics (4)
The content of this course will vary from year to year, but in each case it will center about fundamental problems in metaphysics, such as the mind-body problem, problem of universals or the other minds problem. The discussion of these issues may be either historical or analytic or both, depending upon the interests of the instructor.

172. Epistemology (4)
A course dealing with topics in the theory of Knowledge, such as the nature of Knowledge and belief, the justification of Knowledge claims, Knowledge of the external world, Knowledge of other minds, the nature of perception, memory.

180. Senior Colloquium (4)
A seminar dealing with the examination of specific philosophical problems and topics, designed for seniors of high standing who major in Philosophy. *Prerequisites: senior status and permission of department.* May be repeated for credit.

198. Directed Group Study (4)
Directed group study on a topic or in a field not included in the regular departmental curriculum by special arrangement with a faculty member.

199. Individual Study (4)
Prerequisite: permission of departmental adviser.

Graduate

200. Proseminar in the History of Philosophy (4)
A course of studies designed to prepare students for advanced work in seminars.

201. Greek Philosophy (4)
A study of selected authors and tests from the history of ancient Greek philosophy.

202. Hellenistic and Roman Philosophy (4)
Selected topics drawn from the major philosophical schools in the Hellenistic and Roman periods, among them Stoicism, Epicureanism, Skepticism, and Neo-Platonism.

203. Medieval Philosophy (4)
A study of representative writings from one or more of the major philosophical movements of the Middle Ages.

204. Early Modern Philosophy (4)
A study of selected philosophers of the sixteenth and seventeenth centuries as, for example, Descartes, Spinoza, Leibniz, and Locke.

205. Eighteenth Century Philosophy (4)
A study of major philosophical texts of the period such as Kant's *Critique of Pure Reason* and *Hume's Treatise of Human Nature.*

206. Nineteenth Century Philosophy (4)
A selective study of major philosophical texts of the period with emphasis on such figures as Hegel, Marx, Nietzsche, Mill and others.

207. Contemporary European Philosophy (4)
A study of selected topics in twentieth century European philosophy as reflected in the major writings of Husserl, Heidegger, Sartre, Merleau-Ponty, and others.

208. Contemporary Analytical Philosophy (4)
A study of the historical development of the analytical movement with emphasis on major texts.

210. Philosophy of Logic (4)
A study of major topics in logical theory, together with a close examination of contributions by different philosophical schools to the analysis of central issues in philosophy of logic. *Prerequisites: Philosophy 110 or equivalent.*

211. Advanced Symbolic Logic (4)
An intensive examination of propositional and quantificational logic as a basis for further deductive development. *Prerequisites: Philosophy 110 or equivalent.*

212. Philosophy of Science (4)
An examination of such problems as concept formation, the explanation of law, the role of logic and mathematics in the sciences.

215. Introduction to Formal Semantics (4)
A general introduction to theories of sense and reference, comprising a comparative approach to Fregean, Russellian and Tarskian semantic techniques, with emphasis on semantic primitives and the general structure of theories of truth.

223. Ethics (4)
An examination of the nature of moral problems, judgments and principles, with emphasis on recent developments in moral philosophy and classic formulations of ethical theories.

224. Social and Political Philosophy (4)
An analysis of social philosophies and ideologies in their relationship to basic types of social structure.

235. Philosophy of Language (4)
Examination of some current philosophical and scientific views on the nature, use and acquisition of natural languages.

250. Aesthetics (4)
An exploration of problems in philosophy of art, aesthetic experience and aesthetic judgment within the context of a critical survey of some current aesthetic theories and their illustrative application in various fields of art.

260. Philosophy of Religion (4)
A study of the philosophical foundations of religious experience, including the nature of belief and knowledge, faith and reason, God and the character and meaning of religious commitment.

262. History of Law in Philosophical Perspective (4)
Course will study the way in which the historical development of the Western Legal System reflects issues raised in the literature of legal philosophy. Students will read works of legal philosophy in conjunction with studies of the history of legal doctrines and institutions.

264. Philosophy of History (4)
An examination of basic concepts, categories, and presuppositions of historical experience in the context of representative philosophies of history.

270. Contemporary Epistemology and Metaphysics (4)
A detailed examination of some fundamental issues in contemporary philosophy, especially those centering about the theories of meaning and reference.

272. Theory of Knowledge (4)
An examination and critique of representative theories of mind, reality, knowledge and perception.

280. Department of Philosophy Colloquium (4)
Special topics submitted by visiting philosophers for critical appraisal by staff and students. (Satisfactory/Unsatisfactory grades permitted.)

285. Seminar on Special Topics (4)
A seminar for examination of specific philosophical problems. (Satisfactory/Unsatisfactory grades permitted.)

290. Directed Independent Study (4)
Supervised study of individually selected philosophical topics. May be repeated for credit. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades optional.)

295. Research Topics (1-12)
Advanced, individual research studies under the direction of a member of the staff. May be repeated for credit. *Prerequisite: permission of graduate adviser.* (Satisfactory/Unsatisfactory grades optional.)

299. Thesis Research (1-12)
(Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching (1-4)
A course designed to meet the needs of graduate students who serve as teaching assistants in Philosophy courses at UCSD. Analysis of texts and materials relating to the courses, discussions of teaching techniques, formulation of paper and examination topics in consultation with the instructor of the course. (Satisfactory/Unsatisfactory credit only.)

501. Studies and Teaching in Humanities (1-4)
A course designed to meet the needs of graduate students who serve as teaching assistants in the Humanities Sequence in Revelle College, Cultural Traditions in Muir College and Third College Programs. *Prerequisite: required of all teaching assistants assigned to humanities sequence.*

Physical Education

OFFICE: Gymnasium

Supervisors:
John H. Douglass, M.A.
Theodore W. Forbes, Ed.D.
Howard F. Hunt, M.A.
Frank N. Vitale, M.A.

Associate Supervisors:
Bert N. Kobayashi, Ph.D.
J. Charles Millenbah, M.A.
James R. White, Ph.D.
J. Barry Cunningham, M.A.

Assistant Supervisors:
John W. Cates, M.A.
Diana E. Dann, M.S.
Margaret C. Marshall, M.F.A.
Robert Moss, M.S.
Andrew Skief, Jr., M.S.
Judith M. Sweet, M.S.

* * *

"Activity" and "participation" describe the many programs of the Department of Physical Education. Modern facilities provide an activity center for class sections in a wide variety of coeducational lifetime activities, casual recreation ("doing your own thing") and organized competition for the novice or expert through intramural or inter-collegiate competition. Gymnasiums, natatorium, tennis courts, and playing fields are a hub of campus life for all students who want to learn a new sport, perfect a skill, join fellow students in an activity club, or compete against fellow students or those from neighboring colleges. All students are entitled to locker and towel issue on a quarterly basis and can use all facilities which also include a golf driving range and sailing on Mission Bay.

Learning to Be Active and Fit

Courses listed below offer a wide variety of choices in aquatics, lifetime sports, fitness for living, combatives, survival, and officiating. Most classes meet twice weekly for one-hour sessions with sections offered according to skill levels. Enrollment is voluntary and students are encouraged to sign up for one or more courses of their choice.

Participating in Activities

Intramurals Throughout the year, students compete in individual and team sports under actual game situations. Teams are formed within dormitories and special-interest groups with special emphasis on coed activities. Contact the Intramural Office in the Recreation Gymnasium for information to organize a team and compete in flag football, innertube basketball, six-man volleyball, three-man basketball, squash, handball, badminton, soccer, kickball, softball, fencing, table tennis, innertube water polo, etc.

Recreational Athletic Clubs Many students organize or join an activity club of their choice. Currently the department sponsors twenty-two clubs: aikido, archery, bicycle, bowling, cricket, fencing, folk dance, glider, golf, gymnastics, horseback, karate, modern dance, Muir outing, sailing, skin/scuba diving, sky-diving, snow ski, surfing, tennis, water ski and yoga.

Casual Recreation Many hours are available to use gymnasium and pool facilities. Noontime and evening volleyball or basketball games are popular and the sauna is open from 8 a.m. to 10 p.m. daily. There is a golf driving range within bicycling distance of the main campus and a sailing facility on Mission Bay at Santa Clara Point (seven miles south of the campus).

Extramural Athletics Undergraduate students possessing a high degree of proficiency in sport skills may compete against other Southern California colleges and universities in regularly scheduled men's and women's athletic events. Presently 32 UC San Diego teams represent the campus. Participation is entirely voluntary; students are encouraged to compete for the pleasure of participation.

Courses

Registration for physical education classes takes place in the Gymnasium on the first day of instruction each quarter. Consult the *Schedule of Classes* issued by

the Office of the Registrar for specific course offerings. Several levels of skill proficiency follow:

A — introductory level (intended for those who have never participated in the activity);

B — advanced beginning level (continued instruction and practice on basic skills);

C & D — intermediate level (improvement of skill techniques and/or game strategy);

E — advanced level (for skilled participants with instruction to perfect techniques and sharpen competitive strategy.)

1A-B-C. Swimming (0)
Designed to permit students to gain or improve swimming strokes, techniques, and aquatic skills on an individual basis.

2. Synchronized Swimming (0)
Designed for advanced swimmers. Fundamentals in individual and group water ballet. Opportunity for public presentations.

3. Lifesaving (0)
The American Red Cross Senior Lifesaving Certificate will be awarded to students satisfactorily completing the course. Emphasis is placed upon knowledge and skills to prepare one to save his or her own life, or the life of another in an emergency. *Prerequisite: Intermediate Swimming or consent of instructor.*

4. Water Safety Instruction (0)
Standard American Red Cross course to train authorized water-safety instructors to teach A.R.C. swimming and lifesaving courses thereafter. *Prerequisites: only holders of the A.R.C. Senior Lifesaving Certificate are eligible to register. Students must pass Part I in order to qualify for Part II.*

7A-D. Skin-Diving (½)
Techniques of skin-diving and practical experience. Introductory course will include lectures on equipment, environment and principles of skin-diving with pool training. Advanced course will emphasize practical experience in ocean dives. *Prerequisite: consent of instructor.*

8C-D. Scuba Diving (½)
Intermediate course exposes basic certified scuba diver to all aspects of scuba diving to inspire self-confidence and enhance enjoyment of this activity. Advanced course assists more experienced scuba divers in gaining proficiency in skills and knowledge about diving and the ocean environment. *Prerequisites: current certification as a scuba diver under NAUI, SIO/UC, NASDS, or L.A. County; or consent of instructor. Students must furnish all basic scuba gear.*

9C. Intermediate SCUBA Diving (1)
Course is designed to propel the beginning/newly-certified inexerienced SCUBA diver safely through the awkward first ten dives in the ocean environment. It will introduce the diver to many aspects of SCUBA so as to inspire self-confidence and to enhance enjoyment. *Prerequisites: current certification as SCUBA diver under one of the following: NAUI, YMCA, NASDS, SIO/UC, SCIP, LA County, or consent of instructor. Students must furnish all basic gear.*

9E. Advanced SCUBA Diving (1)
A course designed to orient the Intermediate SCUBA diver to the La Jolla oceanic environment at depths of forty to one hundred feet—submarine canyon diving and boat diving in the La Jolla/Del Mar/Solana Beach/Point Loma waters. *Prerequisites: successful completion of the UCSD Intermediate SCUBA course, or equivalent. Students must furnish all gear.*

10A-B. Surfing (0)
Surfing techniques taught in pool including mounting, sitting, paddling and turning surfboard, safety techniques. Only after mastery of pool techniques will student be allowed to surf in ocean. *Prerequisites: ability to swim 400 yards, basic lifesaving skills and UC San Diego beginning swimmer's certificate.*

11A-B-C-D. Sailing (0)
Course is designed to make sailing an easily understood sport and provide students an opportunity for a lifetime of stimulating and relaxing activity. Special emphasis is placed on nautical terms, water and safety rules, demonstrations and practical exercises in rigging and boat handling.

14A-B-C-D-E. Tennis (0)
Instruction in the fundamentals of the serve, strokes, volley, rules, scoring, tactics and court strategy.

15A-B-C-D-E. Badminton (0)
Instruction in the fundamentals of the serve, strokes, volley, rules, scoring tactics and court strategy. Designed to allow both men and women students, novice and expert, an opportunity to participate.

16A-B-C-D-E. Volleyball (0)
An emphasis on fundamental skills in serving, spiking, blocking, and teamwork techniques. Opportunity for team competition.

17A-C. Golf (0)
Instruction and practice in the fundamentals of golf. Emphasis is placed upon golf swing and techniques of using all clubs under varying conditions.

18A-C-D. Cycling (0)
The wonderful world of the bicycle builds the exercise habit into daily routines. Proper riding techniques, care, maintenance, and safety considerations add to the extra thrills of exploring backroads, byways and paths in a 50 mile radius of campus or overnight trips for advanced cyclists.

19. Squash (0)
Introduction to the sport, including instruction in fundamental skills and techniques, individual and group practice, and opportunities for competition.

20. Handball (0)
Instruction in fundamentals of the serve, rally and court strategy. Opportunity for singles and doubles competition.

21A-C. Modern Dance (0-1)
Opportunities in dance techniques. Pattern variations will be discovered in time, space and design. These woven together with the technical skills will produce a means of communication through a controlled body.

22A-C. Jazz Dance (0-1)
Emphasis will be on technical skills of jazz dance including general rhythmic exercises, isolations, turns, locomotor combinations, and dance sequences to the accompaniment of contemporary rock and jazz music. Students will have the opportunity for simple improvisation and composition.

23A-C-E. Ballet (½)
An introduction to classical ballet. An experience in a disciplined form of dance which is essential to dancers before attempting modern and contemporary dance styles. An opportunity for students to be trained in ballet with emphasis on technique, theory, music, projection, and terminology.

24. Folk Dance (0)
The course will give students an understanding of the background of Folk Dancing by developing an awareness of the characteristics, styles, step patterns, formations, and quality of movement of each country or area. Emphasis will be placed on line, circle, and couple dances from Israel, Greece, Turkey, Italy, Scotland, Rumania, and Czechoslovakia.

25A-B-C. Tap Dance (0)
Emphasis on rhythm, coordination, timing, and style. Beginning course will teach basic time step, soft shoe, fast buck rhythms and simple routines suitable for performance. Advanced-beginning will include more intricate rhythms such as riffs, pull backs and wings. Intermediate will include more complicated steps and rhythms. All classes have exercises at the barre.

29A-C. Horseback Riding (0)
Fundamentals of horsemanship will stress styles of riding, goals and equipment, mounting and dismounting, trail riding, care of the horse and terminology. Particular course emphasis provides the rider with an understanding and appreciation of the horse so that they may perform as a team.

33. Conditioning-Coed (0)
Designed to meet individual needs of each student enrolled in the class through personal evaluation, diet, measurements and exercise programs.

34. Weight Training (0)
Participation in individual exercise routines, running, weight and strength exercises to increase general fitness, endurance and muscular efficiency.

35. Exercise, Nutrition and Weight Control (½)
Theory and practice of regular exercise and nutritional needs for development, maintenance and continuation of good health.

37. Rhythmical Conditioning (0)
Combines vigorous rhythmical exercises with the challenge of individual choreography. It includes a variety of musical arrangements and is individually adapted for low, medium, and high levels of participation.

38A-B-C-D-E. Basketball (0)
Instruction in fundamentals is combined with opportunities for team play. Some pre-knowledge of the game is desirable since emphasis will be on vigorous competition.

40A-B-C-D. Gymnastics (0)
Fundamentals of gymnastics, including instruction on the use of apparatus and tumbling routines.

43. Gymnastics "Circus Stunts" (0)
Advanced gymnastics techniques involving "circus-type" activities including trampolining, tumbling, vaulting, juggling, free exercise, unicycling and riding the Balla Rolla Board. Particular stress will be placed upon individual cardio-respiratory endurance, agility, strength, coordination and kinesthetic balance.

46A-C-E. Fencing, Epee (Electric) (½)
Classical French style, brief history, electrical equipment and safety, protocol and basic technique. Attacks, both simple and compound; defenses, simple and compound; strategy and directing of bouts using French terminology.

47A-C-D. Fencing, Foil (½)
Classical French style. Protocol, on guard, advance and retreat, attacks (simple and compound), parries (simple and compound), strategy and basic rules.

48C-D. Fencing, Sabre (½)
Designed for the intermediate and advanced student of fencing to continue his training in classical Hungarian sabre-style.

49. Fencing, Theatrical (½)
Fencing techniques useful to students involved in performing arts. Emphasis will be upon choreography and dramatic presentation.

50A-B-C-D-E. Karate (0)
Instruction and training in the fundamentals of Sho-to-kan Karate, emphasizing: basic stances and techniques; "kata," ancient stylized sequences of defensive and counter-offensive movements; sparring, a graded progression from strictly controlled defense and counter-attack situations to free sparring for competition.

51A-C-E. Wrestling (Amateur-Combatives) (0)
Amateur wrestling, brief history, safety elements and dress, protocol, basic techniques of: takedowns, rides, pinning combinations; defense of rides by escapes and reversals and basic counts. Additionally, rules, courtesy and physical conditioning are an integral part of the course. At the end of the course a tournament with officiating will be held.

52A-C-E. Judo (0)
Includes origin and development of Judo, nature and basic rules of judo contests; basic techniques and terminology. Intermediate and advanced Judo emphasizes improvement of skills and intraclass competition.

53A-C. Aikido (0)
Instruction and training in fundamentals of Aikido. Provides a non-aggressive, non-competitive art of self-defense for men and women through development of individual's sense of balance, timing and mental atitude.

54A-D. First Aid (0)
Standard and advanced course. Upon successful completion of the course, the student is awarded a Red Cross Certificate. Prepares the student to render effective first aid in treatment of wounds, burns, fractures, dislocations, artificial resuscitation and other emergency conditions. Laboratory practice on splints and bandaging.

55. Camp Leadership (0)
Provides students with knowledge and skills needed to establish and maintain camping programs or to become a camp counselor.

56. Prevention and Care of Physical Activity Injuries (0)
An analysis of the human mechanism and motor skills in the application of physical training techniques and the prevention and care of commonly occurring physical activity injuries.

57. A-B-C. Self Defense I, II, III (0)
Designed to familiarize students, women particularly, with methods of self defense. Mainly directed toward students not involved in martial arts. Deals with psychology of self-defense situation. Students may enter at any level.

58. Theory and Practice of Theatrical Combat (2)
Two one-hour lectures, one two-hour lab per week. The mechanics of offensive and defensive movement in staged combat. Analysis and practice of related skills in theatrical scenes; choreographed physical conflict.

59A,B,C. Applied Rehabilitation for Post Muscle and Joint Trauma (1, ½, 0)
A course to provide students with muscle and joint trauma injuries with specific information and instruction concerning the nature of tissue injury, the rehabilitative process,

and preventative measures useful in avoiding or reducing further injury. *Prerequisities: referral from attending physician.*

Intercollegiate Athletics (0)
A wide variety of intercollegiate sports activities is offered to all undergraduate students. Program is designed for those who possess a high degree of proficiency in sport skills. Competition with other colleges and universities is scheduled.

61. Baseball

62. Basketball

63. Crew

64. Cross Country

65. Fencing

66. Golf

67. Gymnastics

68. Karate

69. Rugby

70. Sailing

71. Snow Skiing

72. Soccer

73. Surfing

74. Swimming

75. Tennis

76. Track

77. Volleyball

78. Water Polo

79. Wrestling

80. Badminton

81. Field Hockey

82. Lacrosse

83. Cycling

84. Women's Softball

87. Psychology of Officiating (0)
Techniques and analysis of basketball officiating, stressing mechanics and practical application of rules leading to official's rating for students employment.

88. Modified Activities (0)
Particular emphasis is placed upon modified fitness and individualized sports programs offering opportunities for social and physical development for those unable to engage in normal physical-education classes. Programs are modified to fit the student rather than the student to fit the programs.

Physics

OFFICE: 3426 Mayer Hall

Professors:
William Ian Axford, Ph.D.
Keith A. Brueckner, Ph.D.
E. Margaret Burbidge, Ph.D. *(Astronomy)*
Geoffrey R. Burbidge, Ph.D. *(Astrophysics)*
Joseph C. Y. Chen, Ph.D.
George Feher, Ph.D.
William R. Frazer, Ph.D. *(Chairman)*
John M. Goodkind, Ph.D.
Francis R. Halpern, Ph.D.
Walter Kohn, Ph.D.
Norman M. Kroll, Ph.D.
Leonard N. Liebermann, Ph.D.
Ralph H. Lovberg, Ph.D.
Shang-Keng Ma, Ph.D.
John H. Malmberg, Ph.D.
George E. Masek, Ph.D.
Bernd T. Matthias, Ph.D.
Carl E. McIlwain, Ph.D.
William A. Nierenberg, Ph.D.
Thomas M. O'Neil, Ph.D.
Laurence E. Peterson, Ph.D.
Oreste Piccioni, Ph.D.
Sheldon Schultz, Ph.D.
Lu Jeu Sham, Ph.D.
Harry Suhl, Ph.D.
Robert A. Swanson, Ph.D.
William B. Thompson, Ph.D.
John C. Wheatley, Ph.D.
David Y. Wong, Ph.D.
Herbert F. York, Ph.D.

Associate Professors:
Donald R. Fredkin, Ph.D.
Robert J. Gould, Ph.D.
Wayne Vernon, Ph.D.
Nguyen-Huu Xuong, Ph.D.
M. Brian Maple, Ph.D. *(Acting)*

Assistant Professor:
Oscar Lumpkin, Ph.D.

* * *

The Major Program The upper-division program is intended to provide basic education in several principal areas of physics, with some opportunity for study in neighboring areas in the form of restricted electives. Provision is made, both in the main course and in the elective subjects, for some training in a few of the more technological aspects of physics.

In the junior year, the emphasis is on macroscopic physics; the two principal physics subjects are electromagnetism and mechanics. The mathematics background required for the physics program is completed in this year.

In the senior year, a sequence of courses in quantum physics provides the student with the modern view of atomic and some aspects of sub-atomic physics and the principal analytical methods appropriate in this domain. The relation of the microscopic to the macroscopic world is the subject of courses in thermodynamics and statistical physics, with illustrations drawn from gas dynamics and solid-state physics. The quantum physics sequence aims at an inte-

grated, descriptive and analytical treatment of those areas of physics in which quantum effects are important, particularly atomic and nuclear physics and elementary particles.

The following courses are required for the physics major:

(a) Lower-division:
(1) Physics: Natural Science or Physics 2A-B-C; or Physics 3*A-B-C-D; or Science 4A-B-C and 4BL or 4CL.
(2) Chemistry: Natural Science 2D-DL-F; or Science 3A-AL-B (or upper-division chemistry course with associated laboratory).
(3) Mathematics: Mathematics 2D-E or 2DA*-EA*.

*Strongly recommended.

(b) Upper division:
(1) Physics: Physics 100A-B-C, 110A-B, 120A-B, 130A-B, 140A-B, and two additional laboratory courses from the following group: 120C, 131, 132, 170, or 199 with departmental approval.
(2) Mathematics: Mathematics 110A.
(3) Restricted Electives: Three upper division or graduate courses in natural sciences or mathematics, subject to departmental approval; one elective must be in mathematics (Math 120 recommended).

(c) Suggested Schedule:

FALL	WINTER	SPRING
Junior Year		
Physics 100A	Physics 100B	Physics 100C
Physics 110A	Physics 110B	Physics 120A
Restricted Elective	Math 110A	Restricted Elective
Senior Year		
Physics 120B	Physics 120C or 131	Physics 132 or 170
Physics 130A	Physics 130B	Restricted Elective
Physics 140A	Physics 140B	

Physics Major with Specialization in Biophysics The upper-division program is essentially the same as the standard physics major with some modification to provide the education in biology and chemistry needed for advanced work in biophysics. Students entering the program with backgrounds deficient in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics:

(a) Lower division:
(1) Physics: Natural Science or Physics 2A-B-C; or Physics 3A-B-C-D; or Science 4A-B-C and 4BL or 4CL.
(2) Chemistry: Natural Science 2D-DL-F-FL; or Science 3A-AL-B-BL.
(3) Biology: Natural Science 2E.
(4) Mathematics: Mathematics 2D-E or 2DA-EA.

(b) Upper division:
(1) Physics: Physics 100A-B-C, 110A, 120A-B, 130 A-B, 131, 153.
(2) Chemistry: Chemistry 131, 140A-B, 143A.
(3) Biology: Biology 102, 110A-B-C.
(4) Mathematics: Mathematics 110A.
(5) Restricted Elective: Mathematics 120 is recommended.

(c) Suggested Schedule:

FALL	WINTER	SPRING
Junior Year		
Physics 100A	Physics 100B	Physics 100C
Physics 110A	Math 110A	Restricted Elective
Chemistry 140A	Chemistry 140B	Physics 120A
Chemistry 143A		
Senior Year		
Physics 130A	Physics 130B	Biology 102
Physics 120B	Physics 131	Biology 110C
Biology 110A	Biology 110B	Physics 153
	Chemistry 131	

Physics Major with Specialization in Biophysics-Premedical The upper-division program is essentially the same as the standard physics major with some modification to provide the education in biology and chemistry needed for the study of medicine. Students entering the program with backgrounds deficient in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics-premedical:

(a) Lower division:
(1) Physics: Natural Science or Physics 2A-B-C; or Physics 3A-B-C-

D; or Science 4A-B-C and 4BL or 4CL.
(2) Chemistry: Natural Science 2D-DL-F-FL; or Science 3A-AL-B-BL.
(3) Biology: Natural Science 2E.
(4) Mathematics: Mathematics 2D-E or 2DA-EA.

(b) Upper division:
(1) Physics: 100A-B-C, 110A, 120A-B, 130A-B, 131, 153.
(2) Chemistry: Chemistry 131, 140A-B, 143A.
(3) Biology: Biology 101 or 110X, 102, 106, 117.
(4) Mathematics: Mathematics 110A.
(5) Restricted Elective: Mathematics 120 is recommended.

(c) Suggested Schedule:

FALL	WINTER	SPRING
Junior Year		
Physics 100A	Physics 100B	Physics 100C
Physics 110A	Math 110A	Physics 120A
Biology 101	Restricted Elective	Biology 117
Senior Year		
Physics 130A	Physics 130B	Biology 102
Physics 120B	Physics 131	Biology 106
Chemistry 140A	Chemistry 140B	Physics 153
Chemistry 143A	Chemistry 131	

Physics Major with Specialization in Earth Sciences The upper-division program consists of the standard physics major augmented by Earth Sciences 101, 102, 103, 120, and SIO 256A. If necessary, the senior physics laboratory requirements may be modified by arrangement with the department. See "Earth Sciences."

Noncontiguous Minor in Physics (Revelle College) Students majoring in fields other than the sciences may arrange noncontiguous minor programs in physics by consulting with the Department of Physics. Examples of such programs are the following:

1. Mathematics 2D, 110A; Physics 110A, 130A-B-C
2. Mathematics 2D, 110A; Physics 110A, 130A, 160, 161
3. Mathematics 2D-E; Physics 100A-B-C, 120A
4. Mathematics 2D-E; Physics 110A-B, 140A-B.

Because of the large number of mathematics prerequisites required for physics courses, students who elect noncontiguous minors in the field of physics find it desirable to supplement the noncontiguous minor by devoting some of their free elective time to additional courses in physics.

The Graduate Program

The Department of Physics offers curricula leading to the Master of Science and Doctor of Philosophy degrees.

Entering graduate students are required to have a sound knowledge of undergraduate mechanics, electricity and magnetism; to have had senior courses or their equivalent in atomic and quantum physics, nuclear physics, and thermodynamics; and to have taken upper-division laboratory work. An introductory course in solid-state physics is desirable.

Master's Degree Program Requirements for the Master of Science degree can be met according to Plan II (comprehensive examination). (See "Graduate Studies: The Master's Degree.") The comprehensive examination is identical to the first-year written examination for Ph.D. students. A list of acceptable courses is available in the Department of Physics office. There is no foreign language requirement.

Doctoral Degree Program The Ph.D. program consists of three components: graduate courses, apprenticeship in research, and thesis research. In addition, opportunitites for teaching are provided. The department has developed a flexible program which provides a broad, advanced education in physics while at the same time giving students opportunity for emphasizing their special interests.

Entering students are assigned a faculty adviser to guide them in their program. Many students spend their first year as teaching assistants or fellows and begin apprentice research in their second year. After two years of graduate study, or earlier, they complete the departmental examinations and begin thesis research. Typically, thesis work takes two or three years. There is no foreign language requirement.

Entrance Testing An entrance test covering undergraduate physics is given to entering graduate students during registration week, for the purpose of enabling the faculty to give them better guidance in their graduate work. Performance on this test has no bearing on the students' status in graduate school.

First-Year Written Examination Students are required to take a written examination after completing one year of graduate work at UC San Diego. The examination is on the level of material usually covered in undergraduate courses and the following first-year graduate physics courses. It is offered twice a year, at the beginning of the fall and spring quarters, and lasts two days, four hours per day. The examination may be repeated once, the next time it is offered.

First Year Graduate Courses

Fall:
Physics 200A (Theoretical Mechanics)
Physics 203A (Adv. Classical Electrodynamics)
Mathematics 210A (Mathematical Methods)

Winter:
Physics 200B (Theoretical Mechanics)
Physics 212A (Quantum Mechanics)
Mathematics 210B (Mathematical Methods)

Spring:
Physics 203B (Adv. Classical Electrodynamics)
Physics 212B (Quantum Mechanics)
Mathematics 210C (Mathematical Methods)

Second-Year Oral Examinations
Students are required to take two oral examinations after completing two years of graduate work or earlier.

General The general oral examination, administered by a faculty committee, tests general mastery of advanced physics. Students are asked to indicate areas in which they have special competence and are questioned more intensively in these areas. The examination is offered twice a year, at the beginning of the fall and spring quarters, and lasts approximately one hour.

This examination will be waived for students who obtain credit (C or better) in six advanced courses selected from the following groups, provided that they obtain at least a 3.0 average in five out of the six. The selection must include all of Group I.

Second-Year Graduate Courses

Group 1 (3)
Physics 212C (Quantum Mechanics) Fall
Physics 210A (Statistical Mechanics) Fall
Physics 210B (Statistical Mechanics) Winter

Group 11: (3)
Physics 206 (Biophysics) Winter
Physics 211 (Solid State Physics) Spring
Physics 213 (Theoretical Nuclear Physics) Winter
Physics 215 (High Energy Nuclear Physics) Spring
Physics 216 (Atomic and Molecular Theory) Fall
Physics 218A (Plasma Physics) Winter
Physics 219 (Astrophysics) Fall

Oral Presentation of a Topic This examination is held two weeks following the general oral examination and lasts approximately one hour. Three topics of current interest in physics, together with relevant references, are made available to students. Each student presents to a faculty committee a one-half hour talk on the topic he or she has chosen. This is followed by approximately one-half hour of questioning related to the topic.

The oral examinations may be repeated once the next time they are offered.

Qualifying Examination After students have passed the departmental examinations, they should obtain a faculty research supervisor. When they are ready to demonstrate their ability to engage in thesis research, they may take the qualifying examination.

Thesis Defense When students have completed their thesis, they are asked to present and defend it before their doctoral committee.

Advanced Courses and Seminars In addition to the above-listed basic courses, the department offers a weekly general departmental colloquium, advanced courses for students doing specialized research, and seminars in the main departmental areas of interest. Students are strongly urged to enroll for credit in appropriate advanced courses and seminars.

Course Credit by Examination
Students have an option of obtaining credit for a physics graduate course by taking the final examination without participating in any class exercises. They must, however, officially register for the course and notify the instructor and the department office of their intention no later than the first week of the course.

Courses

Lower Division

Most of the lower-division physics courses are incorporated in the science sequences of the colleges. The Department of Physics is responsible for the teaching of physics in the natural science sequence of Revelle College, the science and technology sequence of Third College, and the scientific perspectives and the materials science programs of Fourth College. (The physics part of the science sequence of Muir College, 4A-B-C, is the responsiblity of the Department of Applied Physics and Information Science.)

The Physics 2 sequence has the same syllabus as the Natural Science 2 sequence but begins one quarter earlier; it is primarily for life science majors. The Physics 3 sequence is particularly recommended for students majoring in physical science or engineering.

NS1D-1DL-1E-1EL. Physics
See Course Listings: *Nautral Sciences*

NS2A-2B-2C. Physics
See Course Listings: *Natural Sciences*

2A. Physics (4)
An introduction to natural phenomena which can be understood in terms of the physical sciences is followed by the study of particle motion. Applications are made to astronomy and to the structure of matter. *Prerequisites: Mathematics 2A and concurrent registration in Mathematics 2B.* (F)

2B. Physics (4)
A continuation of Physics 2A to the electrical effects of stationary and moving charges, time-dependent fields, and waves. *Prerequisites: Mathematics 2B and concurrent registration in Mathematics 2C.* (W)

2C. Atomic Physics (4)
The study of waves is followed by an introduction to the quantum theory as applied to atoms and their radiation. The exclusion principle is used to study the chemistry and physics of atoms. The course includes a 2-hour laboratory which covers the physics of 2A, 2B, and 2C. *Prerequisite: Mathematics 2C.* (S)

3A. Physics (4)
First quarter of a physics sequence which provides a solid foundation in physics; it is particularly recommended for students majoring in physical science or engineering. Measurement, vectors, motion in one dimension, motion in a plane, particle dynamics, work and energy, conservation of energy, conservation of momentum, collisions, rotational kinematics, rotational dynamics, equilibrium of rigid bodies. *Prerequisite: Mathematics 2A or equivalent, or consent of instructor.* (F)

3B. Physics (4)
Simple harmonic motion, complex numbers, resonance, linear systems, fluid mechanics, waves in elastic media, sound waves, geophysical waves, Huygen's principle, geometrical optics, coherence (lasers), interference, diffraction, holography, polarization. *Prerequisites: Physics 3A, Mathematics 2B or equivalent, or consent of instructor.* (W)

3C. Physics (4)
Gravitation, charge and matter, electric field, Gauss's law, electric potential, capacitators and dielectrics, current and resistance, electromotive force and circuits, magnetic field, Ampere's law, Faraday's law, inductance, magnetic properties of matter, electromagnetic oscillation and circuits. The course includes a three-hour laboratory. *Prerequisites: Physics 3B, Mathematics 2C or equivalent, or consent of instructor.* (S)

3D. Physics (4)
Maxwell's equations, electromagnetic waves, Michelson-Morely experiment, special relativity, Lorentz transformation, four-vectors, relativistic momentum and energy, particle aspects of electromagnetic radiation, wave aspects of material particles, wave function and probabilistic interpretation, Schrodinger equation, square well, barrier penetration, history of hydrogen atom problem. Schrodinger solution of hydrogen atom problem. The course includes a three-hour laboratory. *Prerequisite: Physics 3C.* (F)

5. The Skies (4)
Introductory descriptive (non-mathematical) account of modern astronomy, with emphasis on what is observed and on the development of ideas. The earth's place in the universe, the sun, the birth, life and death of stars, galaxies and cosmology. (W)

Science and Technology 10C. Physics
See Course Listings: *Science and Technology*

Science and Technology 11C. Physics
See Course Listings: *Science and Technology*

Science and Technology 15A-B-C. Physics
See Course Listings: *Science and Technology*

31A-B-C. The Perspective of Physics (4-4-4)
An introduction to physics both classical and modern with the development where required of mathematics. Primary emphasis will be placed on learning the way a physicist deals with the natural world by studying the development of physics, its interaction with other intellectual disciplines, and the analysis of simple situations. The limitation and value of the physicist's analysis will be discussed together with the impact of physical thought and its successes on other fields. Three hours lecture. (F,W,S)

Upper Division

(See also Course Listings: **Frontiers of Science**)

100A. Electromagnetism (4)
Coulomb's law, electric fields, electrostatics; conductors and dielectrics; steady currents, elements of circuit theory. Four hours lecture. *Prerequisite or co-registration: Mathematics 2D.* (F)

100B. Electromagnetism (4)
Magnetic fields and magnetostatics, magnetic materials, induction; AC circuits; displacement currents; development of Maxwell's equations. Three hours lecture. *Prerequisite: Physics 100A: prerequisite or co-registration: Mathematics 2E.* (W)

100C. Electromagnetism (4)
Electromagnetic waves, radiation theory; application to optics; motion of charged particles in electromagnetic fields; relation of electromagnetism to relativistic concepts. Four hours lecture. *Prerequisite: Physics 100B.* (S)

110A. Mechanics (4)
Mechanics of systems of particles; conservation laws; planetary motion; linear oscillators; statics and dynamics of plane rigid bodies. Four hours lecture. *Prerequisite or co-registration: Mathematics 2D.* (F)

110B. Mechanics (4)
Special relativity: Lagrange's and Hamilton's equations; small oscillations of coupled systems; non-inertial frames; general motion of rigid bodies. Four hours lecture. *Prereq-*

uisite: Physics 110A; prerequisite or co-registration: Mathematics 2E. (W)

116. Properties of Solid State (4)
The binding mechanism of various classes of materials. The periodic table, molecular bonds, free electron theory of metals, band theory, Hume-Rothery and other empirical rules. Properties of ionic, covalent, and metallic solids. Categories of useful materials: metals, alloys, ceramics, composites under diverse conditions. Three hours lecture. *Prerequisites: Mathematics 2A-2E, and a lower division physics-chemistry sequence.* (F)

120A-B-C. Physical Measurements (4-4-4)
A laboratory-lecture course covering the basic elements in physical measurements, with emphasis on electronic methods. The lecture will provide an introduction to circuit theory and error analysis. Three hours lecture, four hours laboratory. (S,F,W)

125. Electrical and Magnetic Materials (4)
Dielectrics (including ferroelectrics), conductors, semiconductors, liquid crystals, superconductivity, magnetism. Applications of materials in modern technology. *Prerequisites: Physics 116.* (F)

130A. Quantum Physics (4)
Atomic physics in the nineteenth century; radioactivity, Rutherford experiments; Bohr model, optical spectra, X-ray spectra, electron spin, vector model. Four hours lecture. *Prerequisites: Mathematics 110A or equivalent, Physics 100A-B-C or equivalent, Physics 110A or other upper division physical science course.* (F)

130B. Quantum Physics (4)
Atomic structure according to wave mechanics; Schrodinger equation for hydrogen-like atoms; Pauli principle, Heisenberg principle; particle in a periodic potential. Four hours lecture. *Prerequisite: Physics 130A.* (W)

130C. Quantum Physics (4)
Elementary nuclear physics, quantum mechanics of radiation; elementary particles and scattering. Three hours lecture. *Prerequisites: Physics 100C, 130B.* (S)

131. Modern Physics Laboratory (2)
Experiments in radioactivity, X-rays, atomic physics, resonance physics, solid-state physics, etc. One hour lecture, four hours laboratory. *Prerequisite: Physics 130A.* (W)

132. Modern Physics Laboratory (2)
Experiments in atomic physics, optics, physical electronics, fluid dynamics, surface physics, etc. One hour lecture, four hours laboratory. *Prerequisites: Physics 130A-B.* (S)

140A-B. Thermal Physics (4)
Thermodynamics, including the first, second and third laws; thermodynamic potentials: phase transitions; applications to low-temperature physics, radiation and chemical reactions. Elementary statistical mechanics, probabilistic interpretation of entropy fluctuation phenomena, transport phenomena. Four hours lecture. *Prerequisite: Physics 110A.* (F,W)

150. Continuum Mechanics (4)
Mechanics of continuous media; waves, instabilities, applications to earth sciences, oceanography, and aerodynamics. Three hours lecture. *Prerequisite: Physics 110B.* (S)

151. Plasma Physics (4)
Particle motions, plasmas as fluids, waves, diffusion, equilibrium and stability, nonlinear effects, controlled fusion. *Prerequisites: Physics 100A-B, 110A.* (S)

152. Introduction to Solid-State Physics (4)
Crystal symmetry, free electron gas, band structure, properties of insulators, semiconductors and metals; atomic diffuslon, alloys, electronic transport phenomena. Four hours lecture. *Prerequisites: Physics 130B, 140B.* (S)

153. Topics in Biophysics (4)
Discussion of physical probes used to explore the relation between structure and function of biomolecules. Course content varies yearly. Three hours lecture. *Prerequisite: upper division standing in biology, chemistry, or physics, or consent of instructor.* (S)

160. Survey of Astronomy and Astrophysics (4)
Introduction to modern astronomy and astrophysics. Three hours lecture. *Prerequisite: Physics 110A.* (F)

161. Astrophysics (4)
The physics of stars, interstellar matter, and stellar systems. Three hours lecture. *Prerequisites: Physics 130A, 160.* (W)

162. Astrophysics (4)
Continuation of Physics 161. Three hours lecture. *Prerequisites: Physics 130B, 140B, 161.* (S)

170. Advanced Laboratory (2)
Experimental study of a special problem in optics, cryogenics, resonance physics, nuclear physics, etc., using existing apparatus or developing new apparatus, or both. Hours by arrangement. *Prerequisites: Physics 131 or 132.* Not offered 1976-77. (S)

171. Advanced Electronic Laboratory (4)
Electrical networks, vacuum tube and solid-state electronics, analysis and design, and components. Power supplies. Amplifiers, noise and feedback, oscillators, digital and logic circuits, microwaves and special topics. Emphasis on applications to physical research. Six hours. *Prerequisite: consent of instructor.* Not offered 1976-77. (F)

180. The Physics of Music (4)
Acoustics; mechanical production of sound (musical instruments, auditorium design); high-fidelity reproduction (linear transducers and amplifiers, recording and playback devices); electronic production of sound (non-linear amplifiers, sound synthesizers). Three hours lecture. *Prerequisites: freshman calculus, mechanics, electricity and magnetism.* (S)

182. Atmospheric Physics and the Physics of Flight (4)
The application of basic physical principles to a study of the earth's atmosphere and to aircraft flight and operations in the earth's atmosphere. Three hours lecture. *Prerequisites: Natural Science 1D-E or Natural Science 2A-B or Science 4A-B-C.* (S)

195. Physics Instruction (2)
Students will be responsible for and teach a class section of a lower-division physics course. They will also attend a weekly meeting on teaching methods and materials conducted by the professor who supervises their teaching. *Prerequisite: consent of instructor.* (F,W,S)

198. Directed Group Study (2 or 4)
Directed group study on a topic or in a field not included in the regular departmental curriculum. *Prerequisite: consent of instructor and departmental chairman.*(F,W,S)

199. Special Project (2 or 4)
Independent reading or research on a problem by special arrangement with a faculty member. *Prerequisite: consent of instructor and departmental chairman.* (F,W,S)

Graduate

200A. Theoretical Mechanics (4)
Lagrangian mechanics with application to linear and nonlinear motion in inertial and non-inertial frames. (F)

200B. Theoretical Mechanics (3)
Variational principles, Hamilton's equations and Hamilton-Jacobi theory. Special relativity. Rigid body and continuum mechanics. *Prerequisite: Physics 200A.* (W)

203A. Advanced Classical Electrodynamics (3)
The boundary value problems of electrostatics and the electrostatics of macroscopic media, magnetostatics and the properties of magnetic materials, currents in extended media, macroscopic properties of superconductors, electromagnetic induction and quasi-static phenomena. Maxwell theory and wave propagation. *Prerequisite: Physics 100C or equivalent.* (F)

203B. Advanced Classical Electrodynamics (4)
Application of Maxwell's equations to radiating systems and boundary value problems, such as wave guides and diffraction phenomena; relativistic electrodynamics; radiation by moving charges; classical electron theory; nonlinear phenomena. *Prerequisites: Physics 100C or equivalent; Physics 203A.* (S)

206. Topics in Biophysics and Physical Biochemistry (3)
Application of physical methods to biochemistry, e.g., X-ray diffraction, optical rotary dispersion and circular dichroism, magnetic resonance. (Same as Chemistry 206.) *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (W)

210A-B. Statistical Mechanics (3-3)
Systems of weakly interacting elements; ensemble theory; applications to gases, plasmas, and liquids; elements of theory phase transitions; fluctuations and non-equilibrium processes. *Prerequisites: Physics 140A-B, 152 or equivalent; Physics 212B.* (F,W)

211. Solid-State Physics (4)
Basic graduate course in solid-state physics, dealing with topics such as lattice dynamics, magnetism in insulators, electronic band structure, transport phenomena and electrodynamics in metals, optical properties. *Prerequisite: Physics 152 or equivalent.* (S)

212A-B. Quantum Mechanics (4-4)
Physical basis of quantum mechanics, the Schrodinger equation and the quantum mechanics of one-particle system, matrices and the transformation theory of quantum mechanics, approximation methods for discrete stationary states, translational and rotational invariance, angular momentum and spin, theory of scattering, approximation methods in the continuum and for time-dependent problems and the quantum theory of atomic structure. *Prerequisite: Physics 130B or equivalent.* (W,S)

212C. Quantum Mechanics (4)
Many-particle systems, second quantization and application to nonrelative many-body problems, relativistic quantum theory. *Prerequisite: Physics 212B.* (F)

213. Theoretical Nuclear Physics (3)
Basic phenomenology of strong interactions; two-and three-nucleon systems; weak and electromagnetic interactions of nucleons; thermonuclear reactions; nuclear systematics, models of nuclear structure, particle-transfer reactions, fission; introductory BCS pairing and nuclear matter theory. *Prerequisites: Physics 130C or equivalent, Physics 212C.* (W)

215. High-Energy Nuclear Physics (3)
An introduction to the elementary particles with particular emphasis on the invariance principles by which they are classified. *Prerequisite: Physics 212C.*

216. Atomic and Molecular Physics (3)
Structure of atoms, the Hartree-Fock method, correlation energy and relativistic corrections. Structure of molecules, the Born-Oppenheimer method, the molecular electronic state, the stability and build-up of molecules, molecular orbital theory. The interaction of atoms and molecules with external fields. Atomic and molecular collisions. *Prerequisite: Physics 212A.*

218A. Plasma Physics (3)
The basic physics of plasmas is discussed for the simple case of an unmagnetized plasma. Topics include: thermal equilibrium statistical properties, fluid and Landau theory of electhon and ion plasma waves, velocity space instabilities, quasi-linear theory, fluctuations, scattering of radiation, Fokker-Planck equation. (W)

218B. Plasma Physics (3)
This course deals with the magnetized plasma. Topics include: Appleton-Hartree theory of waves in cold plasma, waves in warm plasma (Bernstein waves, cyclotron camping), MHD equations, MHD waves and shocks, MHD theory of equilibrium and stability (interchange instability), adiabatic invariants and drift model of interchange instability, drift waves. *Prerequisite: Physics 218A.* (S)

219. Introductory Astrophysics (3)
Fundamentals of radiative transfer; theory of gray and non-gray stellar atmospheres; Eddington's approximation, principles of invariation. Formation of absorption lines, curve of growth, resonance radiation. Convection theory. Stellar structure: polytropes, nuclear reactions, stellar models. Stellar evolution. *Prerequisites: Physics 130C, 140B, or equivalent.* (W)

220. Group Theoretical Methods in Physics (3)
Study of the representations and applications of groups to problems in physics, with particular emphasis on the permutation of unitary groups. *Prerequisite: Physics 212C.* (Satisfactory/Unsatisfactory grades permitted.) (F)

221. Advanced Mechanics (3)
Advanced topics such as general relativity, hydrodynamics and shock waves, elasticity. *Prerequisite: Physics 200B.* (Satisfactory/Unsatisfactory grades permittted.) Not offered 1976-77. (S)

222. Advanced Nuclear Physics (3)
Topics of current interest. Examples: ambiguities in the nuclear two-body problem, three-nucleon systems and Faddeev equations, recent developments in the theory of nuclear matter and finite nuclei, exotic nuclei. *Prerequisite: Physics 213.* (Satisfactory/Unsatisfactory grades permitted.) Not offered 1976-77. (S)

223A. Advanced Astrophysics (3)
Theory and observation of white dwarfs, degenerate matter. Interstellar matter: theory and observation of emission lines and continua; thermal energy balance. The Crab Nebula; synchrotron radiations; Fermi acceleration, X-ray, optical and radio flux spectra. Other topics of current interest. *Prerequisite: Physics 219.* (Satisfactory/Unsatisfactory grades permitted.) (W)

223B. Advanced Astrophysics (3)
Kinematical and dynamical properties of the galaxy; spiral structure; stellar dynamics; masses and rotation of galaxies; theory and observation of galactic nuclei, radiogalaxies; evolution of the universe; observational cosmology, cosmic blackbody radiation; other topics of current interest. *Prerequisite: Physics 223A.* (Satisfactory/Unsatisfactory grades permitted.) (S)

224. Advanced Quantum Mechanics (3)
Covariant perturbation theory, mass and charge renormalization of quantum electrodynamics, radiative corrections to scattering and atomic energy levels, introduction to dispersion theory. *Prerequisite: Physics 212C.* (Satisfactory/Unsatisfactory grades permitted.) Not offered 1976-77. (F)

225A-B. General Relativity and Cosmology (3-2)
The principle of covariance, tensors and tensor transformations in special relativity; the principle of equivalence; tensor calculus; foundations of general relativity, applications and tests of the theory, gravitational waves;

applications in cosmology and observational tests of cosmological theories. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (W,S)

230A. Advanced Solid-State Physics (3)
A sequel to Physics 211 for students intending to specialize in solid-state physics and related subjects. Examples of topics to be covered are electron-electron and electron-phonon interactions, superconductivity, Landau theory of Fermi liquids, surfaces, disordered systems. *Prerequisite: Physics 211.* (Satisfactory/Unsatisfactory grades permitted.) (F)

230B. Advanced Solid-State Physics (3)
Selection of topics of current interest. Examples: Magnetic and electric resonances, surface physics, superconductivity, ferroelectrics, disordered systems, phase transitions, liquid helium, ferromagnetism. Topics given in this course may vary from year to year. *Prerequisite: Physics 211.* (Satisfactory/Unsatisfactory grades permitted.) (W)

231. Collision Theory (3)
Collision theory and its application to atomic and molecular processes. Description of collision processes, scatterings and resonances in composite systems. Rearrangement collisions and the methods of approximation. *Prerequisites: Physics 212A-B.* (Satisfactory/Unsatisfactory grades permitted.) (S)

232. Advanced Plasma Physics (3)
An advanced course treating topics of current research interest, such as; weak turbulence theory, fusion, diagnostic techniques, etc. *Prerequisites: Physics 218A-B.* (Satisfactory/Unsatisfactory grades permitted.) (F)

233. Elementary Particle Theory (4)
Current problems in elementary particle theory, especially the theory of strong interactions. *Prerequisite: Physics 215.* (Satisfactory/Unsatisfactory grades permitted.) (F)

234. High-Energy Experimental Physics (4)
Current elementary particles research. Techniques used in experiments with high-energy accelerators. *Prerequisite: Physics 215.* (Satisfactory/Unsatisfactory grades permitted.) (S)

236. Many-Body Theory (4)
Effects of interactions in large quantum mechanical systems at zero or finite temperature analyzed from a unified viewpoint. Symmetries, conservation laws, perturbation theory, sum rules, inequalities. Applications to Bose, Fermi, normal, superfluid, charged, neutral, degenerate, dilute, etc. systems. *Prerequisites: Physics 210A-B, 212C.* (Satisfactory/Unsatisfactory grades permitted.) (S)

239. Special Topics (1-2)
From time to time, it will be possible to give a self-contained short course on an advanced topic in special areas of research. (Satisfactory/Unsatisfactory grades permitted.)

250. Solid-State and Cryogenics Physics Seminar (0-1)
Discussions of current research in solid-state physics. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

251. High-Energy Physics Seminar (0-1)
Discussions of current research in nuclear physics, principally in the field of elementary particles. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

252. Plasma Physics Seminar (0-1)
Discussions of recent research in plasma physics. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

253. Astrophysics and Space Physics Seminar (0-1)
Discussions of recent research in astrophysics and space physics. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

254. Atomic and Molecular Physics Seminar (0-1)
Discussions of current research in atomic and molecular structures and collisions. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

255. Theoretical Solid-State Seminar (0-1)
Discussions of current research in theoretical solid-state physics. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

256. Experimental Solid-State Physics Seminar (0)
Discussions of current research in experimental solid-state physics and biophysics. (F,W,S)

257. High-Energy Physics Special Topics Seminar (0)
Discussions of current research in high-energy physics. (F,W,S)

258. Astrophysics and Space Physics Special Topics Seminar (0)
Discussions of current research in astrophysics and space physics. (F,W,S)

260. Physics Colloquium (0-1)
Discussions of recent research in physics directed to the entire physics community. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

285. Seminar in National Security for Science Students (3)
The course will consist of two parts: first, a presentation of what our national security policy is, and second, a discussion of how various current science and technology programs and policies relate to it. (Satisfactory/Unsatisfactory grades permitted.) Not offered 1976-77. (W)

298. Independent Study (1-4)
Prerequisite: consent of instructor and departmental chairman. (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

299. Research in Physics (1-12)
(Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

Physiology and Pharmacology

OFFICE: 2042 Basic Science Building

Professors:

Samuel H. Barondes, M.D. *(Psychiatry)*
Eugene F. Bernstein, M.D., Ph.D. *(Surgery)*
Colin M. Bloor, M.D. *(Pathology)*
Theodore H. Bullock, Ph.D. *(Neurosciences)*
John W. Evans, M.D., Ph.D. *(Mathematics)*
Darrell D. Fanestil, M.D. *(Medicine)*
Morris E. Friedkin, Ph.D. *(Biology)*
Arnost Fronek, M.D., Ph.D. *(Bioengineering)*
Harold T. Hammel, Ph.D. *(Physiology)*
Nathan O. Kaplan, Ph.D. *(Chemistry)*
Allen Lein, Ph.D. *(Reproductive Medicine)*
Arnold J. Mandell, M.D. *(Psychiatry)*
Steven E. Mayer, Ph.D. *(Medicine, Co-Chairman, Group in Physiology and Pharmacology)*
John Ross, Jr., M.D. *(Medicine)*
S. Jonathan Singer, Ph.D. *(Biology)*
Charles E. Spooner, Ph.D. *(Neurosciences)*
Daniel Steinberg, M.D., Ph.D. *(Medicine)*
John B. West, M.D., Ph.D. *(Medicine, Co-Chairman, Group in Physiology and Pharmacology)*
Henry O. Wheeler, M.D. *(Medicine)*

Benjamin W. Zweifach, Ph.D. *(Bioengineering)*

Associate Professors:
James W. Covell, M.D. *(Medicine and Bioengineering)*
David J. Faulkner, Ph.D. *(Chemistry)*
Dean L. Franklin *(Adjunct, Medicine)*
Palmer W. Taylor, Ph.D. *(Medicine)*

Assistant Professors:
Stephen R. Gross, Ph.D. *(Medicine)*
Joanne S. Ingwall, Ph.D. *(Medicine)*
Morton P. Printz, Ph.D. *(Medicine)*
James T. Stull, Jr. *(Medicine)*

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The Graduate Program The graduate program leads to the Ph.D. degree in one or both of the following aspects of the life sciences: (1) the function and metabolism of cells, organs and organ systems; (2) the fundamental mechanisms of action of drugs, their effectiveness and their use in better understanding of biochemical, physiological and pathological processes. Students are encouraged to design and execute investigations in a self-critical and independent manner and to develop proficiency as teachers. Entrance requirements are flexible. Undergraduate preparation should include courses in calculus, organic chemistry, physical chemistry and biochemistry.

Doctoral Degree Program During the first two years of graduate study, the student will be required to take basic courses in biochemistry, physiology and pharmacology and to participate in a laboratory rotation program so that he or she can become familiar with the research activities of the faculty. Additional course work will depend upon the student's interests and the direction of the thesis project. The student is expected to have chosen such a project and to have taken qualifying examinations by the end of the second year of graduate studies.

The graduate program is interdepartmental and interdisciplinary; it involves faculty of the Departments of Biology, Chemistry, Medicine, Neurosciences, Psychiatry, the Bioengineering Group and Scripps Institution of Oceanography. Specialized research fields are the physiology of respiration and temperature regulation, cardiovascular physiology and pharmacology (including bioengineering approaches to these disciplines), neurotransmitter metabolism, metabolism of specialized tissues, chemotherapy and drug action at the molecular and biochemical levels.

The graduate program in physiology and pharmacology is designed also to educate physician-scientists. The flexibility of this program and that of the School of Medicine permits students admitted to both degree programs to obtain an M.D. and a Ph.D. in about six years.

Examinations Students obtain letter grades in the program's basic courses. At the end of the second year, candidacy for the Ph.D. degree is determined by a two-part examination. The first part tests student competence and ability to design a pertinent research problem in an area unrelated to his or her major interest; the second deals with the dissertation problem. After preparing the dissertation, an oral defense of the thesis completes the requirement for the Ph.D. degree.

Teaching Teaching experience is an important part of the program. Students direct laboratory exercises and discussion sections of the School of Medicine core courses.

Courses

204A. Cell Biology (4)
This provides graduate students with sophisticated understanding of molecular and cellular principles pertaining to human biology and medicine. The course covers cytogenic and molecular aspects of inheritance; intracellular metabolism; properties and functions of macromolecules; microbial physiology and introductory virology; organization of membrane systems and their functions in transport nerve stimulation, and basic aspects of immunology. *Prerequisite: consent of instructor.* (F)

204B. Introductory Biochemistry (3)
A comprehensive course in introductory biochemistry. The course is intended for entering graduate students, including those who have not had a formal course in biochemistry. *Prerequisites: physical and organic chemistry, consent of instructor.* (F)

204C. Human Biochemistry (2)
An advanced course in biochemistry which will primarily deal with the molecular basis of human disorders. *Prerequisites: Chemistry 211 or its equivalent, consent of instructor.* (F)

204L. Cell Biology and Biochemistry (3)
A variety of laboratory projects for first-year medical students and graduate students. *Prerequisite: consent of instructor.* (F)

205. Basic Neurology (9)
Interdisciplinary survey of structure, function, chemistry and pharmacology of normal human nervous system emphasizing neurological mechanisms underlying development, sensory and motor capabilities and higher nervous processes. *Prerequisites: P/P 206 or equivalent and consent of instructor.* (S)

205L. Basic Neurology Laboratory (2)
Interdisciplinary survey of structure, function, chemistry and pharmacology of the normal human nervous system, emphasizing neurological mechanisms underlying devel-

opment, sensory and motor capabilities and higher nervous processes. *Prerequisites: Phys/Pharm 206 or equivalent and consent of instructor.* (S)

206. Organ Physiology and Pharmacology (12)
Medical physiology, pharmacology and elements of histology are introduced. Basic functions of the major organ systems and their interaction in man are studied. Major topics include: general principles of drug action, fluid balance and electrolyte metabolism, blood, heart and circulation, respiration, renal function, etc. *Prerequisites: Phys/Pharm 204 or equivalent and consent of instructor.* (W)

206L. Organ Physiology and Pharmacology, Laboratory Course (3)
Selected laboratory exercises demonstrating basic principles of pharmacology and organ physiology. Electrocardiography, hemodynamics, myocardial control mechanisms, renal function, gastrointestinal function, dose-response relationships in pharmacology, autonomic mechanisms and other aspects of physiology and pharmacology are illustrated in laboratory setting. *Prerequisites: Phys/Pharm 204 or equivalent and consent of instructor.* (W)

209. Endocrinology, Reproduction and Metabolism (5)
An integrated introduction to the physiology and pharmacology of the endocrine and reproductive systems in man, followed by a review of metabolic regulation and nutrition. An overview of the endocrine system is presented. Regulation of hormone secretion, mechanisms of hormonal action and clinical implications are discussed. The basic aspects of the biology of reproduction are covered in detail, including discussion of human embryology, endocrine control, the reproductive cycle and facets of population dynamics. Finally, metabolic regulation is reviewed, with emphasis on endocrine influences and related nutritional problems are discussed (energy balance, temperature regulation, obesity, diabetes mellitus, hypercholesterolemia). Pharmacologic agents influencing the endocrine and reproductive systems are reviewed, including the use of hormones as drugs. *Prerequisites: P/P 206 or equivalent and consent of instructor.* (S)

221. Selected Topics in Cardiovascular Instrumentation (2)
Basic principles of the design and use of modern cardiovascular instrumentation techniques — both laboratory and clinical — are discussed in a series of 12 seminars dealing with different problems in the cardiovascular area. Topics will range from electronic monitoring and display systems, to video and x-ray procedures, to system analysis and outline computational methods. *Prerequisites: P/P 206 and 206L and consent of instructor.* (S)

222. Introduction to the Cardiovascular Sciences (1)
An introduction to the basic and clinical sciences pertinent to cardiology. The seminar group will use "heart failure" as a central theme from which to explore biochemistry, physiology, pharmacology and histology as they relate to the diagnosis and treatment of cardiovascular disease. Open to 6 to 20 students. *Prerequisite: OPP and the consent of the instructor.* (S)

223. Metabolic Basis of Inherited Disease (2)
A brief introductory review of patterns of inheritance and cytogenetics followed by detailed consideration of the biochemical abnormalities and their phenotypic expression as disease. Discussion of biochemical methods for localizing enzyme defects and biological and physiological characterization of disordered metabolism. *Prerequisites: P/P 204 and 204L or permission of instructor.* (S)

224. Advanced Medical Pharmacology and Therapeutics (3)
The course is designed to complement the pharmacology taught in the core curriculum, by introduction of new topics and more advanced study of major areas such as anesthetics, analgesics, anti-inflammatory agents. *Prerequisites: P/P 206 and 206L and permission of instructor.* (S)

224S. Advanced Medical Pharmacology and Therapeutics (1)
Small group discussion of topics covere d in the lectures in 224. Students will review specific areas of research or therapeutic interest. Limited to 10 students. (S)

225. The Mechanics and Energetics of Cardiac Contraction (2)
The mechanics of cardiac muscle contraction and those factors which determine the energy requirements for contraction will be discussed in depth. Students will be required to review and present pertinent discussions on current literature relating to these subjects. *Prerequisites: P/P 206 and 206L.* (S,F)

226. Respiration Physiology (3)
This course is devoted to aspects of respiratory physiology that are not covered in Physiology/Pharmacology courses 206 and 206L. These include atmospheric pollutants, comparative physiology of gas exchange, and environmental physiology of respiration including diving physiology and liquid breathing. *Prerequisites: P/P 206.* (S)

228. Advanced Cardiovascular Physiology (1)
This course surveys cardiovascular physiology with the emphasis on structure, mechanics and energetics of cardiac muscle. An introduction to the theoretical basis of and fundamental approach to research problems in cardiovascular physiology is provided. *Prerequisites: P/P 206 and 206L and consent of instructor.* (F,S,W)

229. Molecular & Biochemical Pharmacology (2)
An examination of the molecular and biochemical bases of drug action. The course in the spring quarter is directed towards drug action in relation to intermediary metabolism, mediators of smooth muscle responses, drug metabolism, chemical carcinogenesis, principles of chemotherapy and selective toxicity. *Prerequisite: course in biochemistry.*

230. Neuro/Pharm (2)
An examination of the molecular and biochemical bases of drug and neurotransmitter action. The fall quarter course is devoted to receptor mechanisms, neuropharmacology and drug action on excitable tissues. *Prerequisite: course in biochemisty.*

241. Methods in Physiology and Pharmacology (2)
Topics will include biochemical procedures, subcellular fractionation, elementary principles of electronics and circuits, techniques in radioisotope usage and isolated muscle mechanics. The course will consist of one 2 hour lecture and one 3 hour laboratory or demonstration. *Prerequisites: Enrolled in Phys/Pharm 204A, 204B, 204C.*

248. Introduction to Drug Action and Pharmacology (3)
An introductory study of the actions of drugs and chemicals on animals (including humans) in modifying the physiological responses of tissues in isolation and *in situ*. This course is particularly appropriate for students electing a Health Science or Human Biology major and as an introductory course for graduate students. *Prerequisite: consent of instructor.* (F)

253. Advanced Renal Physiology-Pharmacology (2)
The course will consist of an in-depth analysis of renal physiology and pharmacology with emphasis on the most recent advances in the area. The subject matter will be presented *via* lectures by the instructors (2 hrs./week) and presentation of assigned topics by the students. *Prerequisite: School of Medicine 206 or consent of instructor.* (W)

264. Poisons—Natural and Man-made—and their Mechanisms of Action (3)
An introduction to the effects of environmental agents on biologic systems, particularly emphasizing effects on humans. Emphasis will be placed on the biochemical mechanisms by which toxic agents affect organisms, and these mechanisms will be correlated with physiologic changes. Three hours lecture, 1 hour discussion. *Prerequisites: Biology 106, 110A, 144 or consent of instructor.* (s)

296. Directed Reading (1-4)
Reading of special topics under the direction of a faculty member. Exact subject matter to be arranged in individual cases. *Prerequisite: consent of instructor.*

297. Graduate Seminar (1)
For first-year graduate students and for medical students: Each week a different faculty member will discuss his or her research in the broad areas of physiology, physiological chemistry and pharmacology. For advanced graduate students: Discussion of current research and pertinent literature on a rotating basis. *Prerequisite: consent of instructor.* (F,W,S)

298. Directed Study (1-12)
Reading and laboratory study of special topics under the direction of a faculty member. Exact subject matter to be arranged in individual cases. (F,W,S)

299. Independent Study or Research (1-12)
Independent study or research. *Prerequisite: consent of instructor.* (F,W,S)

Political Science

OFFICE: 2550 Humanities-Library Building

Professors:
Henry W. Ehrmann, Ph.D. *(Visiting)*
Sanford A. Lakoff, Ph.D. *(Chairman)*
†Roger R. Revelle, Ph.D.
Martin Shapiro, Ph.D.
††Herbert F. York, Ph.D.

Associate Professors:
Samuel L. Popkin, Ph.D. *(Acting)*

Assistant Professors:
Mario Barrera, Ph.D.
Peter F. Cowhey, M.A. *(Acting)*
David D. Laitin, Ph.D.
Susan L. Shirk, Ph.D.

†Affiliated from Scripps Institution of Oceanography
††Affiliated from Program on Science, Technology and Public Affairs

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The Major Program The undergraduate major in political science aims to provide both a broad introduction to the discipline and an opportunity for students to pursue topics and areas of study in which they develop a particular interest. The major is especially appropriate undergraduate preparation for subsequent careers in law, government, and public service. Each student enrolled in the program is required to take Political Science 10, 11, and 12, and any twelve upper-division courses approved by a departmental faculty adviser. Candidates for departmental honors are required to take Political Science 191A and B, which may be counted toward the upper-division requirement. ***Since the department is in the process of adding faculty and enlarging the list of course offerings, students are strongly advised to consult the department for the latest listing of courses before pre-registration.***

Note: Any of these courses may be used to satisfy the social science component of the Third College general education requirement under Program B.

Courses

Lower Division

10. Introduction to Political Science: American Politics (4)
This course surveys the processes and institutions of American politics. Among the topics discussed are individual political attitudes and values, political participation, voting, parties, interest groups, Congress, presidency, Supreme Court, the federal bureaucracy and domestic and foreign policy-making. (F)

11. Introduction to Political Science: Comparative Politics (4)
Through comparison of the politics of a number of post industrial and developing nations, this course seeks to acquaint the student with a range of alternative political organizations running from constitutional democracies to totalitarian dictatorships. Special attention will be paid to the actual workings of the political process in various parts of the world. (W)

12. Introduction to Political Science: International Relations (4)
The issues of war/peace, nationalism/internationalism, and economic growth/conservation will be examined in both historical and theoretical perspectives. (S)

Upper Division

100A-B-C. Systems of Political Thought (4-4-4)
This course treats the development of western political thought, from the time of Plato and Aristotle, to the modern era. Selected texts will be examined closely, including Plato's *Republic,* Machiavelli's *Prince* and *Discourses,* Hobbes' *Leviathan,* Locke's *Second Treatise on Government* and the writings of Marx and Mill in order to inquire into such topics as the meaning of justice and nature of systematic thinking about politics. (F,W,S)

101. Comparative Politics (4)
A focus on the problems of stability and democracy in various political systems; on the politics, economics, and ideologies of Western Europe and Communist systems. Comparisons will be drawn between one-party, multi-party and dictatorial regimes. *Prerequisite: Pol. Sci. 10, 11, and 12.*

102. Europe: Unification and Fragmentation (4)
This course explores the conditions that allow for the simultaneous presence of unifying and fragmenting elements in European politics ranging from Britain's joining the common market to violent conflict in Northern Ireland. The course considers how the dominant positions of the U.S. and the Soviet Union affect unification and how the new regional identities relate to the classic conflict of Marxism, Democratic Socialism, and Capitalism. (S)

***103. China in World Politics (4)**
This course will examine many of the major issues in the international relations of Pacific-Asia and in Sino-American relations since the end of World War II. Within the context of such issues the course will analyze Chinese leaders' changing perceptions of the international political system and the way in which they formulate and attempt to carry out their foreign-policy goals. *Prerequisite: junior or senior standing and one course in political science or consent of the instructor.*

105A-B. Technology and Society (4-4)
This course examines the impact of advances in science and technology on society. Among the topics considered: the theory of post-industrial society, the debate over limits to growth, the "energy crisis", the making of science policy, and the roles and responsibilities of scientists and technologists in politics. (F,W)

***106. Politics in France (4)**
This course is an attempt to explain how France has become an increasingly bi-polarized political system. Emphasis will be placed on (1) French "conservative" and "radical" ideologies; (2) French political parties; (3) the institutions of the Fifth Republic with and without deGaulle; (4) French local politics; (5) France in a crisis situation; (6) prospects for the future.

107A-B. Voting, Campaigning and Elections (4-4)
This course will consider the nature of public opinion and voting in American government. Studies of voting behavior will be examined from the viewpoints of both citizens and candidates and an effort will be made to develop models of their electoral behavior. Attention will also be devoted to recent efforts to develop rational choice theories of electoral behavior and to critiques of elections as democratic institutions. The role of the mass media and money also will be examined. (F,W)

108A-B. Politics of Education (4-4)
This course examines a series of controversies over the direction and control of education. American materials, including experience with desegregation and community control, will be stressed, but attention will also be paid to controversies arising in other systems, including modern China, Malaysia and Nigeria. The second quarter of this course stresses field research. Students will be asked to select a particular problem in connection with schooling and investigate the problem directly, with the supervision of the instructor. (F,W)

***109. The Presidency (4)**
The role of the presidency in American politics. Topics will include nominating and election politics, relations with Congress, party leadership, presidential control of the bureaucracy, international political role and presidential psychology.

110. Congress and the Presidency (4)
This course is an examination of the relations between the executive and legislative branches of government, including constitutional and political aspects of the separation of powers. Consideration will be given to supervision of the Executive Branch by Congress using the Watergate Affair as a case study. *Prerequisite: consent of the instructor.* (W)

***112A. Law and Politics — The Urban Courts (4)**
An examination of the relation of trial courts to the urban political system; judicial recruitment; the relation of trial courts to appellate courts, police, prosecutors and defense attorneys, and the penal system. *Prerequisite: lower division political science or consent of instructor.*

112C. Law and Politics — Courts (4)
This course is a systematic treatment of the role of courts in various societies. It will cover European and Asian as well as American courts and courts in developing as well as developed societies. (F)

112D-E. Law and Politics — The Supreme Court (0-8)
A two-quarter sequence examining the political role of the Supreme Court and the evolution of constitutional doctrines. Both quarters must be taken sequentially in the same year; one grade to be given at the end of the 2nd quarter. *Students who have received credit for 112B may not enroll.* (F,W)

***112G. Undergraduate Seminar in Law and Politics (4)**
An undergraduate seminar designed to allow students who have already had lecture courses in Law and Politics to pursue some aspect of those courses in greater depth and in a small group setting. *Prerequisite: PS 112 A, B or C and permission of instructor.*

***112H. Special Topics in Law and Politics (4)**
An undergraduate seminar designed to allow students who have already had lecture courses in Law and Politics to pursue some aspect of those courses in greater depth and in a small group setting. This course is open to students who have had 112G. *Prerequisite: PS 112A, B, or C or G and permission of instructor.*

***113. The Law-Making Process (4)**
This course deals with the law-making process in the United States. It examines various American law-making institutions including parties, interest groups, legislatures, bureaucracies, courts and private organizations.

114A-B. People and Politics (4-4)
This course is about how people learn about politics and why they participate in politics. Among the topics to be treated will be how children learn about politics, why some people participate in politics and some don't, what kinds of personalities are to be found among political leaders and followers, and why people have the political attitudes they do. (W,S)

115. American Political Parties (4)
Examines the development of the two major parties as well as third party movements. Considers the nature of party affiliation, the role of leaders, activists, and organizers, and the relation of parties to government and special interest groups. (W)

116. Formal Theories of Voting (4)
This course makes a non-technical presentation of the mathematical theory of voting, social choice, and coalition formation and also represents an introduction to game theory. Only high school mathematics is required. Rather than dealing in abstractions, the entire presentation uses concrete examples of real political phenomena, largely drawn from French politics. Students will be asked to apply the theoretical framework to the analysis of the selection of the American president, including the primary, convention, and electoral college processes. (F)

125A. Chicano Politics (4)
A survey of contemporary Chicano politics. The Chicano community in the American political system; government policies as they affect Chicanos; barrio and movement politics and strategies; social and economic trends as they affect politics. *Prerequisite: sophomore standing.* (W)

125B. Field Work in Chicano Politics (4)
Each student will be required to do field work relating to the Chicano community, in either individual or group projects. The topic should be on some aspect of Chicano politics, broadly defined, and have theoretical significance. Class will meet once a week for two hours and there will

be some common reading. *Prerequisites: sophomore standing, Political Science 125A, and consent of instructor.* (S)

***131. Selected Topics in Latin American Politics (4)**
A comparative analysis of contemporary political issues in Latin America. Material to be drawn from two or three countries. Among the topics: development; nationalism; political change.

***132. Politics in the People's Republic of China (4)**
This course will study post-1949 China as a country which has experimented broadly with economic, social and political problems confronted in their attempt to build a modernized society based on revolutionary ideals.

133A. Vietnam: The Politics of the Village (4)
This first unit of a two-quarter sequence will discuss the nature of Vietnamese society, especially its village structure, but also its religious, ethnic and class divisions. (W)

133B. Vietnam: The Politics of Intervention (4)
The second unit of the sequence will examine the intervention of foreign powers in Vietnam (including France, the Unithe Soviet Union) and the effects of intervention. (S)

139. Political Modernization Theory (4)
A survey of approaches to the study of modernization. Processes of the development of capitalism, industrialization and urbanization will be examined. The way in which these processes affect mobilization, incorporation, assimilation, legitimacy and the institutionalization of political regimes will be studied. (W)

144. African Politics (4)
An examination of pre- and post-colonial trends in African political organization. Economic management, dissemination of ideologies, leadership and relations with other states will be among the topics considered. (W)

148. Public Control of Private Enterprise (4)
This course treats the regulatory process in the U.S., with particular reference to the rationale for government intervention and the criticisms raised against it. The major regulatory mechanisms and agencies will be described, with special reference to such topics as consumer information, automobile safety standards and emissions controls, the regulation of pollution, patents, and energy investments. Some European alternatives to American institutions and practices will also be considered. (F)

149. Undergraduate Research Seminar: Government Regulation of Economic Activity (4)
This course will undertake an intensive examination of certain key issues in government regulation of private industry. Students will be expected to undertake research projects on one of these issues. *Prerequisite: Political Science 148.* (S)

150A. Political Change in the United States (4)
An analysis of the political structure of the present-day United States, and an introduction to proposed strategies for producing change in that structure. Special attention will be given to the topic as it relates to such minority groups as Blacks and Chicanos in the United States. *Prerequisite: sophomore standing.* (W)

150B. Political Change in the United States (4)
A review of strategies that have been proposed for producing political change in the United States. These strategies will be evaluated in light of the analytical material presented in the previous quarter. (S)

***151. Topics in American International Relations (4)**
This course will examine post-World War II American international relations in selected geographical and issue areas. The approach will include analysis and evaluation of specific American policies toward the selected areas and analysis of the internal process of foreign policy decision-making.

152. American Foreign Policy (4)
American foreign policy as directed to our allies, our adversaries and to neutrals, and concerning energy and ecology as well as more traditional issues — will be critically analyzed. Analysis will center on questions of purposes, interests, and political responsibility. General theories of American foreign policy, both conventional and radical, will also be discussed. (F)

***153. International Organization (4)**
Three independent themes will be explored: (1) the prospects for, and an evaluation of, world government; (2) the purposes of international organizations of more limited scope than world government, and the implications of these organizations for future world reorganization based on current social, economic, ecological and political trends.

154. Comparative Politics and Political Culture (4)
To what extent do aspects of culture — language, religion, family, history, beliefs, and values — influence the range of political behavior in any society, or define the range of questions on its political agenda? If in some way culture has an important bearing on politics, what are the mechanisms of real political change? To what extent is political change uni-directional toward some homogeneous industrialized world; and to what extent will heterogeneous cultures develop along divergent paths? These are the seminal questions around which this course will be organized. *Prerequisites: Consent of instructor.* (S)

155A-B. Politics and the International Economic Order (4-4)
This course will examine the links between international economics and international politics. A systematic study of multinational corporations and trans-national interest groups will be pursued in order to see how nation-states adapt to new economic, technological and political challenges. The energy crisis, the apparent collapse of the postwar economic order, and the new challenges to the law of the sea will also be examined to see how nation-states adapt. Finally, the adaptation process itself will be analyzed in an attempt to forecast the future international political order. *Prerequisite: Political Science 12 or permission of instructor.* (F,W)

***156. The Policy Making Process (4)**
This course will describe the policy-making processes employed by American national government. Attention will be focused on the law-making process and on decision making within the executive branch.

157 Technology and the Poor Countries (4)
This course treats the gap between the rich and the poor countries and the role of technology in bridging this gap. Special attention will be given to the sources of global poverty and to the importance of increasing agricultural productivity and the role of the advanced countries. (S)

***160A-B. The Ideal of Equality in Theory and Practice (4-4)**
The ideal of equality is examined from the perspective of three traditions in political thought — the liberal, the socialist and the conservative. In the second quarter, the ideal will be examined in relation to actual practice in various societies.

*Not to be offered in 1976-77.

191A-B. Senior Honors Seminar: Frontiers of Political Science (0-8)
This course will be taught jointly by the staff of the department with occasional lectures by visitors. It is open only to seniors interested in qualifying for departmental honors. Admission to the course will be determined by the department on the basis of the student's academic record. Each

student enrolled will be required to write an honors essay under the supervision of a member of the faculty. This essay, which is to be submitted by the end of the winter quarter, will be the basis of the final grade for the course. (F,W)

197. Field Study in Political Science (4)
Field work in the local area in some aspect of politics or public policy. The project should be largely designed by the student, with faculty supervision, and should contribute to an overall understanding of the political process. (F,W,S)

198. Directed Group Study (2-4)
Directed group study in an area not presently covered by the departmental curriculum. (F,W,S)

199. Independent Study for Undergraduates (4)
Independent reading in advanced political science by individual students. *Prerequisite: consent of instructor.* (F,W,S)

298. Directed Reading (1-12)
Guided and supervised reading in the literature of the several fields of political science. Prerequisite: graduate standing. (F,W,S)

Psychology

OFFICE: 5217 Psychology-Linguistics Building

Professors:
Norman H. Anderson, Ph.D.
Robert M. Boynton, Ph.D.
J. Anthony Deutsch, D.Phil.
Edmund J. Fantino, Ph.D.
George Mandler, Ph.D.
Donald A. Norman, Ph.D. *(Chairman)*
George S. Reynolds, Ph.D.

Associate Professor:
Ebbe B. Ebbesen, Ph.D.
Jean M. Mandler, Ph.D.
Harry L. Munsinger, Ph.D.
David E. Rumelhart, Ph.D.

Assistant Professors:
Alonzo B. Anderson, Ph.D.
Lynn A. Cooper, Ph.D.
Norbert Kerr, Ph.D.
Vladimir J. Konecni, Ph.D.
Donald I. A. MacLeod, Ph.D.
James L. McClelland, Ph.D.
Elissa L. Newport, Ph.D.
Ben A. Williams, Ph.D.

* * *

Ursula Bellugi, Ed.D., *Associate Adjunct Professor of Psychology*
Robert Galambos, Ph.D., M.D., *Professor of Neurosciences*
Steven A. Hillyard, Ph.D., Associate Professor of Neurosciences
Larry Squire, Ph.D., *Assistant Professor of Psychiatry*

* * *

The Major Program The department offers courses in all major areas of experimental psychology, with emphasis in the areas of human information processing, sensation and perception, learning and motivation, physiological psychology, developmental psychology and social psychology. The department emphasizes modern research in the experimental and theoretical analysis of human and animal behavior. Students who major in psychology can expect to develop a knowledge of a broad range of content areas, as well as basic skills in experimental and analytic procedures.

The department offers a flexible program of study towards the B.A. degree. Several different options are available to the student, from a general curriculum which allows for diversity of studies to a specialized curriculum which allows the student to explore a limited number of topic areas in great depth. An honors program—requiring laboratory courses and a year-long individual research project—is also available to students. The honors program is specifically designed for students interested in preparing for graduate or professional school. The more general curricula are available to students who do not plan to continue studies beyond the B.A. degree.

A Bachelor of Arts degree in psychology will normally be given to any student who has satisfactorily completed at least twelve four-unit upper division psychology courses. The course must follow a prescribed program and must include at least one course in statistics. The choice of which twelve or more courses a student wishes to take should be made on the basis of three criteria: interest in the topic, long-range goals, and the prerequisites for the various courses that are offered.

A major consideration in deciding the type of program one will pursue are the prerequisites of the various upper division psychology classes taught by the department. The student should note the prerequisites for *all* of the classes he or she might be interested in taking. It is important to take those classes which are prerequisites for many others early in one's program. For example, students are well advised to take Introduction to Statistics (60) in their sophomore year, or sooner, as it is a prerequisite for many other psychology classes. Similarly, many of the classes which serve as introductions to the various

areas of psychology (e.g., Introduction to Sensation and Perception, and Introduction to Social Psychology) are prerequisites for more advanced courses in those areas. Therefore, these classes should also be taken early in one's college career.

All students are encouraged to plan their major program with the aid of a faculty member of the department. Such planning should normally take place in the student's sophomore year to insure that ample time is available to satisfy the necessary prerequisites for the courses taught in the department.

General Major Students interested in obtaining a broad or general overview of experimental psychology and related topics would normally take the following courses:

Introduction to Statistics (60)
Introduction to Experimental Psychology (108)
Introduction to Developmental Psychology (101)
Introduction to Social Psychology (104)
Introduction to Sensation and Perception (102)
Introduction to Cognitive Psychology (105)
Introduction to Physiological Psychology (106)
Introduction to the Principles of Behavior (103)
History of Psychology (166)
Explanation and Knowledge (165)

in addition to other upper division psychology electives which might be of particular interest to the student.

Honors Program Those students primarily interested in pursuing a career in experimental psychology and who therefore intend to go to graduate school in psychology are encouraged to develop an honors program. The defining characteristic of an honors program is that students will complete a year-long independent research project (194) in their senior year which results in an honors thesis. Naturally, the area in which the honors research is done should be chosen on the basis of interest. For example, a student interested in the neurological mechanisms which underlie memory would normally do an honors thesis in the area of physiological psychology. A student interested in animal behavior would normally do his or her research in learning and motivation. The honors project will normally be under the supervision of a faculty member in the psychology department. In preparation for such a project the honors candidate must take:

Introduction to Statistics (60)
Introduction to Experimental Psychology (108)
Advanced Statistics (111)
Any Methods or Laboratory Course (115, 116, 121, 126, 127)
Honors Thesis (194A,B,C)

and some sequence of courses related to the area of the honors thesis. Note that a laboratory or methods course is a prerequisite for the Honors Thesis (194A, B, C).

Areas of Specialization A student may wish to specialize in one or more areas of psychology whether or not he or she does an honors thesis. This option can be accomplished by taking sequences of courses which deal with the same general area.

Human Development A student interested in specializing in human development would normally take:

Introduction to Statistics (60)
Introduction to Developmental Psychology (101)
Cognitive Development: Piaget (136)
Psycholinguistics (145)
Behavior Genetics (149)

as well as other electives of interest.

Social Psychology A student interested in specializing in social psychology would normally take:

Introduction to Statistics (60)
Introduction to Social Psychology (104)
Advanced Statistics (111)
Experimental Methods in Social Psychology (126)
Methods in Applied Social Psychology (127)
Group Processes (155)
Topics in Legal Psychology (157)
Ethnic Attitudes (156)
Emotions (143)
The Psychology of Judgment (148)

as well as other electives of interest.

Cognitive Psychology A student interested in specializing in cognitive psychology could take:

Introduction to Statistics (60)
Introduction to Cognitive Psychology (105)
Visual Cognition (160)

Memory and Attention (135)
Psychology and Artificial Intelligence (133)
Psychology of Thinking (134)
Psycholinguistics (145)
Cognitive Development: Piaget (136)
Advanced Statistics (111)
Laboratory in Cognitive Processes (115)
The Psychology of Judgment (148)
Choice and Decision (141)

as well as other electives of interest.

Sensation and Perception A student interested in specializing in sensation and perception would normally take:

Introduction to Statistics (60)
Introduction to Sensation and Perception (102)
Introduction to Cognitive Psychology (105)
Visual Cognition (160)
Physiological Basis of Perception (159)
Laboratory Methods in Sensory Psychology (116)
Memory and Attention (135)

as well as other electives of interest.

Learning and Motivation A student interested in specializing in learning and motivation would normally take:

Introduction to the Principles of Behavior (103)
Introduction to Statistics (60)
Learning and Motivation (120)
Laboratory in Learning and Motivation (121)
Comparative Psychology (150)
Control of Human Behavior (151)

as well as other electives of interest.

Physiological Psychology A student interested in specializing in physiological psychology would normally take:

Introduction to Physiological Psychology (106)
Neural Basis of Memory (162)
Introduction to Statistics (60)
Introduction to Sensation and Perception (102)
Comparative Psychology (150)
Physiological Basis of Perception (159)
Laboratory Methods in Sensory Psychology (116)

in addition to other electives of interest.

It should be noted that students need *not* take all of the courses listed in the above sequences. These sequences are presented merely to provide examples of programs which provide students with the opportunity to specialize in a particular area of psychology.

Prerequisites for Psychology Majors Experimental psychology uses the tools and knowledge of science; calculus, probability theory, computer science, chemistry, biology and physics. Accordingly, students in upper-division courses must have an adequate background in these topics. Prerequisites for individual courses are specified in the catalog listings for the courses.

Psychology majors are required to take one course in computer programming (e.g., APIS 61), three science courses, and a year of college-level mathematics. Students are encouraged to satisfy these prerequisites as early as possible.

The College Science and Mathematics Requirements Each college imposes its own science and mathematics requirement upon its students. A student who wishes to major in psychology must also fulfill the special prerequisites listed above. These prerequisites are automatically met by the Revelle College requirements. Muir College and Third College students will have to take one year of mathematics, as well as the required number of science courses from the ones offered to them. Fourth College students will also have to take one year of mathematics as well as the required number of science courses.

The Noncontiguous Minor for Revelle College Students may enroll in psychology courses in order to fulfill the requirements of the noncontiguous minor. The noncontiguous minor will normally consist of three of the lower-division courses in psychology and three courses selected from the upper-division offerings of the department. Please note carefully the prerequisites for the upper-division courses. Students who wish to pursue a noncontiguous minor should consult with one of the departmental undergraduate advisers before enrolling for these courses. Lower-division psychology courses may not be used simultaneously to satisfy both the social-science requirement and the noncontiguous minor requirement.

Minor Program for Third College
Students in Third College who are interested in a minor in psychology should first take Psychology 10A, 10B and 10C. These three classes provide an organized introduction to human psychology. The minor should be completed by taking any three upper division psychology classes. Students should carefully examine the prerequisites for each of the upper division psychology classes which they hope to take. Many of the more advanced classes have prerequisites which must be satisfied in order to take the class. For example, Introductory Statistics (Psych 60) is a prerequisite for almost all of our upper division classes.

Minor Program for Fourth College
The Fourth College requires its students to complete two six-course sequences to complete area of concentration requirements. Six of these twelve courses must be upper division courses. The psychology department offers several areas of concentration within which one may develop a minor sequence. The student should choose a six course sequence conforming to the following rules: a) any lower division psychology course (i.e., Psych 10A, 10B, 10C, 11, 14, 16, 60) may be applied toward the minor; b) upper division courses should be drawn from one of the following areas of concentration (lower division courses are listed below only to indicate a particular appropriateness for the area); c) at least 3 of the 6 courses used for the minor must be upper division. Students must, of course, observe all course prerequisites. The student should also note that one may develop one's own sequence in consultation with Department of Psychology advisers.

Minor in General Psychology
Introduction to Statistics (60)
Introduction to Experimental Psychology (108)

plus any four from the list below:

Introduction to Developmental Psychology (101)
Introduction to Sensation and Perception (102)
Introduction to the Principles of Behavior (103)
Introduction to Social Psychology (104)
Introduction to Cognitive Psychology (105)
Introduction to Physiological Psychology (106)

Minor in a Specialization Within Psychology A student may also minor in any of the six areas of specialization listed above. A satisfactory minor can be built by taking a sequence of courses listed under a specific area of specialization.

The Graduate Program The Department of Psychology provides broad training in experimental psychology. Increased specialization and the general burgeoning of knowledge make it impossible to provide training in depth in every aspect of experimental psychology, but most aspects are represented in departmental research.

Preparation Apart from the general University requirements, the department generally expects adequate undergraduate preparation in psychology. A major in the subject, or at least a strong minor, is normally a prerequisite, but exceptions may be made for applicants with good backgrounds in such fields as biology and mathematics.

Language Requirements There is no foreign-language requirement.

Master's Degree Program Normally, students will be accepted only for the Ph.D. Students in the doctoral program may, however, qualify for the M.A.

Plan II has been adopted by the department (see *Graduate Studies: The Master's Degree).* Each candidate must complete a two-course requirement in quantitative methods and at least six additional graduate courses other than the research courses 296, 298 and 299. Each candidate must also pass the master's examination, which is offered by the department once each year.

Graduate Curriculum

First Year Requirements In the first year of study, each student must fulfill the following requirements:

1. Each student must fulfill a quantitative methods requirement, either by taking two quantitative methods courses approved by the graduate committee or by showing a satisfactory knowledge of these courses through an examination.
2. In addition to the quantitative methods requirement, each student is expected to take at least eight courses from the list prepared by the graduate affairs committee. At least five of these must be basic courses from at least four different areas.

During the first year of study, the student is required to complete five of these courses, four of which must be basic seminars. By the end of the second year the student must have completed at least five basic seminars in four different areas. The graduate committee will provide a list of acceptable courses and a list of the areas.

3. All first year graudate students are required to submit a research paper on the project completed as a part of their research practicum. The paper should be appropriate in style, length, and quality to papers published in the normal, refereed journals of the student's research area. The format of the paper should be in the style of a journal article acceptable to any of the major journals in the student's area (the publication manual of the American Psychological Association, second edition, 1974, should be followed).

   The research paper will be read and evaluated by the student's research adviser and by at least two other readers appointed by the graduate affairs committee. The paper will be graded on a 3 point scale: +, 0, and —. Additional readers may be required when there are conflicting evaluations.

   The research paper is presented orally also at a research meeting held at the end of the spring quarter. Attendance at this meeting is required of the entire department's graduate students and faculty. Typically, each student is allowed 10 minutes to present the paper with a 5 minute question period following the presentation. At the annual evaluation meeting the department awards a prize for the best paper presented at the paper-reading meeting.

4. Students are evaluated by the entire faculty by a meeting at the end of the academic year. At the department evaluation, the normal minimum standards for allowing a student to continue beyond the first year are completion of all department requirements, satisfactory completion of the first-year research project (including the oral presentation), a B+ average in the quantitative methods courses and a B+ average in the courses which fulfill the area requirements.

Qualifying Examination for the Ph.D. Degree The qualifying examination has two parts. In one part, the student is examined on topics related to the thesis proposal. In the other, the student is examined on a broader range of topics. This broader range of topics is determined jointly by the student and the qualifying committee. Prior to the examination, the student submits to the committee a written list of the four areas in the department in which the student is qualified and a list of topics in those areas on which the student wishes to be examined. The student and the committee work together to reach a mutually satisfactory document that lists the topics to be covered. Then, at the time of the examination, a definite period of time is set aside for questions on these topics.

These regulations took effect on the first day of classes in the 1975/76 academic year (September 19, 1975). All students are required to follow the new program, except that those students who have already passed the written qualifying examination are allowed to follow the old requirement (the qualifying examination will consist only of questions on the area of the thesis proposal itself).

Teaching In order to acquire adequate teaching experience, all students are required to participate in the teaching activities of the department for one quarter of half-time teaching in every year of residence.

Residency Each student must complete the requirements for qualifications for candidacy for the Ph.D. degree by the end of the third year of residence. Any student failing to qualify by this time will be placed on probation. A student who fails to qualify by the end of the spring quarter of the fourth year of residence will automatically be terminated from the department.

No student may allow more than eight calendar years to elapse between starting the graduate program and completing the requirements for the Ph.D. degree. Students will automatically be terminated from the program at the end of the spring quarter of their eighth calendar year in the department.

Research From the first year of graduate study all students are enrolled in a research practicum (Psychology 296). Students are assigned to current research projects in the department, and receive the personal supervision of a member of the staff.

Courses

Lower Division

10A-B-C. Psychology (4)
An introduction to the scientific study of psychology. The course will present an overview of modern scientific psychology with a particular area of modern psychological research discussed in each quarter. Areas to be covered include developmental, social interactions, and personality theory, along with the study of learning and memory, sensation and perception, motivation and emotion.

11. Perception and Information Processing (4)
An introduction to basic principles of perception, learning and information processing.

14. Social Psychology Applied to Human Problems (4)
An introduction to concepts and methods in social psychology.

16. Introduction to Psychology (4)
An Introduction to basic concepts in psychology: development, learning, thinking, and problem solving.

60. Introduction to Statistics (4)
Introduction to the experimental method in psychology and to mathematical techniques necessary for experimental research. *Prerequisite: one year of mathematics or permission of instructor.*

90. Freshman Seminars (0)
Freshman seminars organized around the research interests of various faculty members. *Prerequisites: freshman standing and consent of instructor.*

Upper Division

101. Introduction to Developmental Psychology (4)
A lecture course on a variety of topics in the development of the child, including the development of perception, cognition, language and sex differences. *Prerequisite: Psychology 60.*

102. Introduction to Sensation and Perception (4)
An introduction to problems and methods in the study of perceptual and cognitive processes. *Prerequisite: Psychology 60 or one year of college-level mathematics.*

103. Introduction to Principles of Behavior (4)
An example of the principles of conditioning and their application to the control and modification of human behavior.

104. Introduction to Social Psychology (4)
An intensive introduction and survey of current knowledge in social psychology. *Prerequisite: Psychology 60.*

105. Introduction to Cognitive Psychology (4)
Introduction to the experimental study of higher mental processes. Topics to be covered include pattern recognition, perception and comprehension of language, memory and problem solving. *Prerequisite: junior standing.*

106. Introduction to Physiological Psychology (4)
Intensive introduction to current knowledge of physiological factors in learning, motivation, perception, and memory.

108. Introduction to Experimental Psychology (4)
Various members of the psychology faculty will discuss their current research with special emphasis upon methodological problems.

111. Advanced Statistics (4)
Intermediate examination of the experimental method in psychology and mathematical techniques necessary for experimental research. *Prerequisites: Mathematics 80A or Psychology 60 and permission of instructor.*

115. Laboratory in Cognitive Psychology (4)
Lecture and laboratory work in human information processing. *Prerequisites: Psychology 105 and 111 and consent of the instructor.*

116. Laboratory in Sensory Psychology (4)
An introduction to the experimental measurement and analysis of auditory and visual phenomena. *Prerequisite: Psychology 159 (co-registration permitted).*

120. Learning and Motivation (4)
Survey of research and theory in learning and motivation. Includes instincts, reinforcement, stimulus control, choice, aversive control, and human applications. *Prerequisites: Psychology 103, 60, and co-registration with Psychology 121 required.*

121. Laboratory in Operant Psychology (4)
Lecture and laboratory in operant psychology. *Prerequisite: must be taken with Psychology 120.*

126. Experimental Methods in Social Psychology (4)
Lecture and laboratory work in social psychology. *Prerequisites: Psychology 104 and 111 or equivalent.*

127. Methods in Applied Social Psychology (4)
Emphasizes learning of experimental and quasi-experimental methodology applicable to social problems. Students carry out field research in areas such as the psychology of law (judicial decision making), traffic-related behavior (risk-taking), environmental psychology, and other areas of student interest. *Prerequisites: Psychology 104 and 60.*

130. Developmental Psychology and Education (4)
An introduction to cognitive development with emphasis on its relation to education. *Prerequisites: enrollment in Teacher Education Program or consent of instructor.*

133. Psychology and Artificial Intelligence (4)
A survey of current developments in artifical intelligence as it pertains to psychology. Special attention will be given to work in automatic speech understanding, natural language processing, belief systems, problem solving and game playing. *Prerequisites: Psychology 105 and APIS 61.*

134. Psychology of Thinking (4)
An introduction to contemporary models of cognition and the process of thinking. *Prerequisite: Psychology 105.*

135. Memory and Attention (4)
An intensive introduction to the study of the human as an information processing system. Covers topics in perception, memory, cognition, and artificial intelligence. *Prerequisite: Psychology 105 and APIS 61.*

136. Cognitive Development: Piaget (4)
Intensive examination of Jean Piaget's theories of cognitive growth from birth to adolescence. Topics: development of imagery and mental representation; thought and language; concepts of space, causality and number; logical thinking. *Prerequisite: Psychology 101 or 105.*

141. Choice and Decision (4)
Empirical techniques, from the testing of mathematical models to the collection of process tracing data. Content includes decision making and problem solving. *Prerequisites: Psychology 105 and 111.*

143. Emotion (4)
Introduction to current theories and research on emotion, with special reference to theories of anxiety. *Prerequisite: Psychology 105 or 104.*

145. Psycholinguistics (4)
Presentation of the psychology of language, including its biological basis, its development in children, and its use by the adult. Of particular interest will be the question of the relevance of linguistic descriptions to psycholinguistics. *Prerequisites: Psychology 105 or Linguistics 1 and 2.*

148. The Psychology of Judgment (4)
General theory of judgment based on algebraic models. Emphasis on varied substantive applications, including person perception, social attitudes and opinions, decision-making, and psychophysical judgment. *Prerequisites: Psychology 104 or 105, and Psychology 111.*

149. Behavior Genetics (4)
An exploration of the nature/nurture controversy with particular attention to human intelligence. *Prerequisite: Psychology 101 or 10A or any genetics course in biology.*

150. Comparative Psychology (4)
Principal emphasis will be on the comparative psychology of learning and ethology. Selected topics such as critical periods and animal communication will be covered. *Prerequisite: Psychology 103 or 106.*

151. Control and Analysis of Human Behavior (4)
Extensions of learning principles to human behavior. Topics include methods of self-control, applications to clinical disorders, and the design of cultures. *Prerequisite: Psychology 120.*

155. Group Processes (4)
An introduction to the social psychological study of human behavior in small groups. Special emphasis will be given to interpersonal relations, structure, leadership and cohesiveness. The course will combine lecture, discussion and small group experience methods. *Prerequisites: Psychology 104 and any one of Psychology 126, 127.*

156. Ethnic Attitudes (4)
This course examines beliefs and values of ethnic groups in the United States with emphasis on behavioral and social consequences. The origin and development of racial attitudes will be studied, with an emphasis on the attitudes of African and European Americans. *Prerequisites: Psychology 104, and any one of the following: Psychology 126, 127, Urban and Rural Studies 108, or permission of instructor.*

157. Topics in Legal Psychology (4)
Several topic areas of research on psychological factors in the legal system will be surveyed. The psychology of the courtroom will receive special emphasis (especially jury research). Students will also complete original projects representing library, field, or experimental research in an area of their choice. *Prerequisites: Psychology 104 and 60 or permission of instructor.*

159. Physiological Basis of Perception (4)
A survey of sensory and perceptual phenomena with emphasis on the physiological mechanisms underlying them. *Prerequisites: Psychology 102 or consent of instructor.*

160. Visual Cognition (4)
This course will provide an advanced examination of cognitive processing and representation of visual information. Topics to be covered in depth include visual memory, pattern recognition, and visual imagery. *Prerequisites: Psychology 102 and 105.*

162. Neural Basis of Memory (4)
A review of current topics concerning plasticity in the nervous system including development, invertebrate nervous systems, neuro-physiological and morphological correlates of memory in mammalian brain, pharmacology of memory, human memory and brain function. *Prerequisite: Psychology 106.*

164. Non-traditional Approaches to Psychological Disorder and Therapy (4)
Survey of psychological approaches to interpersonal disorders and their therapies. Topics: Humanistic therapies; Gestalt; Trans-Actional analysis; Peer counseling, (e.g. Synanon, Re-evaluation counseling, AA, Life Style Therapies—such as communes); Group methods (e.g. encounter, sensitivity training, psycho-drama, etc.); Biophysical methods (Rolfing, bio-energetics, etc.). Lectures, discussions and experiential opportunities at San Diego centers specializing in the above techniques as can be arranged. A critical but open examination of these approaches to psycho-social discomfort. *Prerequisite: consent of instructor.*

165. Explanation and Knowledge (4)
Discussion of psychological theory and evidence on such topics as epistemology, ordinary language, reasons and causes, existence, socio-cultural determinants of thought, ethics. *Prerequisites: restricted to seniors and graduate students in anthropology, linguistics, philosophy, political science, psychology and sociology.*

166. History of Psychology (4)
Survey of the major trends and personalities in the development of psychological thought. Emphasis will be given to such selected topics as the mind-body problem, nativism vs. empiricism, and the genesis of behaviorism. *Prerequisites: three previous upper division courses in psychology.*

194A-B-C. Honors Thesis (4)
Research seminars and research, under the direction of a member of the staff. *Prerequisites: one laboratory course in Psychology (Psychology 115 through 127) and Psychology 111.*

195. Instruction in Psychology (4)
Introduction to teaching of introductory psychology. Each student will be responsible for and teach a class section in one of the lower-division psychology courses. *Prerequisites: major in psychology and permission of instructor at least one quarter before start of course. Only counts once towards minor or major.*

199. Independent Study (2-4)
Independent study or research under direction of a member of the staff. Not counted for credit towards the major. *Prerequisite: special permission of department.* (Pass/Not Pass only.)

Graduate

201A-B. Quantitative Methods in Psychology (3-3-3)
An intensive course in statistical methods and the mathematical treatment of data, with special reference to research in psychology.

201C. Theoretical Methods in Psychology (4)
An introduction to the methodology of model building and theory development in psychology. Topics to be covered include the techniques from: stochastic modeling, computer simulations, decision theory and scaling. (Satisfactory/Unsatisfactory grades permitted.)

202. Sensory Mechanisms (4)
A survey of current problems in the analysis of sensory systems.

203. Physiological Psychology (3)
The central nervous system and its relation to behavior. Seminar.

204. Social Psychology (3)
The behavior of man as a function of social variables. Seminar.

205. Human-Information Processing (3)
An intensive introduction to the study of the human as an information-processing system. Covers topics in perception, memory, cognition and artificial intelligence.

206. Conditioning and Learning (3)
Classical and operant conditioning in lower animals. Seminar.

207. The Nature and Nurture of Development (4)
This graduate seminar will consider the theories, methods and data related to the genetics and environment of behavior with particular attention to early cognitive development, social behavior, and the antecedents of abnormal development.

208. Methods in Cognitive Psychology (3)
Traces the development of formal methods from mathematical equations to the information-processing framework. Content includes choice and decision, problem-solving and other intellective tasks.

209. Judgment and Decision-Making (3)
Survey of principal problems of judgment. Role of judgmental processes in decision-making, psychophysics, and social-personality. Emphasis will be on experimental analysis, but conceptual formulations in signal detection theory, choice theory, adaptation level theory and integration theory will be stressed. Seminar.

210. Motivation and Learning (3)
Basic seminar on principles of human and animal motivation and learning.

211. Piagetian Theory (3)
Selected topics in Piaget's theory of cognitive development. Seminar.

212A-B. Introduction to Visual Science I & II (3-3)
Specification and measurement of the visual stimulus; introductions to basic physiological optics and visual neurophysiology. *Prerequisites: 212A: open to undergraduates with Psychology 159. 212B: open to undergraduates with Psychology 212A.*

220. Detection Theory in Psychology (2)
The application of detection theory to human-information processing. Advanced seminar.

221. Judgmental Processes (2)
The psychology of judgments and information integration. Advanced seminar.

222. Brain Functions (2)
Selected topics. Advanced seminar.

223. Advanced Topics in Vision (4)
An in-depth analysis of empirical and theoretical issues in a specialized area of vision or visual perception. Emphasis most likely will be on a topic of ongoing vision research at UC San Diego. *Prerequisite: Psychology 212A or special permission of instructor.*

224. Verbal Learning and Memory (2)
Selected problems. Advanced seminar.

225. Experimental Analysis of Behavior (2)
Advanced seminar in modern techniques and findings, with special emphasis on operant conditioning and lower animals. Advanced seminar.

226. Contemporary Problems in Vision (2)
Survey seminar on recent work in physiological optics, vision research and the visual process.

227. Perceptual Development (2)
Selected topics with emphasis on current experimental work. Advanced seminar. *Prerequisite: permission of the instructor.*

228. Advanced Topics in Mathematical Psychology (4)
Advanced seminar on mathematical models in learning, memory, perception, sensory processes. *Prerequisite: Psychology 201C.* (Satisfactory/Unsatisfactory grades permitted.)

229. Selected Topics in Social Psychology (2)
Advanced seminar on theoretical issues in attitudes and socal perception with special attention to current research.

230. Advanced Topics in Developmental Psychology (2)
Theoretical and methodological problems in cognitive, perceptual and social development. Advanced seminar.

231. Advanced Topics in Human Information Processing (2)
Selected discussions of advanced topics. Advanced seminar. *Prerequisite: Psychology 205 or consent of instructor.*

232. Advanced Topics in Human Social Behavior (3)
The course will cover topics in human social behavior, with special emphasis on recent developments in experimental and social psychology. Such topics as aggression, affiliation and the relationship between self-reports and other behavior will be examined. Advanced seminar. *Prerequisite: permission of instructor.*

233. Topics in Learning and Motivation (3)
Advanced topics in learning and motivation, with special emphasis on current research. Advanced seminar. *Prerequisite: Psychology 210.*

234. Cognitive Development (2)
Nature and function of perception and judgment from a developmental point of view. Advanced seminar.

235. Topics in Psycholinguistics (3)
Selected topics in experimental psycholinguistics and applications to language acquisition and pathology. *Prerequisite: consent of instructor.*

236. Animal Discrimination Learning (3)
Intensive examination of problems in the study of discrimination learning.

237. Methods and Topics in Experimental Social Psychology (3)
An advanced seminar dealing with the laboratory and field methods of experimental social psychology and topics such as aggression, altruistic behavior, conformity and bystander intervention. Students will be encouraged to engage in field experimentation.

238. Psychological Theories of Pattern Recognition (3)
Examination of current theoretical and experimental approaches to problems of visual pattern recognition and object identification.

241A-B-C. Advanced Topics in Cognition (4-4-4)
Research and discussion on selected topics in cognitive psychology. *Prerequisite: permission of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

242A-B-C. Research Topics in Developmental Psychology (4-4-4)
Advanced seminar concentrating on methods of research and current experimental literature. May be taken by undergraduate senior majors concurrently enrolled in Psychology 194. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

243. Language Acquisition (4)
Discussion of the acquisition of language by young children, including such topics as its stages, mechanisms, and relation to nonlinguistic development. *Prerequisite: Permission of instructor.*

244. Psycholinguistics (4)
Discussion of human language abilities and consideration of a variety of psychological, biological, and linguistic models to account for them.

245. Advanced Topics in Human Cognition (3)
Research and discussion on selected topics in human cognition. *Prerequisite: permission of Instructor.*

246. Exploration in Cognition (3)
Research seminar in advanced topics in the study of cognition. *Prerequisites: restricted to students in the LNR research group; others should request permission of the instructor; advanced knowledge of modern concepts of human information processing.*

247. Introduction to Group Processes (4)
Selected topics in small group research will be discussed. Choice of topics will be largely determined by instructors and student interest, but will span a broad range of research on group structure, process, and performance. *Prerequisites: Psychology 201A-B, or permission of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

248. Semantic Theory (4)
An introduction to the fields of semantics and pragmatics. Material from linguistics, philosophy and artificial intelligence will be related to current developments in psychology and psycholinguistics. *Prerequisite: permission of instructor.*

249. Reading (4)
Application of an information processing approach to reading, drawing on research findings in visual information processing, psycholinguistics, and certificial intelligence. Advanced seminar.

250. Group Cohesiveness (4)
Basic problem in theory and research on group cohesion. Seminar. *Prerequisite: Psychology 247.*

260. Advanced Topics (2)
Advanced seminar on special topics in theoretical and experimental psychology. *Prerequisite: graduate student in psychology.*

280. Seminar in Communication and Information Research (1)
(Satisfactory/Unsatisfactory grades permitted.)

296. Research Practicum (1-12)
Research in psychology under supervision of individual staff members. (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

298. Library Research (1-12)
Reports and surveys of the literature on selected topics. *Prerequisite: graduate student in psychology.* (F,W,S)

299. Independent Research (1-12)
Independent research and thesis research. (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

500. Apprentice Teaching (4)
Required teaching practicum for students enrolled in graduate program in psychology. (Satisfactory/Unsatisfactory grade only.)

Science

OFFICE: Science 3A, 3AL, 3B, 3BL, 3C — Chemistry Department; Science 4A, 4B, 4C, 4AL, 4BL, 4CL — APIS Department

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These courses are to be used by Muir College students in fulfilling the science requirements of various majors, as well as the General Education requirements of the College (See *Muir College: The General Education Requirements).* The Science 3 series is a course in university-level chemistry; the Science 4 series is a course in university-level physics. Although these courses are intended primarily for students planning to major in a science, they are excellent courses for any student who is adequately prepared.

Courses

Lower Division

3A. Science: General Chemistry (4)
Introductory chemistry with emphasis on the applications of chemistry to molecular biology. Required for Muir students majoring in biology. Three hours lecture, one hour discussion. (W)

3AL. Science: Quantitative Chemical Analysis (2)
A laboratory course that introduces the student to laboratory techniques, analytical procedures and physical measurements. Includes gravimetric, volumetric and instrumental methods of chemical analysis. Emphasis is on accuracy and precision. One hour lecture and two three-hour laboratories. Interchangeable with Natural Science 2DL in Revelle and Chemistry 4AL in Fourth College. (W,S)

3B. Science: General Chemistry (4)
A continuation of General Chemistry 3A. Three hours lecture, one hour discussion. *Prerequisite: Science 3A.* (S)

3BL. Science: Quantitative Chemical Analysis (2)
A continuation of Science 3AL. One hour lecture and two three-hour laboratories. Interchangeable with Natural Science 2FL in Revelle and Chemistry 4BL in Fourth College. *Prerequisite: Science 3AL.* (F)

3C. Thermochemistry (4)
This course will be required of all Muir students majoring in biology. Thermodynamics, physical chemistry, and chemical reactions will be studied with occasional reference to reactions of biological interest. Emphasis will be on general principles and problem-solving. Three hours lecture, two three-hour laboratories. *Prerequisite: Science 3B.* (F)

4A. The Physics of Equilibrium and Motion (4)
An introduction to the science of mechanics. The principle of static equilibrium. Newton's laws, with applications to linear and circular motion. The concepts of work and energy. The conservation of energy, linear momentum, and angular momentum. Two hours lecture, two hours recitation. *Prerequisite: Mathematics 1A or 2A. Concurrent registration permissible.* Rotenberg and staff. (F)

4B. Waves Energy and Properties of Matter (4)
An introduction to continum mechanics, dimensional analysis, and wave motion. Elementary geometrical optics with applications to optical instruments. Calorimetry and heat transport. Two hours lecture, two hours recitation. *Prerequisite: Science 1A; Mathematics 1B or 2B; Concurrent registration permissible.* Mendis and staff. (W)

4C. Electromagnetic Theory (4)
The concepts of fields and potentials. Ohm's Law. Capacitance and inductance. DC and simple AC circuits. Magnetic fields, the law of induction. Two hours lecture, two hours recitation. *Prerequisite: Science 4A and 4B, Mathematics 1C or 2C. Concurrent registration permissible.* Banks and staff. (S)

4AL-4BL-4CL. Physics Laboratory (2-2-2)
A laboratory course sequence designed to demonstrate various concepts in Science 4A-4B-4C respectively, as well as to acquaint students with simple laboratory techniques and physical measurements. One hour lecture and three

hours laboratory. *Prerequisite: some prior knowledge about Science 4A-4B-4C or concurrent registration is encouraged.* Luo, Lee. (F,W,S)

Science and Technology

OFFICE: Building 303, Matthews Campus

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Professors:
William R. Frazer, Ph.D. *(Physics)*
Donald R. Helinski, Ph.D. *(Biology)*
Te Chiang Hu, Ph.D. *(APIS)*
William Nachbar, Ph.D. *(AMES)*
Laurence E. Peterson, Ph.D. *(Physics)*
Sheldon Schultz, Ph.D. *(Physics)*
Herbert Stern, Ph.D. *(Biology)*

Associate Professors:
Elvin J. Harper, Ph.D. *(Chemistry)*
John Helton, Ph.D. *(Mathematics)*
Trevor C. McMorris, Ph.D. *(Chemistry)*
Melvin I. Simon, Ph.D. *(Biology)*
Frank B. Thiess, Ph.D. *(Mathematics)*
Joseph W. Watson, Ph.D. *(Chemistry, Provost of Third College)*
Daniel E. Wulbert, Ph.D. *(Mathematics, Chairman of Science and Technology Program)*
Juan Yguerabide, Ph.D. *(Biology)*

Assistant Professors:
Edward C. Alexander, Ph.D. *(Chemistry)*
Willie C. Brown, Ph.D. *(Biology)*
Ronald J. Evans, Ph.D. *(APIS)*
P. A. George Fortes, Ph.D. *(Biology)*
Leonard R. Haff, Ph.D. *(Mathematics)*
David L. Isaman, Ph.D. *(APIS)*
William B. Kristen, Ph.D. *(Biology)*
John Leong, Ph.D. *(Chemistry)*
Katja Lindenberg, Ph.D. *(Chemistry)*
Juan Luco, Ph.D. *(AMES)*
Oscar J. Lumpkin, Ph.D. *(Physics)*
George W. Luna, Ph.D. *(Mathematics)*
Roy H. Ogawa, Ph.D. *(Mathematics)*
Ramon Pinon, Jr., Ph.D. *(Biology)*
Herbert B. Shore, Ph.D. *(Physics)*
Meredith G. Somero, Ph.D. *(Biology)*

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General Requirements The Science and Technology Program is designed to give students an understanding of the basic laws of nature and their relation to the foundations of a technological society. A basic sequence is required of all students in Third College, consisting of three quarters covering biology, chemistry, and physics (Science and Technology 10ABC or 11ABC).

1. The Science and Technology 10ABC sequence is for students with weak or modest previous preparation in science and/or no career objectives in this area.

2. The Science and Technology 11ABC sequence is for students with good high school science preparation and/or aspirations towards a science major.

The mathematics requirements for students in Third College consist of two quarters (8 units) of any mathematics course offering at UC San Diego. Descriptions of the courses are listed under the Department of Mathematics.

Science Majors Science and technology is a lower division interdisciplinary program of the Third College. It is designed to prepare students for the science, mathematics, and engineering majors at UC San Diego. Therefore, students declaring a science, mathematics, or engineering major are expected to satisfy the science and mathematics prerequisites for the departmental major as well as the Third College general education requirements. (See appropriate department under *Departments of Instruction.)* It is also recommended that students consult a faculty member affiliated with the Science and Technology Program, in the department offering the major.

Applied Mechanics and Engineering Science Majors Third College students interested in preparing for an upper-division major in applied mechanics, systems science, or bioengineering (engineering or premedical) in the Department of Applied Mechanics and Engineering Sciences (AMES) can select an individual lower-division program worked out with their AMES/Third College advisers to satisfy AMES prerequisites (see AMES). Such a program would normally require completion of Mathematics 2A, 2B, 2C, 2DA and 2EA, and Science and Technology 16A and 16B, before the two-year AMES major is begun. Third College students interested in the four-year program leading to the Bachelor of Science in Engineering (Engineering Sciences) should contact their AMES/Third College advisers immediately after being accepted to the College.

Courses

Lower Division

10A. Introduction to Modern Biology (4)
An introductory course in modern biology exploring specific areas to illustrate biological principles. A significant portion of the course is devoted to microbiology. (F)

10B. Chemistry (4)
This course is designed to introduce some of the fundamental concepts and theories of chemistry, including atomic and molecular structure and the nature of chemical reaction. (W)

10C. Physics (4)
Selected basic phenomena encountered in the natural sciences. Typical topics include the range of length, time, and mass dimensions encountered in physical phenomena: energy, the role of gravity in the existence and composition of the earth's atmosphere, and models of the universe. Some familiarity with algebra and trigonometry will be helpful. Calculus not required. (S)

11A. Vertebrate Zoology (4)
An introduction to the vertebrate way of life through the examination of selected topics in anatomy, physiology, environmental adaptation, and evolution. (Biology 15 is a sequel to Science and Technology 11A.) (F)

11B. Introduction to Chemistry (4)
A basic introduction to chemistry for science majors covering principles of bonding, molecular structure, physical properties, reactivity and equilibria. (S)

11C. Physics (4)
This course is designed to introduce potential science majors to concepts in physics and to prepare them for further sequences in the sophomore year. Topics include kinematics, dynamics, energy, momentum, and thermodynamics. *Prerequisites: Sci/Tech. 11B, Math 4A, 4B, or the equivalent. 4C should be taken concurrently (or previously).* (S)

12A. Chemistry (4)
This course is the first part of the three-part introductory-chemistry sequence. Lecture material includes chemical kinetics, thermodynamics and chemical equilibrium. *Prerequisites: Sci/Tech. 11B or consent of instructor.* (F)

12AL. Chemistry (2)
Laboratory course: Introduction to basic gravimetric, titrimetric, and chromatographic methods. *Prerequisite: Sci/Tech 11B or consent of instructor. Should be taken concurrently with 12A.* (F)

12B. Chemistry (4)
The second part of the introductory-chemistry sequence. The areas of acid-base chemistry, electro chemistry, inorganic complexes, and structural chemistry are developed. *Prerequisite: Sci/Tech. 12A or permission of instructor.* (W)

12BL. Chemistry (2)
Laboratory course: Analytical Chemistry. A course in basic analytical chemical analysis involving use of gravimetric, titrimetric and instrumental method. *Prerequisite: Sci/Tech 12AL.* (W)

12C. Chemistry (4)
The third part of the introductory-chemistry sequence. An elementary course in organic chemistry which introduces basic theories of atomic structure, bonding and molecular structure, properties of hydrocarbons, description of various functional groups, stereochemistry, some reactions of organic compounds and a brief look at biologically important molecules. *Prerequisite: Sci/Tech. 12B.* (S)

15A. Physics (4)
A lecture and laboratory course in physics with special emphasis on applications to biology and medicine. An introduction to mechanics: motion in one and three dimensions, momentum, energy and circular motion. This course is primarily for students in the Third College Human Biology Program, or Chemistry majors. *Prerequisites: Sci/Tech. 11C, Math 4C or equivalent, or consent of instructor.* (F)

15B. Physics (4)
Introduction to electromagnetism and applications in electricity: electric and magnetic fields, electric potential, d.c. and a.c. circuit theory, electrical measurements, electromagnetic radiation. *Prerequisites: Sci/Tech. 15A, concurrent enrollment in Math 2A or consent of instructor.* (W)

15C. Physics (4)
Introduction to mechanics of fluids, thermal physics, optics, description of the structure of atoms and nuclei. *Prerequisite: Sci/Tech. 15B or consent of instructor.* (S)

16A. Introduction to Engineering Mechanics (4)
Statics or particles and rigid bodies, forces in beams and cables, friction, analysis of elastic truss structures, dynamics of particles in two and three dimensions, linear and angular momentum, energy, impulsive motion. Applications to engineering problems. *Prerequisites: Sci/Tech. 15A, or equivalent; Math 2DA (or concurrent registration), or Math 2D and Math 2E (concurrent registration with Math 2E permitted).* (W)

16B. Introduction to Circuit Analysis (4)
Steady-state and transient analysis of circuits composed of linear electrical elements; electromechanical analogy; acoustic and hydraulic elements. Applications to engineering problems. *Prerequisites: Sci/Tech. 15B, or equivalent; Math 2EA (or conurrent registration), or Math 2D and Math 2E.* (S)

20. Problem Solving & Basic Programming (2)
This course is an introduction to BASIC mini computer programming and applications. The following are typical of the topics covered: interactive techniques, simulation methods, subroutines, Matrix manipulations, computer aided instructions, graphics, and statistics calculations. The class will meet for three weeks, five days a week, for "hands on" instruction on the two Third College computers. This will be followed by an individual project in the student's area of interest. A student with credit for APIS 61 will not be eligible for credit in this course. Students wishing to pursue further instruction in programming or computer science are advised to follow Science and Technology 20 with APIS 61. *Prerequisite: this course will not require an extensive mathematics background. A solid high school background or some college mathematics will suffice. A student with credit for APIS 10 or APIS 13 will not be eligible for credit in this course.* (F,W,S)

25. Science and the Third World (2)
A general introduction into the issues brought forth by advances in modern biology, and the possible impact of these advances on Third World societies. Topics include information sources, training of scientific personnel, world food situation, genetic engineering, genetics, politics, and I.Q. Priority for Third College students. *Prerequisites: Sophomore standing, 1 quarter each of biology, chemistry and physics.*

Upper Division

195. Undergraduate Teaching
Course is designed to provide undergraduate students with teaching experience in science laboratory courses. The students will assist in the preparation and running of laboratory sections. *Prerequisites: accomplishment of above-average grade in course in question and approval of instructor.* (F,W,S)

Science, Technology and Public Affairs

Professors:
Herbert F. York *(Physics) (Program Director)*

Associate Professor:
Georgios H. Anagnostopoulos *(Philosophy)*

* * *

Hannes Alfven *(Professor of APIS)*
James R. Arnold *(Professor of Chemistry)*
Clifford Grobstein *(Professor of Biology)*
Sanford A. Lakoff *(Professor of Political Science)*
Stanford S. Penner *(Professor of AMES)*
Roger R. Revelle *(Professor of Political Science)*

The program offers an opportunity to study the important social policy issues that lie at the intersection of science, technology and decision-making and to develop awareness of the social and political factors that condition technological and scientific development as well as the impact of science and technology on the social order. The program will be attractive to students anticipating careers in law, administrative sciences, science, engineering, business, and international affairs. The program will serve as a meeting place for those interested in approaching policy questions from the perspective of the physical and biological sciences and for those in the social sciences having an interest in the scientific and technological component of present social, political, and environmental problems.

The Minor Program for Fourth College

The science, technology and public affairs (STPA) minor consists of six courses chosen from the following lists. Of these six, at least four must be from the list of STPA courses and not more than two of those four should be given by the same instructor. Two of the six courses may be chosen from the list of related courses in other departments and programs. Students' specific plans for completing the minor should be approved by the program office no later than early in the junior year.

Courses

Upper-Division Core Courses

100A. Origins and Results of the World's Space Programs (4)
(Same as Contemporary Issues 100) A course designed to explore and analyze the origins and results of a particular modern technology, using the world's space programs as an example. The political, technological, and strategic origins of the U.S., Soviet, and other space programs from the earliest times will be presented, with special emphasis on the period since World War II. Results to be discussed will include science and monitoring-arms control agreements. Mr. York and Mr. Alfven

100B. Seminar on the Results and Value of the Space Programs (4)
A continuation, in seminar form, of STPA 100A for those who want to go more deeply into the matter. Each student will be required to present a paper for discussion by the others. Limited to 20. *Prerequisite: STPA 100A or consent of instructor.* Mr. York (Not to be offered 1976-77.)

101A. Arms and Arms Control (4)
(Same as Frontiers of Science 104) A course designed to explore and analyze a particular current issue in technology policy and how society goes about coping with it. The technological, political, and strategic ideas that underlie both the nuclear-arms race and attempts to control it will be discussed in a historical perspective. Mr. York (Not to be offered 1976-77.)

101B. Seminar on Arms and Arms Control (4)
A continuation, in seminar form, of course 101A for those who want to go more deeply into the subject. Each student will be required to present a paper for discussion by the others. Limited to 20. *Prerequisite: STPA 101A or the consent of the instructor.* Mr. York (Not to be offered 1976-77.)

105A-B. Technology and Society (4)
(Same as Political Science 105A-B) This course examines the impact of advances in science and technology on society. Among the topics considered: the theory of post-industrial society, the debate over limits to growth, the "energy crisis," the making of science policy, and the roles and responsibilities of scientists and technologists in politics. Instructors: S. Lakoff, H. York, R. Revelle

107. Technology and Human Values (4)
(Same as Philosophy 125) Traditional ideas of nature and the rise of science and technology. The influence of the rise of science and technology on political ideals, on human life, on freedom, on education, and on warfare. Mr. Anagnostopoulos

111. Technology, Ecology, Morality (4)
(Same as Frontiers of Science 111) The effects of technological development on the welfare of human beings and other living things. The course is designed both for scientists and engineering majors concerned with examining the moral aspects of their career choices, and for all who are actively interested in this broad complex of issues. The course will be built generally around Lewis Mumford's "The Myth of the Machine." Specific topics like nuclear weapons, the space program and DDT will be treated with some depth. Instructor: J. Arnold (Not to be offered 1976-77.)

119A. Energy: Demands, Resources, Impact, Technology & Policy (4)
(Same as Frontiers of Science 119A) Past and estimated future energy demands. Renewable and non-renewable energy resources. Economic impact of energy use. Energy conservation in manufacturing, transportation, home use. Energy policy. AMES and physics faculty.

119B. Energy: Non-Nuclear Energy Technologies (4)
(Same as Frontiers of Science 119B) Oil recovery from tar sands and oil shale. Coal production, gasification, liquification. The hydrogen economy. Energy-storage systems. Techniques for direct energy conversion. Solar-energy utilization. Energy from windmills. Tidal-and-wave-energy utilization. Hydroelectric power generation. Hydrothermal energy. Geothermal energy from hot rocks. Electrical power production, transmission, and distribution. *Prereq-*

uisites: Lower division science and mathematics sequence in Revelle or equivalent and STPA 119A. AMES and physics faculty.

119C. Energy: Nuclear Energy Technologies (4)
(Same as Frontiers of Science 119C) A brief survey of energy demands and resources. Available nuclear energy. Physical background—thermal dynamics—atomic and nuclear physics—fission and fusion processes. Physics of fission reactions—engineering aspects—safety and environmental effects. Fusion, scaling laws and start-up criteria—laser fusion. Magnetic confinement—Equilibrium instability. *Prerequisites: Lower division science and mathematics sequence in Revelle or equivalent and STPA 119B.*

157. Technology and the Poor Countries (4)
(Same as Political Science 157) This course treats the gap between the rich and the poor countries and the role of technology in bridging this gap. Special attention will be given to the sources of global poverty and to the importance of increased agricultural productivity and the role of the advanced countries. Instructor: R. Revelle

180. Senior Seminar in Science and Public Policy (4)
Discussion of requirements for effective utilization of scientific knowledge in public policy analysis with examples presented by experts on such issues as impact of biomedical advances, technology in relation to national needs, nuclear power and nuclear weapons and implications of space exploration. *Prerequisite: senior or graduate standing.* Instructor: C. Grobstein and others.

199. Special Project (2 or 4)
Directed study on topics in science, technology & public affairs; especially for Fourth College students. *Prerequisite: senior standing.* Instructor: H. York

Related Courses in other departments and programs (change somewhat from year to year.)

AMES 149A-B-C
Biology 5
Communications 180, 191
Economics 105, 116A-B, 160, 161
Frontiers of Science 112, 122, 124, 125
Philosophy 112A-B
Sociology 131
Urban & Rural Studies 144, 146

Scripps Institution of Oceanography

OFFICE: 1156 Ritter Hall

Professors:
Gustaf Arrhenius, Ph.D. *(Oceanography)*
Robert S. Arthur, Ph.D. *(Oceanography)*
George E. Backus, Ph.D. *(Geophysics)*
Andrew A. Benson, Ph.D. *(Biology)*
James N. Brune, Ph.D. *(Geophysics)*
Charles S. Cox, Ph.D. *(Oceanography)*
Harmon Craig, Ph.D. *(Geochemistry and Oceanography)*
Joseph R. Curray, Ph.D. *(Marine Geology)*
Seibert Q. Duntley, Sc.D. *(Physics)*
Albert E. J. Engel, Ph.D. *(Geology)*
James T. Enright, Ph.D. *(Behavioral Physiology)*
David Epel, Ph.D. *(Biology)*
J. Freeman Gilbert, Ph.D. *(Geophysics)*
Edward D. Goldberg, Ph.D. *(Chemistry)*
Harold T. Hammel, Ph.D. *(Physiology)*
Richard A. Haubrich, Ph.D. *(Geophysics)*
Francis T. Haxo, Ph.D. *(Biology)*
Robert R. Hessler, Ph.D. *(Biological Oceanography)*
Douglas L. Inman, Ph.D. *(Oceanography)*
John D. Isaacs, B.S. *(Oceanography)*
Charles D. Keeling, Ph.D. *(Oceanography)*
Devendra Lal, Ph.D. *(Nuclear Geophysics)*
Ralph A. Lewin, Ph.D., Sc.D. *(Biology)*
John A. McGowan, Ph.D. *(Oceanography)*
Henry W. Menard, Ph.D. *(Geology)*
Walter H. Munk, Ph.D. *(Geophysics)*
William A. Newman, Ph.D. *(Oceanography)*
William A. Nierenberg, Ph.D. *(Physics, Vice Chancellor of Marine Sciences and Director of Scripps Institution of Oceanography)*
Robert L. Parker, Ph.D. *(Geophysics)*
Fred B Phleger, Ph.D. *(Oceanography)*
Joseph L. Reid, M.S. *(Oceanography)*
Richard H. Rosenblatt, Ph.D. *(Marine Biology)*
George G. Shor, Jr., Ph.D. *(Marine Geophysics)*
Fred N. Spiess, Ph.D. *(Oceanography, and Chairman of the Department)*
Charles W. Van Atta, Ph.D. *(Engineering Physics and Oceanography)*
Benjamin E. Volcani, Ph.D. *(Microbiology)*
Edward L. Winterer, Ph.D. *(Geology)*
Milton A. Bramlette, Ph.D. *(Geology, Emeritus)*
Edward C. Bullard, Sc.D., F.R.S. *(Geophysics, Emeritus)*
Denis L. Fox, Ph.D. *(Marine Biochemistry, Emeritus)*
Carl L. Hubbs, Ph.D. *(Biology, Emeritus)*
Martin W. Johnson, Ph.D. *(Marine Biology, Emeritus)*
Russell W. Raitt, Ph.D. *(Geophysics, Emeritus)*
Norris W. Rakestraw, Ph.D. *(Chemistry, Emeritus)*
Roger R. Revelle, Ph.D. *(Oceanography, Emeritus)*
Per F. Scholander, M.D., Ph.D. *(Physiology, Emeritus)*
Francis P. Shepard, Ph.D. *(Submarine Geology, Emeritus)*
Victor Vacquier, M.A. *(Geophysics, Emeritus)*
Claude E. ZoBell, Ph.D. *(Marine Microbiology, Emeritus)*

Associate Professors:
Jeffrey L. Bada, Ph.D. *(Marine Chemistry)*
Wolfgang H. Berger, Ph.D. *(Oceanography)*
Russ E. Davis, Ph.D. *(Oceanography)*
D. John Faulkner, Ph.D. *(Marine Chemistry)*
Carl H. Gibson, Ph.D. *(Engineering Physics and Oceanography)*
Joris M.T.M. Gieskes, Ph.D. *(Oceanography)*
James W. Hawkins, Ph.D. *(Geology)*
Walter F. Heiligenberg, Ph.D. *(Behavioral Physiology)*
Myrl C. Hendershott, Ph.D. *(Oceanography)*
Nicholas D. Holland, Ph.D. *(Oceanography)*
John D. Mudie, Ph.D. *(Geophysics)*
Michael M. Mullin, Ph.D. *(Oceanography, and Vice-Chairman of the Department)*
Melvin N. A. Peterson, Ph.D. *(Oceanography)*

Assistant Professors:
Paul K. Dayton, Ph.D. *(Oceanography)*
Daniel Goodman, Ph.D. *(Population Biology)*
Robert T. Guza, Ph.D. *(Oceanography)*
Thomas H. Jordan, Ph.D. *(Geophysics)*
Miriam Kastner, Ph.D. *(Geology)*
J. Douglas Macdougall, Ph.D. *(Earth Sciences)*
Kenneth H. Nealson, Ph.D. *(Marine Biology)*
George N. Somero, Ph.D. *(Biology)*
Hans R. Thierstein, Ph.D. *(Geology)*
Clinton D. Winant, Ph.D. *(Oceanography)*

* * *

Elbert H. Ahlstrom, Ph.D., *Adjunct Professor of Oceanography*
Theodore H. Bullock, Ph.D. *(Neurophysiology)*
John R. Hunter, Ph.D., *Associate Adjunct Professor of Marine Biology*
Reuben Lasker, Ph.D., *Adjunct Professor of Marine Biology*
Brian J. Rothschild, Ph.D., *Adjunct Professor of Oceanography*
Theodore Enns, Ph.D., *Research Physiologist and Lecturer*
Richard W. Eppley, Ph.D., *Research Biologist and Lecturer*
Frederick H. Fisher, Ph.D., *Research Oceanographer and Lecturer*
Osmund Holm-Hansen, Ph.D., *Research Biologist and Lecturer*
Michael P. Kennedy, Ph.D., *Research Associate and Lecturer*
William R. Riedel, M.S., *Research Geologist and Senior Lecturer*
John R. Beers, Ph.D., *Associate Research Zoologist and Lecturer*
Jonathan Berger, Ph.D., *Associate Research Geophysicist and Lecturer*
Angelo F. Carlucci, Ph.D., *Associate Research Microbiologist and Lecturer*
Abraham Fleminger, Ph.D., *Associate Research Biologist and Lecturer*
Theodore D. Foster, Ph.D., *Associate Research Oceanographer and Lecturer*
LeRoy M. Dorman, Ph.D., *Assistant Research Geophysicist and Lecturer*
William H. Fenical, Ph.D., *Assistant Research Chemist and Lecturer*
Robert A. Knox, Ph.D., *Assistant Research Oceanographer and Lecturer*
Elizabeth L. Venrick, Ph.D., *Assistant Research Biologist and Lecturer*

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The graduate department of the Scripps Institution of Oceanography offers graduate instruction leading to M.S. and Ph.D. degrees in oceanography, in marine biology and in earth sciences. Emphasis is on the Ph.D. program. A student's work normally will be concentrated in one of several curricular programs within the department. These programs now include: biological oceanography, marine biology, marine chemistry, geological sciences, geophysics, physical oceanography and applied ocean sciences.

No undergraduate major is offered in the the department though most courses in the department are open to enrollment for qualified undergraduate students with the consent of the instructor. The interdisciplinary nature of research in marine and earth sciences is emphasized; students are encouraged to take courses in several programs and departments, and to select research problems of interdisciplinary character. The research vessels and other facilities of the Scripps Institution and its associated laboratories (including the Institute of Geophysics and Planetary Physics) are available to department students, many of whom participate in oceanographic research at sea.

The Curricular Programs ***Biological Oceanography*** is the field of study concerned with the interactions of populations of marine organisms with one another and with their physical and chemical environment. Since these interactions are frequently complex, and since the concepts and techniques used in investigating the environment and the populations are drawn from many fields, biological oceanography is, of necessity, interdisciplinary. Therefore, studies in physical oceanography, marine chemistry, and marine geology, as well as

biology, are pertinent. Research activities in this curriculum include studies of the factors influencing primary and secondary productivity and nutrient regeneration, food-chain dynamics, community ecology of benthic and pelagic forms, population dynamics, habitat changes and disruption, fishery biology, systematics evolution, biogeography, behavior as it affects distribution, and sampling problems. Theoretical, experimental, and direct observational approaches to these problem areas are conducted.

Marine Biology is the study of marine organisms, their development, and their adaptations. It is, therefore, concerned with the physiological and biochemical processes in marine organisms, their genetic relationships, and the relationship between them and their environment, both biotic and physical. It encompasses several major areas of modern biology, and is interpreted from the viewpoints gained through understanding the physical and chemical dynamics of the seas. Research activities of faculty members in the curriculum currently include microbiology, ultrastructure, photobiology (photosynthesis and respiration, energy-transfer processes and comparative anatomy and physiology of vertebrate and invertebrate vision), barobiology, cardiovascular physiology, comparative biochemistry, comparative and cellular physiology, neurophysiology and behavior, systematics, distribution, ecology, developmental biology and evolution of marine animals and plants.

Marine Chemistry is concerned with chemical processes operating within the marine environment: the oceans, the marine atmosphere, and the sea floor. The interactions of the components of seawater with the atmosphere, with the sedimentary solid phases, and with plants and animals form the basis for research programs. These include: investigations of the carbon system, natural products, chemical interactions between marine organisms, physical and inorganic chemistry of sediment water systems, organic chemistry in the marine environment, distribution of noble gases in seawater, and effects of pollutants on the marine environment.

Geological Sciences emphasizes the application of observational, experimental and theoretical methods of the basic sciences to the understanding of the solid earth, ocean, atmosphere, and the solar system. Principal sub-programs at Scripps are Marine Geology, Petrology, and Geochemistry. Expedition work at sea and field work on land are emphasized as an essential complement to laboratory and theoretical studies. Marine Geology is the field of study concerned with the origin, properties, and history of ocean basins and with the geological processes that affect them. Research areas include tectonics and vulcanism; geomorphology, structure, and deformation of the oceanic crust and continental margins, utilizing both geophysical and geological techniques; deep sea and continental margin sedimentation, stratigraphy, and paleontology; and beach and nearshore processes. Petrology is the study of the origin and history of the rock complexes of the earth's crust and upper mantle, with emphasis on the igneous, metamorphic, and sedimentary rocks of the ocean basins and their margins, the characteristics and interrelations of the oceanic and continental crust, and studies of lunar and meteoritic materials. The Geochemistry Program is designed for students with undergraduate majors in either geology or chemistry. Areas of advanced study and research include the geochemistry of the ocean, the atmosphere, and the solid earth, nuclear geochemistry, circulation and mixing of oceanic water masses based on carbon, oxygen, carbon-14, radium, radon, stable isotopes, and rare gases, studies of volcanic and geothermal phenomena, the interaction of sediments with seawater and interstitial waters, geochemical cycles, and the history and composition of the ocean and sedimentary rocks.

Geophysics emphasizes the application of general experimental and theoretical methods of physics to fundamental problems in the atmosphere, oceans, and interior of the Earth, and in the solar system. Research interests within the curricular group include: magnetohydrodynamic phenomena in the Earth's core, hydrodynamics of oceans and atmospheres, geophysical inverse problems, theoretical seismology, the design of geophysical arrays, multichannel data-processing methods, nonlinear tidal prediction, long-period resonant and equilibrium fluctuations in the Earth and its oceans, radiative transfer in the sea and the atmosphere, interactions of weakly nonlinear wave fields, studies of oceanic crustal structure, acoustic propagation in the oceans, interpretation of regional geomagnetic data, processes of ocean-floor

spreading, and irreversible thermodynamics.

Physical Oceanography is the field of study that deals with mechanisms of energy transfer through the sea and across its boundaries, and with the physical interactions of the sea with its surroundings. Research activities within this curricular group include: study of the general circulation of the oceans, including the relations of ocean currents to driving forces and constraints of the ocean basins; fluctuations of currents, and the transport of properties: the mechanisms of transport of energy, momentum, and physical substances within the sea and across its boundaries; properties of wind waves, internal waves, tsunami and planetary waves; the thermodynamic description of the sea as a system not in equilibrium; optical and acoustic properties of the sea; and the influence of surf on near-shore currents and the transport of sediments.

Applied Ocean Sciences is concerned with man's purposeful and useful intervention into the sea. The program combines the interests of faculty members of the Scripps Graduate Department, the Department of Applied Mechanics and Engineering Sciences, and the Department of Applied Physics and Information Science to produce oceanographers who are knowledgeable of modern engineering and engineers who know about the oceans. Instruction and research are not restricted to structural, mechanical, material, electrical, and physiological problems of operating within the ocean but include the applied environmental science of the sea as well. Since physical, chemical, geological, and biological aspects of the oceans and all forms of engineering may be involved, the curriculum provides maximum flexibility in meeting the needs of each individual student. Present research activities within the curricular group include studies of: deep circulation and deep fish populations; deep-sea autonomous vehicles, instruments, basic control devices and special collecting gear; seismic surveys of the mantle; ocean bottom microseisms and crustal displacements associated with earthquakes; surveys of bathymetric-magnetic trends; deep-sea drilling; design and construction of special purpose ocean vehicles (ships, submarines, platforms) such as FLIP; remotely operated cable-connected vehicles and stations on the sea floor; sonar systems and sonar signal processing equipment; underwater communication and signal detection; underwater photography and television; visibility by swimmers; underwater lasers; remote sensing of sea-surface temperature, roughness, and marine resources from aircraft and orbital spacecraft; meteorology above the oceans; turbulent flows, formation of barrier beaches; mechanisms of currents, sand transport and sediment transport in the surf zone, the shelf and in submarine canyons; diving and hyperbaric physiology. Studies of air-sea interaction, turbulence in mixing from FLIP, the University DC3 and ships of the Scripps fleet.

Requirements for Admission Candidates for admission should have a bachelor's or master's degree in one of the physical, biological, or earth sciences; in some cases a degree in mathematics or engineering science is accepted. The student's preparation should include:

1. mathematics through differential and integral calculus;
2. physics, one year with laboratory (the course should stress the fundamentals of mechanics, electricity, magnetism, optics, and thermodynamics, and should use calculus in its exposition);
3. chemistry, one year with laboratory;
4. an additional year of physics or chemistry;
5. biology and geology, minimum of one quarter each;
6. preparation in at least one foreign language chosen from the following: German, Russian, a Romance language;
7. applicants for admission are required to submit scores on the verbal and quantitative tests of the Graduate Record Examinations given by the Educational Testing Service of Princeton, New Jersey.

Specific additional requirements for admission to the various curricular programs are as follows:

Biological oceanography—two years of chemistry, including general and organic chemistry (physical chemistry requiring calculus may be substituted for physics requiring calculus where a more elementary physics course was taken); and a year of general biology (or zoology, or botany).

Normal preparation should also include a course in general geology and at least one course in three of the following four categories: systematics (e.g., invertebrate zoology), population biology (e.g., ecology), functional biology (e.g., comparative physiology), morphology (e.g., embryology). In special cases other advanced courses in mathematics or natural sciences may be substituted for one or more of the above.

Marine biology—a major in one of the biological sciences (or equivalent), with basic course work in botany, microbiology, or zoology; two years of chemistry, including organic (biochemistry and physical chemistry will be expected of students in experimental biology, although the student may, if necessary, enroll in these courses at UC San Diego after admission). Training in one or more of the following areas is strongly recommended: cellular biology, molecular biology, comparative physiology, genetics, developmental biology, ecology, comparative anatomy, vertebrate and invertebrate zoology, microbiology and botany. A strong scholastic record in a narrower biological field may be considered in lieu of breadth of background.

Marine chemistry—major in chemistry or biochemistry.

Geological sciences—major in one of the earth sciences or physical or inorganic chemistry. Physical chemistry with calculus is required, and preparation beyond the minimum requirements in mathematics, physics, and chemistry is strongly recommended.

Geophysics—major in physics or mathematics, or equivalent training.

Physical oceanography—major in a physical science, including three years of physics and mathematics.

Applied ocean sciences—major in physical science or engineering science, including three years of physics or applicable engineering and three years of mathematics at college level.

Candidates with preparation different from that given above can be admitted only if their undergraduate or previous graduate record has been outstanding.

Programs of Study Because of limited facilities, the department does not encourage students who wish to proceed only to the M.S. If circumstances warrant, the degree is normally offered under Plan II (comprehensive examination) after completion of course work established by the department. The program of study for the Ph.D. degree is determined in consultation with the student's adviser (after the first year, the chairman of the student's guidance or doctoral committee). General requirements of the curricular groups are as follows:

Biological Oceanography The student will be expected to be familiar with the material presented in the following courses: SIO 210A, 240, 260, 270, 275A-B, 276A-B, 280, 280L, and one of 289, 274 or 294A. Other course work ordinarily will be recommended by the student's advisory committee, usually including 278 (or equivalent) and at least one advanced-level course in physical, chemical, or geological oceanography. Participation in an oceanographic cruise (minimum of two weeks duration) is required.

Marine Biology Entering graduate students will be expected to gain a varied research experience in several laboratories during their first year through a "rotation system" normally consisting of six weeks involvement in the activities of each of three different laboratories to be selected in consultation with their guidance committees and with the consent of the other professors concerned. In their first year at SIO, or at latest early in the fall quarter of their second year, students will take the departmental examination, at which time the student will be expected to demonstrate competence in general biology and in the material covered in the following courses: SIO 210A, 260, 280, 280L and 289, as well as any other course work recommended by the advisory committee. All students are expected to enroll and actively participate in a seminar course during two quarters of each year.

Marine Chemistry Students in this curriculum will be expected to take courses within the areas of physical and biological oceanography and marine geology or marine biology, as well as courses in the Department of Chemistry, which will be assigned according to personal needs after consultation with a faculty adviser.

Geological Sciences The Geological Sciences curricular group offers programs leading to the Ph.D. either in earth sciences or oceanography. The only general requirement is responsibility for material offered in

the Marine Geology Seminar (SIO 248A-B-C). The "basic" courses (SIO 210A, 260 and 280) are considered essential for the oceanography degree. Some, or all, of these courses will normally be taken by candidates for the earth sciences degree. Other courses in oceanography and related areas will be selected and scheduled depending on the student's background and interests. In some cases a student's program may include course work in selected subject areas given at other campuses. Normally students will take a comprehensive departmental examination near the end of their third quarter of residence. The doctoral qualifying examination will be given during the second year of residence. There are no additional language requirements beyond the general department admission requirements of one year of college-level study in a modern foreign language useful in the student's studies.

Geophysics There is no single course of study appropriate to the geophysics curriculum; instead, the individual interests of the student will permit, in consultation with the adviser, a choice of course work in seismology, geomagnetism, etc. Every student, however, will be required to have knowledge of one or more of the ocean sciences. In the winter quarter of the second year of residence each student will be given an oral departmental examination, which is intended to cover the student's formal training. A brief presentation of possible research interests will also be expected at this exam. There is no formal language requirement.

Physical Oceanography Students in this curricular program will be expected to have satisfied the departmental admission requirement of preparation in at least one important foreign language and to demonstrate proficiency in the subjects treated by the following courses: SIO 210A, 211A-B, 212A-B, 214, 216A, 220, 223, 240, 260 and 280. Additional requirements chosen from oceanography or other fields will be based on the objectives and needs of the individual student.

Applied Ocean Sciences Students must: *(a)* take or demonstrate their knowledge of the following basic courses: SIO 210A, 240, 260, 280 and AMES 294(A-C); and *(b)* attend the Applied Ocean Sciences Seminar throughout their entire period of enrollment. Additional course requirements for a field of emphasis in a complementary discipline will be established to meet the needs and interests of each individual student by the advisory committee.

Language Requirements The department has no formal language requirements. Graduate students are expected to have satisfied the entrance requirement of preparation in at least one important foreign language. Within the department, curricular programs may require demonstration of ability to use certain foreign languages pertinent to a student's research. All students must be proficient in English.

Departmental and Qualifying Examinations Doctoral candidates normally will be required to take a departmental examination not later than early in the second year of study. The examination will be primarily oral, although written parts may be included. The student will be required to demonstrate in quantitative and analytical manner comprehension of required subject material and of the pertinent interactions of physical, chemical, biological, or geological factors.

After the student has passed the departmental examination, and has completed an appropriate period of additional study, the department will recommend appointment of a doctoral committee. This committee will determine the student's qualifications for independent research, normally by means of a qualifying examination late in the second year of study or early in the third year, and will supervise the student's performance and reporting of his or her research.

The nature of the qualifying examination varies between curricular groups. In biological oceanography, marine biology, geological sciences, physical oceanography, and applied ocean sciences, the student will be expected to describe his or her proposed thesis research and satisfy the committee, in an oral examination, as to mastery of this and related topics. In marine chemistry, the student will be expected to present, in an oral examination, both a major and a minor proposition. The major proposition will consist of a statement of an original research problem or scientific idea within his or her area of interest. The student should be prepared to discuss the theory and experimental techniques that may be involved, the significance of the proposition, and its relationship to previous knowledge. The minor proposition should consist of a re-

search problem or scientific idea outside the student's main field of interest. In geophysics, the student presents an original research problem, in the form of a written proposition, to the candidacy committee. The student's oral presentation and defense of this proposition completes the examination.

Dissertation A requirement for the Ph.D. degree is the submission of a dissertation and a final examination in which the thesis is publicly defended. It is expected that each doctoral candidate will submit a manuscript based on this dissertation for publication in a scientific journal.

Special Financial Aids In addition to teaching and research assistantships, fellowships, traineeships and other awards available on a campus-wide competitive basis, the department has available a certain number of fellowships and research assistantships supported from research grants and contracts, or from industrial contributions.

Courses

Upper Division

198. Directed Group Study (2-4)
Directed group study on a topic or in a field not included in the regular department curricula, by special arrangement with a faculty member. *Prerequisite: consent of instructor.* Staff (F,W,S) (Satisfactory/Unsatisfactory grades permitted).

199. Special Studies (2 or 4)
Independent reading or research on a problem by special arrangement with a faculty member. *Prerequisite: consent of instructor.*

Graduate

207A-B. Problems in General and Physical Oceanography (2-2)
Presentation of reports, review of literature, and discussion of various regions and aspects of the ocean, oceanography, and related fields. Seminar. Isaacs (W,S)

208. Seminar in Applied Ocean Sciences (1)
Topics in applied ocean sciences. One hour seminar. Staff (F,W,S) (Satisfactory/Unsatisfactory grades only)

209. Special Topics (1-4)
Within the next few years, lectures on various special subjects will be offered by members of the staff. The emphasis will be on topics that reveal the interdependence of the biological, chemical, geological, and physical processes operating in the oceans. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

210A. Physical Oceanography (3)
Physical description of the sea; physical properties of seawater, methods and measurements, boundary processes, regional oceanography. *Prerequisites: the mathematics and physics required for admission to the graduate curriculum in the Scripps Institution of Oceanography (see text), or consent of instructor.* Hendershott, Reid (F)

210B. Physical Oceanography (3)
Introduction to mechanics of fluids on a rotating earth; transport and boundary-layer phenomena, turbulent flow, and wave motion; emphasis on applications to biological, chemical, and geological oceanography. *Prerequisites: SIO 210A and consent of instructor.* Arthur, Cox (F) (Satisfactory/Unsatisfactory grades permitted.)

211A-B. Ocean Waves (3-3)
Propagation and dynamics of waves in the ocean including the effects of stratification, rotation, topography, wind and nonlinearity. *Prerequisites: SIO 210A, 214.* Davis, Hendershott (W,S)

212A. Dynamical Oceanography (3)
Dynamics of ocean currents: transport phenomena; geostrophy; inertial motion; free, steady motion in a two-layer system. *Prerequisites: differential equations and consent of instructor.* Arthur (W)

212B. Dynamical Oceanography (3)
Turbulent boundary layers at sea surface and bottom; wind currents and theories of ocean circulation; applications of boundary layer techniques. *Prerequisites: SIO 212A and consent of instructor.* Arthur, Hendershott (S)

213. Radiative Transfer in the Sea (3)
Geometrical radiometry; radiant energy measurements; examples of light fields; effects of air-sea boundary and scattering-absorbing on underwater light fields; experimental and theoretical determination of optical constants in the sea. Application: underwater visibility, marine biology, radiant energy transport problems. *Prerequisite: consent of instructor.* Duntley (F) (Not to be offered 1976-77.)

214. Introduction to Fluid Mechanics (3)
A survey of classical problems in fluid mechanics and approximate techniques of analysis. Topics include conservation equations, straight laminar flows, low and high Reynolds number laminar flow, stability of laminar flows, turbulent flow. *Prerequisite: partial differential equations.* Winant (F)

215. Experimental Fluid Mechanics (4)
A lecture and laboratory course designed to present the experimental aspects of fluid mechanics. Lectures will cover some of the general methods of fluid mechanic measurements. Students working in small groups, will conceive, design, and conduct laboratory experiments, interpret their results and present written reports. *Prerequisite: SIO 214 or AMES 101A, B, C, or consent of instructor.* Winant (S)

216A. Physics of Sediment Transport (3)
Mechanics and energetics of sediment transport by water, wind, waves, and density flows. Types of flow systems, mechanics of granular and fluid media, their interactions and transport relations; and the generation and formation of bed forms under waves and currents. Lectures, laboratory and demonstration sessions. *Prerequisite: consent of instructor; SIO 214, 211A recommended.* Inman, Winant (W)

216B. Nearshore Processes (4)
Application of the mechanics of wind, wave and sediment transport to the nearshore environment and to the formation of sedimentary structures and beaches. Fluid mechanics of the surf zone; generation of longshore and rip currents, surf beat, nonlinear waves. *Prerequisites SIO 211A or 214 or 216A.* Guza, Inman (S)

217. Optical Oceanography (3)
Optical structure of the oceans; global distribution of water clarity; optical effects of marine organisms and sediments; optical aspects of photosynthesis; ocean color; remote sensing; principles of underwater photography and television; visibility by swimmers and marine animals; protective coloration; optimization of underwater artificial lighting for sea floor exploration, exploitation, and facility

construction. *Prerequisite: consent of instructor.* Duntley (F)

219. Special Topics in Physical Oceanography (1-4)
Example topics are case histories and methods in physical oceanography, theories of the ocean circulation, numerical methods in large-scale ocean and atmospheric models, and natural electromagnetic phenomena in the earth and the oceans. Staff (F,W,S)

220. Topics in Geophysical Continuum Mechanics (3)
Mathematical foundations, physical limitations and selected geophysical applications of continuum mechanics. Topics include finite strain; thermodynamics of stress-strain relations; phenomenology and mechanisms of dissipation; continuum theory of dislocations; and generation and propagation of elastic waves in a nearly homogenous medium. *Prerequisites: differential and integral calculus, differential equations, linear algebra.* Backus (F)

221. Topics in Geophysical Fluid Dynamics (3)
Effects of viscosity, density gradients, and gravitational and electromagnetic fields on fluid motion. Topics include forced and free convection and percolation, Alfven waves, and the theory of the origin and secular variation of the earth's magnetic field. *Prerequisite: SIO 220.* Backus (W)

222A. Mathematical Tools in Elementary Geomagnetism and Gravity (3)
Vector spaces, linear operators, spherical harmonics and distributions will be discussed and applied to the description and interpretation of the earth's gravitational and magnetic fields. *Prerequisites: ordinary differential equations; multiple integrals.* Backus (F)

222B. Tensors and Continuum Mechanics (3)
An elementary introduction to tensors will be applied to the foundations of seismology and flow in porous media; topics will include seismic normal modes and the theory of seismic source representation. *Prerequisite: SIO 222A.* Backus (W)

223. Geophysical Measurements (3)
Design of geophysical experiments and analysis of geophysical measurements, interpretation of geophysical time series; wave number filters, theory of arrays, geophysical systems analysis. *Prerequisite: elementary complex variables.* Haubrich (W)

224. Internal Constitution of the Earth (3)
An examination of current knowledge about the composition and state of the earth's interior revealed by geophysical observations. Seismic velocity and mass density distributions; equations of state; phase changes; energy balance and temperatures; constraints on composition from extraterrestrial samples and exposed rocks; spherical and aspherical variations of properties. *Prerequisites: calculus and differential equations, basic chemistry and physics, or consent of the instructor.* Jordan (S)

225. Tides and the Rotation of the Earth (3)
Tide-generating potentials, static and dynamic theory of ocean tides (surface and internal), bodily tides, atmospheric tides, tidal friction and the length of day. *Prerequisite: consent of instructor.* Munk (S)

226A-B. Introduction to Marine Geophysics (3-3)
Methods of geophysical investigations in the ocean, including field techniques, interpretation, assumptions, limitations, and results. Includes underwater sound, seismic methods (reflection and refraction), gravity and geomagnetic fields, heat flow, other related topics. Critical discussion of "state of the art" and current results. *Prerequisites: calculus, differential equations, basic physics, and basic geology or consent of instructor.* This course is intended primarily for geologists and geophysicists. Anderson, Mudie, Raitt, Shor, Spiess (W,S)

227A-B. Seismology (3-3)
Equation of motion, exact transient solution of canonical problems, interface pulses, geometrical diffraction theory, ray theory and mode theory in plane-layer media, free oscillations of the earth, radiation from moving sources, source determination, aeolotropic and heterogeneous media, dissipation, interpretation problems. *Prerequisite: consent of instructor.* Brune, Gilbert (W,S)

229. Geomagnetism (3)
Survey of the application of electromagnetic theory to the solid earth, the main geomagnetic field, the dynamo model of its source, implications of the dynamo theory, induction by external variations, the electrical conductivity inverse problem and its solution, electromagnetic anomalies, induction in simple bodies, induction in the oceans, magnetotelluric theory. *Prerequisites: advanced calculus, differential equations, complex variables and familiarity with Maxwell's equations, or consent of instructor.* Parker (S)

230. Introduction to Inverse Theory (3)
Linear theory of Backus and Gilbert; non-linear theory, which is an approximation based on the linear solution; Backus' inference treatment and the instructor's own variational methods. Examples will be drawn from gravity, geomagnetism and seismology. *Prerequisite: consent of instructor.* Parker (S)

231A-B. Seismological Methods (3-3)
Problems and techniques in seismology, seismic wave propagation, free oscillations of the earth, earthquake source mechanism, seismogram analysis, instrumentation. *Prerequisite: consent of instructor.* Brune (F,W)

232. Interpretation of Seismograms (3)
This course will deal with the principles and practice in the interpretation of seismograms. A variety of projects involving the analysis of seismograms will be assigned. *Prerequisite: consent of instructors.* Brune, Jordan (S)

239. Special Topics in Geophysics (1-4)
Special course offerings by staff and visiting scientists. Example topics are seismic source theory, geophysical prospecting methods, dislocation theory and seismic mechanisms, tectonic interpretation of geodetic data, and dynamo theory. Staff (F,W,S) (Satisfactory/Unsatisfactory grades permitted).

240. Marine Geology (3)
Introduction to the geomorphology, sedimentation, stratigraphy, vulcanism, structural geology, tectonics, and geological history of the oceans. *Prerequisites: the physics, chemistry, and geology required for admission to the graduate curriculum in SIO, or consent of instructor.* Menard (W)

241A-B. Continental Margin Sediments (3-3)
Lectures, reading and discussion of Quaternary sediments, environments of deposition, and physiography of the continental margin, including the shore zone, continental shelf and slope, deep sea fans, and continental rise. *Prerequisite: consent of instructor.* Curray (S,W)

242A-B. Marine Micropaleontology (3-3)
Introduction to the ecology of Foraminifera, with applications to problems of oceanography and paleoceanography. *Prerequisites: SIO 240 or consent of instructor for 242A; 242A for 242B.* Phleger (W,S)

243. Marine Stratigraphy (3)
Principles of stratigraphy as applied to marine environments; laboratory study and interpretation of microfossils in oceanic sediments. *Prerequisite: SIO 240 or consent of instructor.* Winterer, Riedel (F)

244. Seminar in Sedimentary Petrology (3)
Discussions of current research in sedimentary mineralogy, geochemistry, and petrology. The subject(s) will vary from year to year. (Satisfactory/Unsatisfactory grades permitted.) Kastner (W)

245A. Sedimentary Petrology (3)
Characteristics and origin of sediments and sedimentary rocks. *Prerequisite: consent of instructor.* Winterer (W)

245B. Sedimentary Geochemistry and Mineralogy (3)
Principles of chemical sedimentology; structure and composition of sedimentary minerals; mineral assemblages in sediments; reaction mechanisms in sediments and their geochemical applications; stable isotopes and diagenesis. *Prerequisites: consent of instructor: mineralogy, geochemistry, sedimentary petrology, and physical chemistry are recommended.* Kastner (F)

246A. Problems in Paleoceanography (2)
Discussion of current research concerning the physics, chemistry, and biology of ancient oceans. Seminar. Berger (S)

246B. Oceanic Micropaleontology (3)
Production, preservation, and stratigraphic interpretation of microfossils and nannofossils in deep sea sediments. Laboratory introduction to ecological, preservational and stratigraphic analysis of foraminifera and coccoliths. (Satisfactory/Unsatisfactory grades permitted). Berger (S)

247. Tectonics (3)
The large scale structural and morphological features of continents and ocean basins, crustal deformation, oceanic rises, mountain-building, permanency of continents. Menard (W)

248A-B-C. Seminar in Marine Geology (3-3-3)
An advanced discussion of the geomorphology, sedimentation, stratigraphy, vulcanism, structural geology, tectonics, and geological history of the ocean. *Prerequisites: the requirements for admission to the Geological Sciences Curricular Group of the Scripps Institution of Oceanography or consent of instructor.* Staff (F,W,S) (Satisfactory/Unsatisfactory grades permitted.)

250. Coastal Marine Geochemistry (3)
A survey of chemical reactions in estuaries, lagoons, and coastal marine waters. Fundamentals of river and ocean water chemistries. Coastal sedimentation processes. Geochronologies applicable to inshore systems. Goldberg (W)

251. Thermodynamics of Natural Processes (3)
Applications of thermodynamics to general problems in the earth sciences. Topics include chemical and phase equilibria in heterogeneous multicomponent systems; properties of substances at high temperatures and pressures; models for solid solutions and gaseous mixtures; phase equilibria in silicate melts; adiabatic and pseudo-adiabatic transport; steady-flow systems; closed and open system models of the atmosphere, oceans, and solid earth. *Prerequisites: Chemistry 102A or 202A, or Physics 140, Mathematics 2D or equivalent.* Craig (W)

252A. Nuclear Geochemistry (3)
Geochemistry of stable and radioactive isotopes, with emphasis on oceanic and atmospheric applications. Topics include mixing and circulation studies in the ocean, atmosphere-sea interaction, the carbon cycle, volcanic contributions to the atmosphere and ocean, isotope fractionation effects and stable isotope variations in minerals and rocks. *Prerequisites: Mathematics 2D or equivalent, SIO 210A.* (Satisfactory/Unsatisfactory grades permitted.) Craig (W)

252B. Nuclear Geophysics (3)
Natural radioactivity on the earth; artificial radioactivity on the earth; radioactive nuclei as tracers or tools for studying earth sciences and meteoritics; experimental data and information to date. Lai (S)

252C. Nuclear Geology (3)
Treats various topics dealing with natural radioactivity; radiometric dating techniques, their potentials and limitations, discussed in detail with examples from current applications; implications of Rb-Sr, K-Ar and U-Pb systematics for crustal and atmospheric evolution; terrestrial heat production. Macdougall (W)

253A. Igenous and Metamorphic Petrology (3)
Physical, chemical and mineralogic properties of igneous and metamorphic rocks. Emphasis is on the origin and genetic relationships as interpreted from field occurrences, theoretical studies and experimental data. *Prerequisites: physical geology, geochemistry, mineralogy, physical chemistry (may be taken concurrently).* Hawkins (F)

253B. Mineralogic and Petrographic Laboratory (2)
Principles of optical mineralogy and their application to the study of rocks and minerals. Principles of X-ray diffraction and fluorescence, mineral separation techniques, sample preparation. Emphasis is placed on practical application of techniques to the study of sediments, rocks, and minerals. *Prerequisites: physical geology, geochemistry, mineralogy, physical chemistry (may be taken concurrently.)* Curray, Hawkins, Winterer (F)

254. Advanced Igneous Petrology (3)
The origin and evolution of igneous rocks is considered in terms of field and laboratory evidence. Experimental and theoretical studies bearing on igneous processes are discussed and evaluated in the light of geologic occurrences. Special emphasis is given to igneous rocks of the ocean basins and their margins. Typical rock types are analyzed in the laboratory, and their history is interpreted. *Prerequisite: consent of instructor.* Hawkins (S)

255. Crustal Evolution (3)
The properties, origin, and evolution of the rocks in the earth's crust. *Prerequisite: one year of graduate study in Scripps Institution of Oceanography or consent of instructor.* Engel (W)

256A. Field Geology (4)
Mapping of a field area and preparation of a geological report. Principles of stratigraphy and descriptive structural geology are outlined in the lecture room and in the field. Field work is done on weekends in a local area. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) Engel (W)

256B. Earth Sciences Spring Field Trip (1)
Classical areas of the southwest United States, such as the Colorado Plateau, Mojave Desert, Sierra Nevada and the Peninsular Range, are examined in successive years during six-day field trips. Normally required of all first- and second-year graduate students in marine geology. (Satisfactory/Unsatisfactory grades only). Engel (S)

256C. Earth Sciences Summer Field Course (6)
Participation in a department summer expedition for four to six weeks. Field studies in geology, geochemistry and geophysics are conducted at sea and on islands and coastal regions. Areas recently studied include Central America and the Caribbean, Easter Island, the southeastern Pacific, the western Mediterranean and Melanesia. (Satisfactory/Unsatisfactory grades permitted.) Staff

257. Seminar in Petrology (3)
Discussion of current research in petrology and mineralogy. (Satisfactory/Unsatisfactory grades permitted.) Hawkins (W)

258. Seminar in Geology (3)
Discussions of current research and special topics in geology not treated in the general courses. Staff (F,W,S)

259. Seminar in Geochemistry (2)
The subject matter will vary from year to year and will normally cover an area of geochemistry not treated extensively in other courses. Craig (F,W,S) (Satisfactory/Unsatisfactory grades permitted.)

260. Marine Chemistry (3)
Chemical description of the sea: the distribution of chemical species in the world oceans, and their relationships to physical, biological, and geological processes. Gieskes (W)

261. Physical Chemistry of Seawater (3)
The consideration of seawater as an electrolyte solution with emphasis upon its structure and physical-chemical properties. Thermodynamic considerations of mixed electrolyte solutions with particular reference to seawater. *Prerequisite: Chemistry 202A.* Gieskes (F)

263. Major Chemical Cycles in the Sea (3)
The distribution of chemical species in the world oceans and their relation to physical and biological processes, with emphasis on transport and exchange. Keeling (S)

264. Solids in Nature (3)
Experimental and theoretical evaluation of geologically important properties of solids. Characteristic differences between solid types, electronic structure of solids, microscopic significance of thermodynamic concepts. Interaction between matter and radiation, structure of geologically important crystals and glasses, order and disorder. Band structure of solids, excited states, the dynamics of phase change. Conductivity, magnetic and optical properties of solids, with particular consideration of geological systems. *Prerequisite: consent of instructor.* Arrhenius (W)

265. Marine Natural Products Chemistry (3)
An outline of the organic chemicals from marine organisms with special reference to their function in the marine environment. The differences between terrestrial and marine natural products will be stressed. *Prerequisite: basic organic chemistry.* Faulkner, Fenical (W)

266. Geochemistry of Organic Compounds (3)
Distribution, sources, and stability of organic compounds in the geological environment. Major emphasis will be on the synthesis of organic compounds on the primitive earth; organic material in ancient rocks and sediments: and the cycle of organic material in the sea. *Prerequisite: organic chemistry; (biochemistry recommended).* Bada (S)

267. Management of the Marine Environment (3)
Definition of problems involving man's alteration of the chemistry of the ocean. The relative contributions of man and of other natural inputs to the marine environment will be compared. Problems in the national and international management of ocean resources will be dealt with. *Prerequisite: open to second year SIO students.* Goldberg (F)

268. Seminar in Marine Chemistry (1)
Discussion of topics related to the chemistry of the marine environment not treated in general courses. (Satisfactory/Unsatisfactory grades permitted.) Bada (F)

269. Special Topics in Marine Chemistry (1-4)
Staff (F,W,S)

270. Pelagic Ecology (3)
An analysis of the concepts and theories used to explain the biological events observed in the ocean. Emphasis on plankton. *Prerequisites: SIO 210A, 280 or the consent of instructor.* McGowan, Mullin (W)

271. Biological Oceanographic Techniques (4)
An introduction to some shipboard techniques and tools in biological oceanography and related physical and chemical measurements. Enrollment limited to 10. Alternate years. *Prerequisite: SIO 280 and 210A or consent of instructor.* Mullin (Satisfactory/Unsatisfactory grades only.) (S)

272. Oceanic Zoogeography (3)
The patterns of distribution and abundance of oceanic organisms; the nature of oceanic habitats; the relation of zoogeography to paleoceanography. Lectures, student reports, and discussions. *Prerequisite: SIO 240 and 270 recommended.* McGowan (W)

273. The Evolution of Invertebrates (2)
Lectures on the origin of multicellularity and the phylogeny of the invertebrate higher taxa as deduced from embryology, morphology and the fossil record. *Prerequisite: SIO 280, 280L or equivalent.* Newman (W)

274. Marine Arthropods (4)
Lectures and laboratories on the natural history, zoogeography, taxonomy and phylogeny of arthropods, with emphasis on marine forms. *Prerequisite: SIO 280, 280L or equivalent.* Newman, Hessler (W)

275A. Population and Community Models (3)
Survey of techniques for forming and testing hypotheses concerning the quantitative aspects of population and community ecology. *Prerequisite: consent of instructor.* Goodman (F)

275B. Topics in Community Ecology (3)
Maintenance of community structure, with special emphasis on the importance of competition, predation, energetics, and stability as they affect patterns of distribution and abundance; interrelationships between community structure and population phenomena such as trophic specialization, reproductive strategies, and life histories. *Prerequisite: consent of instructor.* Dayton (S)

275C. Natural History of Coastal Habitats (4)
Two 3-hour laboratories per week, 2-4 week-long field trips to sites in Baja California and the Monterey Bay area, several 1-3 day field trips to local habitats including lagoons, sand and rock intertidal habitats, areas of marine fossils, and areas with migrating birds. Format of course variable depending on student interests. Alternate years with 275B. *Prerequisite: open to undergraduates with consent of instructor.* Dayton (S)

276A-B. Applied Statistics (3-3)
Methods of statistical analysis, including both parametric and nonparametric procedures; sampling and design of experiments, with emphasis on those procedures particularly useful in marine studies. *Prerequisite: the mathematics required for admission to SIO or consent of instructor.* Enright, Venrick (W,S)

276C-D. Mathematics in Biology (3-3)
Use of linear algebra, differential equations and transform methods in physiology, biophysics, and ecology. Phase plane techniques and computer simulation will be applied to classical non-linear problems (for instance, the various forms of the Volterra equation). *Prerequisite: calculus.* (Satisfactory/Unsatisfactory grades only.) Lange (F,W)

277. Deep-Sea Biology (2)
The ecology, zoogeography, taxonomy, and evolution of deep-sea organisms, with emphasis on the benthos. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) Hessler (W)

278. Problems in Biological Oceanography (2)
Presentation of reports, review of literature, and discussion of current research in biological oceanography. Seminar. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

279. Special Topics in Biological Oceanography (1-4)
Staff (F,W,S) (Satisfactory/Unsatisfactory grades permitted.)

280. Marine Communities and Environments (3)
Marine environments and their effects on ecological processes and community structure; distribution patterns, adaptations, and evolution of marine organisms. *Prerequisites: bachelor's degree in science or consent of*

instructor; concurrent registration in SIO 280L required for students in marine biology and biological oceanography curricula. McGowan, Mullin, Newman, Hessler, Rosenblatt (F)

280L. Laboratory in Marine Organisms (2)
Laboratory and discussion of the phylogeny, comparative morphology and taxonomy of the major groups of marine organisms, with emphasis on animals. *Prerequisite: registration in SIO 280.* Fleminger and staff (F)

281. Environmental Physiology and Biochemistry of Marine Organisms (3)
Emphasis on adaptation to environmental factors such as temperature, pressure, and salinity. *Prerequisites: adequate training in biology and physical sciences, and consent of instructors.* Holland, Somero (W)

282. Physiology of Marine Vertebrates (3)
Fundamental aspects of comparative physiology. Included are studies of the physical-chemical basis of living systems and the principles and adaptations of animal function. *Prerequisite: bachelor's degree in science or consent of the instructor.* Hammel (W)

282L. Laboratory in Physiology (4)
Research techniques and problems in selected areas of environmental physiology. Staff (S)

283. Isotope Tracer Techniques and Related Topics in Physiology (3)
Biological transport and related processes as determined by isotope tracers. Laboratory includes methods of measuring radioactive and stable isotope tracers, and tracer experiments in marine organisms. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) Enns (S)

284. Cell Physiology of Marine Organisms (4)
Deals with (1) how methods of cell biology can solve problems peculiar to marine animals and (2) how marine animals provide favorable systems for elucidation of general problems of cell biology; laboratory includes training in electron microscopy, cytochemistry and autoradiography. *Prerequisites: basic courses in biology and chemistry; consent of instructor.* Holland (W)

285. Marine and Comparative Biochemistry (3)
Biochemistry of major products of marine organisms, with emphasis on carbohydrates and lipids. The current concepts of their structural and physiological function will be presented and discussed. *Prerequisites: organic chemistry required, physical chemistry and biochemistry recommended.* Benson (S)

285L. Methods in the Comparative Biochemistry of Marine Organisms (4)
Emphasis on biochemical techniques of usefulness to marine biologists. Techniques to be covered include; enzyme purification and assay; starch and acrylamide gel electrophoresis; ultracentrifugation; and ion exchange chromatography. *Prerequisites: adequate training in biology and biochemistry, and consent of instructor.* Somero (S)

286. Cellular Structure and Biochemical Function (3)
Lectures and laboratory studies of subcellular structures and their function in cell metabolism. Experiments involving techniques for isolation and biochemical assay with special reference to marine organisms. *Prerequisites: preparation in biology and biochemistry; consent of instructor, SIO 285 and Biology 201 are recommended for background.* Volcani (S)

287A. Microbial Ecology (2)
Distributions, activities and importance of microorganisms in relation to the environments of coastal waters and open oceans. *Prerequisite: consent of the instructor.* Carlucci (F)

287B. Experimental Microbiology (4)
Ecology of shore microbes, sampling, enrichment and isolation techniques, development of nutrient media, etc. *Prerequisite: preparation in biological sciences, including physiology or microbiology. Introductory courses in chemistry and biology of the sea are recommended.* Lewin (W)

287C. Microbial Metabolism (4)
Biochemistry and physiology in relation to metabolic activities and elemental cycles; growth and death of bacteria. *Prerequisite: consent of the instructor.* Nealson (S)

289. Marine Plants (3)
An introduction to marine plants and the roles they play in the ecology of the seas. *Prerequisite: consent of instructor.* Lewin (W)

291. Physiology of Marine Algae (3)
Lectures and laboratory in comparative physiology of algae with emphasis on marine problems. *Prerequisite: basic courses in biology and chemistry.* Haxo (S)

292. Developmental Biology of Marine Organisms (3)
A survey of developmental patterns, and their experimental modification, in selected groups of marine organisms. Emphasis will be on the morphogenesis, physiology and biochemistry of development, larval adaptation and evolution. *Prerequisite: SIO 280 or consent of instructor.* Epel (F)

292L. Laboratory in Developmental Biology (2)
A laboratory course concentrating on such developmental phenomena as oogenesis, fertilization, morphogenesis and attainment of larval forms in selected phyla. *Prerequisite: SIO 292 or consent of instructor.*

293A-B. Animal Behavior (3-3)
(A) Ethological Approach: Species characteristic behavior, its causation and adaptive significance. Controversies on "innateness", "drives" and related concepts. Ecology in relation to neurophysiology. (B) Control Mechanisms; Feed back and feed forward in elementary behaviors associated with orientation and assessment of environment; random processes describing the occurrence of behavioral patterns. *Prerequisites: basic knowledge of calculus and statistics recommended.* Heiligenberg (F,W)

293L. Experimental Laboratory in Animal Behavior (2)
Quantitative behavorial experiments on fish and invertebrates, focusing on social behavior and orientation. *Prerequisite: consent of instructor.* Heiligenberg (S)

294A. Biology of Fishes (4)
The comparative evolution, morphology, physiology, and ecology of fishes. Special emphasis on local and deep-sea and pelagic forms in laboratory. *Prerequisite: graduate standing or consent of instructor.* Rosenblatt (S)

294B. Seminar in Advanced Ichthyology (2)
Discussion of special topics related to ichthyology. *Prerequisite: graduate standing or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) Rosenblatt (F,W)

296. Special Topics in Marine Biology (1-4)
Example topics are reproduction in marine animals, adaptation to marine environments, larval biology, marine fisheries, macromolecular evolution, physical chemical topics in physiology, philosophy of science. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

297. Marine Biology Seminar (1)
Lectures given by visiting scientists and resident staff and students. (Satisfactory/Unsatisfactory grades only.) Lewin (F,W,S)

298. Special Studies in Marine Sciences (1-2)
Reading and laboratory study of special topics under the direction of a faculty member. Exact subject matter to be arranged in individual cases. *Prerequisite: graduate stand-*

ing. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

299. Research (1-12)
(Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

Sociology

OFFICE: 7001 Humanities and Social Sciences Building

Professors:
Bennett M. Berger, Ph.D.
Aaron Cicourel, Ph.D.
Fred Davis, Ph.D. *(Chairperson)*
Jack D. Douglas, Ph.D.
César Graña, Ph.D.
Joseph R. Gusfield, Ph.D.
Jacqueline P. Wiseman, Ph.D.

Associate Professors:
Rae Lesser Blumberg, Ph.D. *(Acting)*
Randall Collins, Ph.D.
Murray S. Davis, Ph.D. *(Acting)*
David P. Phillips, Ph.D.

Assistant Professors:
Beryl L. Bellman, Ph.D.
Chandra Hecht, Ph.D.
Bruce C. Johnson, Ph.D.
Bennetta Jules-Rosette, Ph.D.
Kristin Luker, Ph.D.
Hugh B. Mehan, Ph.D.
Anthony Ngubo, Ph.D.
Gail M. Omvedt, Ph.D.
Reyes Ramos, Ph.D.
Carlos Waisman, M.A. *(Acting)*
Will H. Wright, Ph.D.

* * *

Sociology at UC San Diego A major in sociology provides a solid liberal-arts background for entrance into professional graduate study in law, business and medicine, or for a direct move into occupations involving general urban problems, the field of corrections, community work and social welfare. For those wishing to continue study in sociology for teaching and research careers, an undergraduate degree from the Department of Sociology will provide recent theoretical and methodological advances in the field. In addition, Sociology 2, which is required of all majors, offers undergraduates the rare opportunity to engage in field research under the guidance of individual faculty members — a chance to explore on their own what they have learned in the classroom.

Many of the courses offered by this department are traditional sociological topics such as deviance, social control and the police, stratification, organizations, race and ethnic relations, social protest and movements, education, urban problems, colonialism and imperialism, etc. Nevertheless, like most of the humanities and social science departments at UC San Diego, the Department of Sociology has concentrated its efforts on developing and teaching innovative approaches to these traditional topics. In line with this philosophy, we offer courses found in few sociology departments across the country, such as sociolinguistics, the sociology of everyday life, and myths and symbols in society. Moreover, this department actively encourages its majors to take courses in other social science disciplines (see *The Major Program for Undergraduates*) in order to broaden their perspective and grasp of various subject matters. In general terms, the department stresses both a comparative-historical approach to sociology and field studies of everyday life settings. Quasi-experimental work and survey research are available also and pursued by several faculty members.

A total of 15 sociology courses is required for the major. Of these the student must take eight required courses — three lower-division and five upper-division. The remaining seven are upper-division electives.

Regulations of the Department of Sociology are flexible, and we do make exceptions if we are shown good academic reasons for doing so. However, the faculty members feel strongly that thorough and balanced program is important for undergraduate studies and have designed this program accordingly. Special courses may be petitioned for by individuals or groups who wish to undertake independent or group study projects in consultation with a sociology faculty member.

Transfer students should see the undergraduate secretary or the undergraduate adviser during their first quarter at UC San Diego in order to petition to have their sociology courses from other colleges accepted to apply toward their majors here.

In addition to declaring their majors on the IBM card during registration, all students wishing to major in sociology must fill out the *Application for Major in Sociology* form available in the Department of Sociol-

ogy office (7001 H/SS). The department will then keep an up-to-date record of their progress toward the degree.

It is preferable that students not declare their majors until after having completed the required lower-division courses in sociology.

The Major Program for Undergraduates

The following is the required program for undergraduates with a major concentration in sociology:

A total of 15 courses in sociology (three lower-division, 12 upper-division), including the required courses listed below. A 2.00 grade-point average in the major. (F's are not applicable toward the major.)

Lower Division

Sociology 1A and 1B (Sociological Analysis). This sequence is required for most upper-division courses in sociology and should be taken during the freshman or sophomore year. Students who have had one year of sociology in an accredited institution of higher education may petition for exemption from this requirement. Sociology 10 is *not* accepted for credit toward the major.

Sociology 2 (Sociological Research). This course should be taken in the sophomore year.

Upper Division

Any *one* course from each of the following cluster areas:

A. Social psychology and interaction: 100, 102, 103, 104, 106, 107, 109, 116, 117, 163.
B. Social organization and institutions: 105, 110, 111, 112, 113, 115, 124, 136, 143.
C. Social control and social problems: 119, 120, 121, 122, 123, 127, 140, 142, 178, 179.
D. Social change, development and comparative sociology: 130, 131, 132, 133, 135, 137A, 137B, 138, 141, 144, 170, 171.
E. Social bases of culture and knowledge: 108, 149, 150, 151, 152, 153, 155, 156, 159, 160, 161, 162, 187.

Students may complete Sociology 181, Statistical Analysis of Sociological Data, in lieu of one of the above cluster areas.

It is strongly recommended that among the courses offered for concentration the student include at least *one* senior seminar (Sociology 190). Such a seminar may be included in the appropriate cluster area.

No courses taken to apply toward the major may be taken on a pass/not pass basis except Sociology 198 (Directed Group Study) or 199 (Independent Study). Only *one* independent study course may be applied toward the major. Independent study courses must be applied for and approved by the department before the beginning of the quarter in which the student wishes to enroll and may be taken on a pass/not pass basis only. See the undergraduate secretary for the necessary application forms and deadlines.

In fulfilling the major, students may take up to three upper-division courses from the regular offerings in the Departments of Anthropology, Economics, History, Linguistics, Political Science, Psychology, Urban & Rural Studies and from the regular offerings of the macro and micro areas of communications. Courses from other departments may be taken if the student submits a petition to the Department of Sociology and thereby obtains permission to have such courses approved for the major.

The Graduate Program

Admission Qualified and interested students may be admitted from a broad range of undergraduate preparations, including the sciences, as well as humanitites and the social sciences. Adequate preparation for graduate work in sociology varies considerably with individual cases, and no specific courses are prerequisites.

Candidate in Philosophy Degree The department will grant a Candidate in Philosophy Degree to students after they pass the oral qualifying examination leading to the Ph.D. This degree indicates successful completion of all graduate work, except the doctoral research and dissertation and special requirements pertinent to the doctoral research.

Doctor of Philosophy Degree The training program is predicated on a division between levels of sociological knowledge. The initial year is largely concentrated on development of overall knowledge of sociology as a means for uniting theory, empirical studies and methods of investigation. The second year is chiefly concentrated on the development of depth in specific fields. The

third year is the formulation and execution of a Ph.D. study. Under normal circumstances, it is anticipated that a candidate will complete a dissertation in approximately three to four years after entrance into the graduate program.

At the core of the program is a group of six quarter courses integrating theoretical materials with empirical studies and providing instruction in practical methods of conducting research. These courses will occupy approximately two-thirds of a normal program during the initial year of graduate study. The purpose of the core curriculum is to provide the student with an introduction to the major theoretical ideas and issues in sociology; classics of research that have been carried out in response to, or as the result of, these basic ideas; and, finally, to provide the student with an understanding of the methods and techniques used in developing such research. As a further means of achieving its goals, the course provides practice in a variety of methods of data collection and analysis, including participant observation, field-study observations, interviewing, survey data-collection and analysis and the use of appropriate statistical techniques and historical research.

The remainder of the program will require a minimum of three courses in a department or departments other than sociology and the development of a depth in three areas of specialization, as designated in consultation with a faculty adviser. No specific courses are prescribed for specializations, since these will be arranged by combinations of formal seminars, independent study and tutorial.

Areas of specialization currently available through present and expected members of the staff are political sociology, complex organizations, mass culture, sociology of science, sociology of education, social movements, collective behavior, occupations and professions, deviance, social stratification, comparative race and ethnic relations, sociology of everyday life, modernization and new nations, sociolinguistics, cognitive sociology, sociology of religion, history of social thought, social change, medical sociology and computer applications in sociology.

During the initial year, the student will be expected to complete examinations based on the content of the core curriculum and, in addition, complete research papers in connection with these courses. On the basis of this and his or her work, each student will be evaluated by the department in a written statement of evaluation at the end of the first year.

For Ph.D. candidacy, the department requires a minimum of three consecutive quarters of residence, with a minimum registration of three courses per quarter.

The department also requires that all students who have not had previous experience in undergraduate teaching participate in the department's undergraduate program as teaching assistants under supervision of department faculty.

Qualifying Examination An oral examination will be conducted by the student's doctoral committee. It is based on knowledge of three areas of specialization and a written statement proposing a specific research study as the basis for the Ph.D. dissertation. In evaluating the student's admission to candidacy, the faculty also will consider his or her previous written work as represented by three papers chosen by the candidate and filed with the committee. Typically, the qualifying examination is taken early in the fall of the student's third year of graudate work.

Dissertation Research and Preparation The nature and requirements for dissertation research will vary greatly, depending upon the specific problem chosen. Following approval of the proposed research, the student is to undertake the study in frequent communication and consultation with the committee. The final thesis and summary will be deposited with the department one month before the final examination.

Final Examination Approximately one month after completion, the student will take a final oral examination based on the dissertation and conducted by the doctoral committee. The examination will be open to all faculty and students in the department.

Courses

Lower Division

1A-B. Sociological Analysis (4-4)
An introduction to the major ideas, concepts and methods in the sudy of societies; social interaction and social struc-

ture; the construction and acquisition of social roles and organizations; major institutions and processes of change. To be taken in sequence.

2. Sociological Research (4)
A survey of major research procedures used by sociologists for studying historical and contemporary everyday activitites. *Prerequisites: Sociology 1A-B.*

10. American Society (4)
An introduction to American society in historical and world perspectives, touching on the following topics: the American cultural tradition; industrialization, capitalism and the welfare state; careers, work and leisure; the changing forms of family and kinship stratification; the distribution of wealth, power and prestige; politics; community, national and international; ethnic and racial groups; the changing position of religion, education, the mass media and the arts; predicting future trends.

Upper Division

Prerequisites: Sociology 1A-B, Sociology 2, or consent of instructor. Additional prerequisites may be specified below.

100. Sociology of Everyday Life (4)
A general introduction to the objective observation, description and analysis of everyday life. The aim of the course is to demonstrate the theory and method of observation by which studies of everyday experience become information basic to the study of society.

101. Sociological Investigations (4)
A basic course on the relations between sociological theory and field research. There is a strong emphasis on the theory and methods of participant observation. Students will write a paper using these methods.

102. Social Psychology (4)
This course will deal with human behavior and personality development as affected by social group life. Major theories will be compared. The interaction dynamics of such substantive areas as socialization, normative annd deviant behavior, learning and achievement, will be considered.

103. The Acquisition of Social Rules (4)
The course examines "socialization" as the acquisition of the rules by children and others new to social groups. The course further examines the development of adult social competence.

105. Popular Culture (4)
An historical and comparative analysis of selected forms of the transmission of cultures. The major emphasis will be directed toward the understanding of the leisure and artistic activities in contemporary mass societies.

106. Introduction to Sociolinguistics (4)
Investigation of the fundamental relations between the forms of language and other aspects of human social order. Special emphasis is given to the interaction between selected modes of language investigations and theories of social cognition and behavior. *Prerequisites: Sociology 100, 101 or consent of instructor.*

107. Advanced Sociolinguistics (4)
A review of recent approaches to the study of language and how their respective methods make the phenomena available. Demonstrations and projects focus on the productive and perspectival nature of language-representation systems. *Prerequisite: Sociology 106.*

108. Sociology of Culture (4)
A study of the concept of culture, its origins and its applications primarily to modern societies. Included will be discussions of the role in society of various symbolic systems, such as art, science, myths, history, language.

109. The Individual and Society (4)
Reciprocal influences between the individual and society will be investigated from a variety of perspectives. The nature, formation and destruction of the social self in family, group and larger social units will be emphasized.

110. The Family (4)
An examination of the family as an institution in modern and premodern societies. This course will begin with a study of the principles of kinship and then investigate the relationship of the family to social structure and social change.

111. Organizations (4)
Determinants of organizational structure; the effects on organizational and individual behavior. Formal and informal structures; effects on goals and values. Industrial organizations, governments, voluntary association, schools, prisons, hospitals, communities as organizations, professions and the organization of science.

112. Social Stratification (4)
The causes and effects of social rankings in various societies. Theories of stratification; the dynamics of informal social groupings; determinants of institutional power and the nature of struggles for power; the distribution of wealth and its causes; the dynamics of social mobility; the effects of stratification on life styles, culture and deviance.

113. Occupations and Professions (4)
Analysis of the social organization of work in modern societies, the concept of career, the development of professionalization. Occupational subcultures; work, leisure and alienation; social relationships of work groups in organizations; human relations in work situations; professional and occupational associations.

115. The Mexican-American Family (4)
An analysis of the past and present structure and functions of the Mexican-American family. Special attention is given to variations in family organization; social functions of the family and family methods of coping as a minority in American society.

116. The Social Organization of Education (4)
The history and philosophy of education in America and other societies; the role of the educational institution in the socialization of the child.

117. Classroom Interaction (4)
This course is designed to develop the student's understanding of and competence in classroom conduct and organization by the application of sociolinguistic theory and the ethnography of communication in the classroom.

118. Comparative Educational Sociology (4)
The organization of education in a number of historical and contemporary societies, such as ancient Greece and Rome, medieval Europe, traditional China, India, and Japan, and contemporary United States, Russia, England, France and Germany. Education will be examined in terms of its internal organization and in relation to religious and secular ritual and ideology, to stratification, economics, and politics.

119. Sociology of Poverty (4)
A sociological analysis of the character and function of poverty in the United States will be presented. Emphasis is placed upon current sociological theory and research in this area of sociological inquiry.

120. Urban Social Problems (4)
Concerns the facts and theories of contemporary social problems in urban America. The emphasis will be on social problems, not on urbanism.

121. Sociology of Deviance, Law and Crime (4)
Concerns the fundamental problems of rule-making and the use of rules, especially laws. Such subjects as addiction, marijuana use and suicide will be considered.

122. Sociology of Law (4)
Functions of law in society; social source of legal change; social conditions affecting the administration of justice; role of social science in jurisprudence.

123. Sociology of Suicide (4)
Traditional and modern theories of suicide will be reviewed and tested. The study of suicide will be treated as one method for investigating the influence of society on the individual.

124. Political Sociology (4)
The contributions of sociology to the study of political systems and processes, including the analysis of the sociocultural context of political behavior and the bases of power.

126. Contemporary Mexican Social Structure (4)
An examination of contemporary Mexican society, including the study of its political, social, and economic institutions since the Revolution that began in 1910.

127. Sociology of Trouble (4)
Idea of naturally created trouble as it is produced and managed by societal members in the process of doing their routine activities is used to create a theory on the production of the social order. Sociology of trouble is defined, developed, contrasted with conflict theory, symbolic interaction, structural funtionalism and discussed as a way to tie in social structure with social process.

128. Sociology of Death (4)
A survey of the relationships between mortality and the social characteristics of the individual and the social characteristics of his environment.

130. Sociology of Development (4)
A sociological perspective on problems of development and modernization in formerly non-industrial societies, with special reference to Africa. An analysis of interactions between the old and the new social structures and processes and the social implications of various selected strategies in social planning for emergent institutions. *Prerequisite: Sociology 137A.*

131. Technology and Social Change (4)
The impact of technological change on social institutions and processes; the social structure of technical discovery, invention and acceptance in modern and developing societies; the ethical and social issues emerging from technological change.

132. Structure and Process of South African Society (4)
An analysis of social structure and processes in racially stratified South African society, with emphasis on patterns of differentiation, social control and boundary maintenance between and within "racial" groups.

133. Social Change (4)
A general introduction to processes of change in modern societies and new nations. Major theories of change; major contemporary trends; conflicts and movements of change; role of technology, ideas and institutional change.

134. The City of San Diego (4)
A research-oriented course on the institutions and subcommunities of San Diego. Readings will be drawn from the sociological studies of urban communities and from studies on the political structure of American cities. Lecturers will include people from the political and planning agencies of the city and its subcommunities. Students will work on individual or joint projects.

135. Comparative Race and Ethnic Relations (4)
An historical and comparative analysis of race and ethnic relations in the United States, Western Europe and Asia. The course will analyze the origins of slavery, the various approaches to minority community development and the causes and consequences of discrimination and prejudice in various national settings.

136. The Chicano Community (4)
Origins of the Mexican-American immigrant in rural Mexico; context of contact; petterns of settlement in the United States; the Mexican community, social structure and social change; acculturation and generational patterns; community leadership and change.

137A. Sociology of Colonialism (4)
A study of the following topics: (1) colonialism and racism (2) a comparison of "Modernization" and Marxist theories of colonialism; (3) phases of European imperialism and types of colonial societies; (4) classes in colonial societies; (5) "Plural societies," i.e., the sources of ethnic conflict; (6) the United States as a "settler colony."

137B. National Liberation Movements (4)
The first half of this course will deal with theoretical and practical problems of movements for national and social revolution in colonized societies. During the second half, an intensive study will be made of a liberation movement in a period of crisis. Both academic studies and analyses of participants will be used. *Prerequisite: Sociology 137A.*

138. Comparative Historical Sociology (4)
Classical and contemporary treatments of long-term and large-scale social processes. Topics include war and the structure of the state, economic development and decay, religion and secular ideologies.

140. Social Protest (4)
Violence and protest. The anti-war movement; student protest; black militancy; racial attitudes in America; white militancy; police and judicial response to protest; the theory of collective behavior as an interpretation of protest; counter-insurgency as a societal response.

141. Culture Conflict and Politics (4)
The effects of conflicts between cultural groups on political proceses and institutions in old and new nations. Topics include the implications of changing moral styles on political issues; the significance of ethnic and religious conflict on politics; the influence of cultural diversities in national development and the impact of cultural and linguistic movements.

142. Forms of Social Control (4)
The organization, development and mission of social control agencies in the nineteenth and twentieth centuries, with emphasis on crime and madness; agency occupations (police, psychiatrists, correctional work, etc); theories of control movements.

143. Power in American Society (4)
The concept of power: definitions, types and social locations. Review of the literature on power structures, local and national, in the United States. Evaluation of the several approaches to power structure (pluralist, power elite, ruling class). Analysis of such related topics as normal politics vs. crisis politics and agencies of change in American politics.

144. Community and Social Change in Africa (4)
The process of social change in African communities, with emphasis on changing ways of seeing the world and the effects of religion and political philosophies on social change. The methods and data used in various village and community studies in Africa will be critically examined.

145. Chinese Society (4)
A general survey of the social history of China with emphasis on the twentieth century. Political economic and cultural foundations of traditional society, contrasting

theories to explain the broad framework of social structure, causes and consequences of revolts and revolutions and the impact of Western ideology and imperialism. Comparisons of the modernization of China and other Western nations. People and society after the Communist liberation.

146. Equality and Inequality (4)
Equality and elitism as persistent issues in modern societies. Materials from philosophy, history and social sciences as used to define and describe current arguments and existing patterns of political power, popular and high culture, educational equality and the distribution of income.

147. Sociological Effects of Industrialization (4)
An analysis of the various ways in which the issue of industrialization has been "solved" in different countries, the determinants of these patterns, and their long-term consequences.

149. Sociology of Religion (4)
This course will explore ways of approaching sacred texts, religious experiences and ritual settings from the perspective of their construction in the world. We will examine how aspects of these phenomena can be made more fully available to sociological analysis. The course will treat also religious institutions and some background material in the analytic study of religion. Data from African religions will be used as a resource for lecture and study.

150. History of Social Thought (4)
Major figures and schools from early nineteenth century through the present, including Comte, Marx, Tocqueville, Spencer, Durkheim, Weber, Simmel, Freud, Sumner, Mead, Park, Parsons and Mannheim.

151. Sociological Theories (4)
An analysis of leading theories of sociology with an emphasis on contemporary perspectives. Theoretical issues include functionalism, ethnological basis of sociology, Marxism, systems analysis and the problem of objectivity. *Prerequisite: senior standing or three sociology courses.*

152. Myth and Symbols in Society (4)
A study of the contribution of mythical symbols and narratives to the establishment of social meanings and behavior in primitive and modern societies. Included will be a review of different theories of myth and narrative, such as those of Levi-Strauss, Cassirer and Propp.

153. Sociology of Knowledge (4)
The analysis of political ideology and its relationship to forms of scientific thought, especially of the social sciences. The analysis of the social influences and institutions affecting the development and transmission of knowledge, including the analysis of universities, communications agencies and markets for popular and high culture.

154. Sociology of Mass Media (4)
This course will be concerned primarily with the techniques and social methods of constructing the news. It will be especially concerned with the news of the newspapers and television. It will also deal with how men construct the news; the effects of their messages on the public and other important subjects, such as the effects of ownership patterns on the messages of the news media.

155. The Sociology of the Western (4)
The role of the Western myth in the development of American consciousness, including its relationship to the history of the West and to modern society.

156. Sociology of Literature (4)
Literature will be discused in the context of the ideas of national and regional culture, "historical situations" and "social order." Other issues to be studied are literary men as spokesmen and as rebels, literary movements and social conditions and literary works as social documents.

157. Culture, Science and Society (4)
The impact of science as an ideology and an institution on modern American society. Discussion will include the political use of science, the organization of research and the effect of science on American culture.

158. Sociology and Drama (4)
The ways in which dramatic metaphors (e.g., the dramaturgical model, the concept of social drama, and the concept of frame) have been applied to the study of human interaction. Also, the ways in which the detailed study of nonverbal behavior (kinesics and proxemics) can be applied to theory and practice in theater.

159. Sociology of Art (4)
Painting and architecture from the courts of the seventeenth century to nineteenth-century impressionism. Art and sponsoring elites. Art and political ideas. Art and the democratic public. Art and the modern city. The use of such ideas as "national character," "spirit of the times," "culture — personality" and "social class" in the understanding of art. Slides will be used to illustrate lectures.

160. Sociology of Intellectual Life (4)
Sociological analysis of the intelligentsia; types of intellectuals, theories concerning their social role; research on the social sources of intellectual work in politics, literature, art and science; historical considerations of intellectual milieu; international comparisons of intellectuals.

161. Work and Leisure (4)
Historical and comparative analysis of problems associated with quality of work and quantity of leisure; impact of cultural and social change on occupational pattern and leisure activity.

162. Sociology of Youth (4)
Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural problem.

163. Ethnographies: Their Uses and Analysis (4)
This course will analyze the methods and underlying assumptions of field observation and ethnographic reporting. It will contrast various types of written and audiovisual ethnographies, critically examine their styles, approaches, and uses as a form of sociological analysis, and provide opportunities for their application.

164. Society in Latin America (4)
A survey of the literature on Latin American social structures and political systems. The emphasis will be historical and comparative, and most readings will deal with the entire area or a group of countries rather than particular cases.

170A. Comparative Rural Societies (4)
This course will examine agricultural societies at different evolutionary levels of technological and societal complexity, ranging from hunting-gathering bands with incipient agriculture to traditional agrarian empires. We shall explore the impact of change, modernization and the world economy on contemporary rural societies, especially Third World underdeveloped ones.

170B. Socio-Economic Change in Developing Areas (4)
This course reviews theories and definitions of development, traces the Industrial Revolution in the West and Japan, and analyzes how the colonialism and world economy fostered by the industrial capitalist countries affected development of Third World nations. Finally, some alternate development paths pursued by underdeveloped countries are examined. *Prerequisite: Soc. 170A.*

171. Women in Cross-Cultural Perspective (4)
Utilizing a new theory of factors affecting female status, we examine topics including women in evolutionary perspective; Third World women and modernization; women's changing position in the U.S.S.R., Israeli kibbutz, and especially U.S.A.; and the political economy of sex stratification.

172. Sociolgy of Women (4)
Historical and comparative analysis of women's varying roles, statuses, and life opportunities.

173. Sociolgy of Men (4)
This course will explore the sociology of sex and gender from the perspective of what it means to talk about "mankind". The course will explore the physiological, biochemical, psychological, and sex role aspects of sex and gender in an attempt to separate out what is distinctively social about male identity.

178. Sociology of Health and Illness (4)
A selective inquiry into the roles of culture, social structure, and organized health professions for defining, mediating, and structuring the health and illness experiences of key social groups in American society.

179. Sociology of Mental Illness (4)
An examination of the social, cultural and political factors involved in the identification and treatment of mental disorders in American society.

180. Designs of Sociological Research (4)
This course will acquaint students with a variety of sociological methods of quantitative research. The course will: (1) teach students how to understand tabular presentations of quantitative materials, (2) provide a basis of evaluating different studies and (3) present strengths and weaknesses of different research designs.

181. Statistical Analysis of Sociological Data (4)
A problem-centered course, emphasizing the correct application of elementary statistical techniques to actual sociological data. The course will cover statistics commonly used in sociological analysis (binominal, t-test, Chi-squared, regression, correlation). *Prerequisites: Mathematics 1A-B or an introductory statistics course or consent of the instructor.*

182. Modeling Social Systems (4)
Issues involved in simulating human behavior. Methodological review of cognitive, personality and interactional models, including their purposes, validity and infelicities.

187. Films and Society (4)
An analysis of films and how they portray various aspects of American society.

190. Senior Seminar (4)
A research seminar on special topics of interest to available staff; provides majors and minors in sociology with research experience in close cooperation with faculty. *Prerequisites: senior standing, plus three sociology courses or consent of instructor.* May be repeated for credit.

191. Youth in American Society (4)
A seminar on recent research in the development of youth as a social category, including the analysis of student and youth movements and subcommunities and generational conflict in the United States and elsewhere. *Prerequisite: one upper-division sociology course.*

198. Directed Group Study (4)
Group study of specific topics under the direction of an interested faculty member. Enrollment will be limited to a small group of students who have developed their topic and secured appropriate approval from the departmental committee on independent and group studies. These studies are to be conducted only in areas not covered in regular Sociology courses. *Prerequisite: upper-division standing or permission of the department.* (Pass/not pass grades only.)

199. Independent Study (4)
Tutorial: individual study under the direction of an interested faculty member in an area not covered by the present course offerings. Approval must be secured from the departmental committee on independent studies. *Prerequisite: upper-division standing or permission of department.* (Pass/not pass grades only.)

Graduate

200. Analyzing Everyday Life (4)
A graduate seminar in the objective observation, description and analysis of everyday life. This seminar will systematically examine phenomenological, ethnomethodological and existential theories of society, in contrast to structural theories. (Satisfactory/Unsatisfactory grades permitted.)

206. Introduction to Sociolinguistics (4)
Investigation of the fundamental relations between the forms of language and other aspects of human social order. Special emphasis is given to the interaction between selected modes of language investigation and theories of social cognition and behavior. (Satisfactory/Unsatisfactory grades permitted.)

212. Social Stratification (4)
The causes and effects of social rankings in various societies. Theories of stratification; the dynamics of informal social groupings: determinants of institutional power and the nature of struggles for power; the distribution of wealth and its causes; the dynamics of social mobility; the effects of stratification on life styles, culture and deviance. Graduate students will be assigned an additional research paper and/or examination of more complex material and design. (Satisfactory/Unsatisfactory grades permitted.)

215. Seminar in Political Sociology (4)
Research and readings in sociological analysis of political institutions. Readings on politics and stratification power structure. Political elites; conflict groups, participation. Student research in selected areas. (Satisfactory/Unsatisfactory grades permitted.)

223. Social Problems (4)
Facts and theories about social problems and possible solutions to them will be analyzed.

235. Comparative Race and Ethnic Relations (4)
An historical and comparative analysis of race and ethnic relations in the United States, Western Europe and Asia. The course will analyze the origins of slavery, the various approaches to minority community development and the causes and consequences of discrimination and prejudice in various national settings. (Satisfactory/Unsatisfactory grades permitted.)

251. Sociological Theories (4)
An analysis of leading theory of sociology with an emphasis on contemporary perspectives. Theoretical issues include functionalism, ethnological method bases of sociology, Marxism, systems analysis and the problem of objectivity. Graduate students will be assigned an additional research paper and/or examination of more complex material and design. (Satisfactory/Unsatisfactory grades permitted.)

252. Historical Trends in Sociological Theory I (4)
History of sociological thought and the classical sociological theorists such as Marx, Simmel, Durkheim, Weber, G. H. Mead and Park.

253. Historical Trends in Sociological Theory II (4)
History of sociological thought and the classical sociological theorists such as Marx, Simmel, Durkheim, Weber, G. H. Mead and Park.

254. Contemporary Trends in Sociological Theory (4)
Contemporary sociological theory, primarily in the post-World War II period, will be covered.

255. Seminar in Sociological Theory (4)
The analysis of a specific issue of theorist with opportunities for supervised research of students in problems of sociological theory. (Satisfactory/Unsatisfactory grades permitted.)

256. Historical Methods in Sociology (4)
Logic of social research and an overview of various perspectives. This course will stress basic issues and procedures in comparative-historical research. Most of the quarter will be devoted to the analysis of materials such as archives, diaries, official records and letters.

257. Survey and Demographic Methods (4)
Emphasis will be placed on the techniques of interviewing and questionnaire construction as these procedures would be used in large surveys. The analysis of demographic materials based on vital statistics and census materials will be discussed.

258. Field Methods (4)
Research will be conducted in field and laboratory settings. The primary focus will be upon conducting field research and the analysis of audiovisual materials. This course will stress the study of everyday face-to-face interaction.

260. Ethnomethodology (4)
An analysis of sociology's relation to genetic and subjectivistic approaches to behavior. Discussion of hierarchical systems and corresponding levels of theory.

261. Social Structure (4)
An analysis of structuralist and phenomenological ideas of structure. Discussion of the differences between major theorists, such as Levi-Strauss, Piaget, Merleau-Ponty, and Gurwitsch. Emphasis on their influences on modern sociological research.

290. Graduate Seminar (4)
A research seminar in special topics of interest to available staff; provides majors and minors in sociology with research experience in close cooperation with faculty. (Satisfactory/Unsatisfactory grades permitted.)

291. Youth in American Society (4)
A seminar on recent research in the development of youth as a sociological category, including the analysis of student and youth movements and subcommunities and generational conflict in the United States and elsewhere. (Satisfactory/Unsatisfactory grades permitted.)

292. Selected Readings in Sociology (2)
Discussion and analysis of selected readings from either one or more major sociologists or a specific area in sociology. Readings will vary depending upon the instructor. This seminar may be repeated for credit.

297. Directed Group Study (4)
The study and analysis of specific topics to be developed by a small group of graduate students under the guidance of an interested faculty member.

298. Independent Study (1-4)
Tutorial individual guided study and/or independent research in an area not covered by present course offerings. (Satisfactory/Unsatisfactory grades permitted.)

299. Thesis Research (1-12)
Open to graduate students engaged in thesis research. (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching (2)
Supervised teaching in lower-divisional contact classes, supplemented by seminar on methods in teaching sociology. (Satisfactory/Unsatisfactory grades only.)

Subject A

OFFICE: 1254 Humanities-Library Building

Adela B. Karliner, M.A., *Lecturer and Supervisor of Subject A*

During the first year of residence, each student whose ECT score is below 600 must enroll in the appropriate writing course for his or her particular college:

Third College:	Third College Composition Program 10A, B or C
Fourth College:	Fourth College 10A & B
Muir College:	Muir College 10A or B
Revelle College:	Humanities 11A, B, C or 12A, B, C

Successful completion of one of these courses or sequences will satisfy the Subject A requirement.

See also "Subject A" under Admissions.

Writing Clinic The Writing Clinic offers non-credit assistance in writing to all students who request it. The instruction, given informally in one or more tutorial sessions, focuses on such immediate writing tasks as course papers, letters of application, and scholarly articles.

Teacher Education Program

OFFICE: Media Center and Communications Building

Hugh Mehan, Ph.D., Assistant Professor of Sociology *(Director of the Program)*
Jean M. Mandler, Ph.D., Associate Professor of Psychology

* * *

Cynthia Lawrence-Wallace, Supervisor of Student Teaching
Randall J. Souviney, Supervisor of Student Teaching

* * *

The Program The Teacher Education Program (TEP) is a campus-wide program physically located at Third College. It is designed to provide the UC San Diego student with a "preliminary" multiple subjects credential within the framework of existing academic departments. There is no school of education at UC San Diego. Students who satisfy program requirements will graduate from UC San Diego with a complete

major in their selected field of specialization *as well as* a "preliminary" multiple subjects credential. A teacher may teach for five years with a preliminary credential. To obtain a "clear" multiple subjects credential in California, the teacher must complete a fifth year of college within five years of the B.A. or B.S. and teach successfully for two years.

The main themes of the TEP are multicultural and child-centered education. A muiticultural education is pluralistic; it recognizes the unique heritage of different cultures and seeks to preserve each child's cultural identity while providing the child with skills necessary to move between different cultural systems if he or she chooses to do so.

A child-centered education is constructed to be consistent with each child's developmentally acquired ability to learn. Current research in comparative cultures, comparative child development, and social interaction will provide the prospective teacher with insight into the relationship between language, culture, and education.

Because of the recognized need for bilingual/biliterate teachers, both locally and nationally, the TEP offers a 'bilingual option' within its four year course of study. Students who plan to become bilingual educators follow the existing program's curriculum with some modifications. These include achieving a second language proficiency (as determined by the UC San Diego language lab) and preliminary field work and student teaching in a bilingual classroom. Upon completion of the bilingual option curriculum, students receive a certificate indicating their bilingual competencies in addition to the preliminary multiple subjects credential and the bachelor's degree. Students who are interested in the bilingual option should contact the TEP office for more information.

Curriculum The State of California requires that the teacher in the elementary school be prepared to teach all courses normally offered in the elementary school. This necessitates professional preparation as well as practical experience in the classroom. The TEP will meet these requirements in the following ways:

Academic Area Requirement The academic area requirement is intended to provide the prospective elementary school teacher with training in the subject matter usually taught in the elementary school. This is *not* a substitute for the student's regular major. The teacher candidate must take a minimum of seven 4-quarter unit courses in *each* of the following areas: (1) mathematics and science, (2) English, (3) social sciences, and (4) humanities, foreign languages and fine arts. University general education requirements at UC San Diego satisfy many of these requirements. Courses are offered in each of these four areas which enable the teacher candidate to work as a classroom aide in the respective discipline in a local school. (See *TEP 183 through 189.*). The candidate can take a total of three elementary aide courses as long as he or she teaches in a different subject area each time; these courses will be credited toward the academic area requirement. The classroom aide experience is seen as an excellent vehicle for learning about the learning processes and interpersonal communication involved in a teaching relationship.

Professional Preparation The state requirement for professional preparation will be met by offering 18 quarter hours of courses which deal with the sociology of education and innovative instructional practices. Details of these courses follow in the course listing.

Practical Classroom Experience The teacher candidate will student-teach for the equivalent of one elementary school semester. During this time the candidate will be given thorough, realistic, and practical experience in classroom instruction, and will be given continuous and diversified responsibilities in the school. The teacher candidate will engage in classroom observation, course preparation, actual teaching, and student evaluation. Concurrent with student teaching, the teacher candidate must take TEP 191C, described below.

Student Selection Students interested in applying to the TEP will be advised in the spring of their sophomore year as to what courses they should take in their junior year, at which time the actual coursework for the TEP begins. Student performance in these courses will be a factor in program selection. Other criteria for admission to the program include:

1) academic excellence,
2) strong desire to teach children and to teach children to teach themselves,

3) strong desire to improve the quality of American education,
4) strong interest in multicultural approaches to education, and
5) community involvement

Prospective candidates for the TEP will be carefully reviewed by a diversified committee composed of faculty, staff, and students. Formal acceptance into the TEP will take place *during* the student's junior year, prior to student teaching.

Courses

All of the following courses are required toward the "preliminary" multiple subjects credential. Students are advised to consult with TEP staff to determine how they can best fulfill the academic area requirement.

Sociology 116. The Social Organization of Education (4)
The history and philosophy of education in America and other societies; the role of the educational institution in the socialization of the child. *Prerequisite: consent of instructor.* (F)

Psychology 130. Developmental Psychology and Education (4)
An introduction to the child's cognitive, perceptual, linguistic and social development with emphasis on his or her relation to education. Piagetian, information processing and cross-cultural points of view will be discussed, including theories of cultural difference in relation to education and the nature of the learning process in relation to success and failure in the schools. *Prerequisite: consent of instructor.* (W)

Sociology 117. Classroom Interaction (4)
This course is designed to develop the student's understanding of and competence in classroom conduct and organization by the application of sociolinguistic theory and the ethnography of communication in the classroom. *Prerequisite: consent of instructor.* (S)

TEP 180. Practicum in Student Teaching (18)
The teacher candidate will be assigned to a classroom in one of the participating schools under the supervision of a participating master teacher. The candidate will begin teaching in the first week of September and will spend at least 5 hours a day, 4 days a week for 15 weeks in the classroom as well as prepare courses, have parent-teacher conferences, and teacher-principal conferences. During this time the candidate will be given thorough practical experience in classroom instruction and continuous and diversified responsibilities. *Prerequisite: affirmed TEP candidacy and concurrent registration in TEP 191C.* (F)

TEP 183-189. Practica in Learning (see below)

TEP 191A. Innovative Instructional Practices (4)
This is one of a three course sequence providing a theoretical and practical grounding in various pedagogical techniques which are consistent with the child's developmentally acquired ability to learn. Typically diverse subject areas are integrated into a single intercurricular course of study by emphasizing activity inquiry techniques of instruction. *Prerequisite: affirmed teacher candidacy.* (W)

TEP 191B. Innovative Instructional Practices (4)
This is one of a three course sequence providing a theoretical and practical grounding in various pedagogical techniques which are consistent with the child's developmentally acquired ability to learn. Typically diverse subject areas are integrated into a single intercurricular course of study by emphasizing activity inquiry techniques of instruction. Students pursuing the 'bilingual option' are provided instruction in bilingual teaching techniques within the framework of this course. *Prerequisite: TEP 191A.* (S)

TEP 191C. Innovative Instructional Practices (6)
This is one of a three course sequence providing a theoretical and practical grounding in various pedagogical techniques which are consistent with the child's developmentally acquired ability to learn. Typically diverse subject areas are integrated into a single intercurricular course of study by emphasizing activity inquiry techniques of instruction. *Prerequisites: TEP 191A-B and concurrent registration in TEP 180.*

Elementary Aide Program

The UC San Diego Elementary Aide Program enables students to engage in classroom aide activity in elementary schools. The program provides a vehicle for students to gain practical experience about the learning process in actual classrooms and to relate this experience to theories of interpersonal relations, cross-cultural communications and education. The courses in the program are open to all UC San Diego students and are particularly recommended for minority students and/or candidates to the Teacher Education Program. The student may serve as an aide for a total of three quarters as long as he or she works in a different subject area each quarter. The following courses are available every quarter; the course description is the same for all seven courses except that the subject areas differ. The prerequisite for all seven courses is consent of the instructor.

TEP 183. Practicum in Foreign Language (4)
The primary focus of the course will be on the learning process. Students will be assigned to work with a small number of elementary school students under the supervision of a participating teacher in a local school. The student will instruct children in a foreign language at least four hours per week. Concurrent with classroom aide activity the student will be involved in a seminar concerning theories of learning and interpersonal communications. *Prerequisite: consent of instructor.* (F,W,S)

TEP 184. Practicum in Learning/ESL (4)
(F,W,S)

TEP 185. Practicum in Learning/Math (4)
(F,W,S)

TEP 186. Practicum in Learning/Science (4)
(F,W,S)

187. Practicum in Learning/English (4)
(F,W,S)

188. Practicum in Learning/Social Sciences (4)
(F,W,S)

189. Practicum in Learning/Fine Arts and History (4)
(F,W,S)

Third College Composition Program

OFFICE: Building 402, Matthews Campus
John Waterhouse, Ph.D., Assistant Professor of Literature *(Director of the Program)*

* * *

Third College Composition Program (TCCP) provides Third College students with intensive courses in writing and analytical reading with an emphasis on comparative, analytical and argumentative strategies. Classes are small and focus on context-building for what will be written each week, and on peer criticism of student writing already completed. Each student has an individual conference with his or her instructor weekly. Students take the TCCP placement exam in the fall and are placed in A, B, or C levels in the 10A-B-C course sequence. A grade of C or better at any level fulfills the Third College freshman-writing requirement. Students who need more than one quarter take an in-progress grade into the next course of the three-course sequence. Also offered is an upper-division course (TCCP 109) focusing on research writing with particular emphasis on the humanities and social sciences. Priority is given to Third College students.

Courses

TCCP 10A. Composition (4)
Intensive practice in writing short pieces of expository prose. The course is organized to give students experience in various rhetorical strategies, from personal descriptive/narrative writing to argumentation. The readings reflect this spectrum. *Prerequisite: placement exam.*

TCCP 10B. Intermediate Expository Writing (4)
A focus on analytical, comparative, and argumentative writing. Students develop experience in writing under pressure as for essay examinations and in organizing term paper length compositions. *Prerequisite: placement exam.*

TCCP 10C. Advanced Freshman Writing (4)
Individualized writing projects related to the students' dominant academic interests. Students with the advice of an instructor frame writing projects of varying scope, subject matter, and rhetorical design. *Prerequisite: placement exam.*

TCCP 109. Research Writing (4)
Advanced practice in compositional and information-gathering techniques necessary for effective term papers of medium length. Students will develop one term paper in weekly stages over the quarter and will have additional weekly practice in expository writing — analytical, classificatory, and comparative. *Prerequisites: upper-division standing and completion of a lower-division writing course.*

Third World Studies

OFFICE: Building 410, Matthews Campus

Professors:
Carlos Blanco-Aguinaga, Ph.D. *(Spanish Literature)*
Sylvia Wynter, M.A. *(Spanish and Comparative Literature)*

Associate Professors:
Edward Reynolds, Ph.D. *(History, Coordinator of Third World Studies)*
Sherley Ann Williams, M.A. (Literature)

Assistant Professors:
Richard J. Arneson, Ph.D. *(Philosophy)*
Anthony Ngubo, Ph.D. *(Sociology)*
Richard Romo, Ph.D. *(History)*
Rosaura Sanchez, Ph.D. *(Literature, Coordinator of Bilingual Sequence)*
Emory J. Tolbert, Ph.D. *(History)*
Benjamin K. T'sou, Ph.D. *(Linguistics)*

Acting Assistant Professor:
Carlos Waisman, M.A. *(Sociology)*

Adjunct Professor:
Lefton S. Stavrianos, Ph.D. *(History)*

* * *

The Third World Studies program has three main objectives:

1. To provide a perspective on world affairs and problems which has not been historically available — namely, an understanding of the Third World and of its relationship to the West from a Third World perspective. In order to understand this perspective, it is necessary to see how the West has viewed and presently views the Third World. Thus, the program becomes totally inclusive. For example, besides trying to understand what kind of society existed in Meso-America when the Spaniards arrived in 1520, the student must also have an understanding of the historical development in Europe which resulted in Spain's decision to seek wider trade abroad.
2. To provide a means of cutting across disciplinary lines in order to integrate past and present knowledge concerning the Third World and its relationship with the West. The program is not conceived as being exclusively historically oriented or as being predominantly a social-science program, but rather one that synthesizes *both* the social sciences and the humanities.

3. To provide an understanding of the relationship between internal Third World societies (Asian-American, Black, Chicano and Native American) and external Third World societies (African, Asian and Latin American) through a comparative approach. Third World societies are compared as they existed before contact with the West, in the various colonial relationships with the West, as well as in their evolution to independence and nationhood in the twentieth century. There is insistence on both the similarities and differences which Third World societies have among themselves and the similarities and differences with Western societies.

The Major Program Students interested in the area of Third World studies may choose either an interdisciplinary major with a disciplinary focus (anthropology, economics, history, literature, political science, sociology, etc.) or a specific departmental major within the humanities or social sciences.

All students majoring in Third World studies are expected to satisfy the lower-division Third World studies requirement of Third College in addition to the *interdisciplinary* or *departmental* major requirements. (Refer to the appropriate department under: "Courses, Curricula and Programs of Instruction.") It is also recommended that students consult the coordinator of Third World Studies or a Third World Studies faculty member, in the department of the selected major.

In addition, the literature component of Third World Studies offers courses in Chicano dialectology; Spanish phonetics and Spanish for Chicanos (see *Literature*); Chicano literature and Black U.S. literature; also, a general literature/Third World major is now being planned.

Courses

Lower Division

1A. History of the Third World to the Nineteenth Century.
Definition of the Third World, its origins in the fifteenth century, its historical evolution into a global system by the nineteenth century, and the nature consequence of its relations with the European metropolis.

1B. History of the Third World in the Twentieth Century
Impact on the Third World of the two World Wars and of the Russian and Chinese Revolutions. Winning of political independence, problems of economic dependence, and current conditions and prospects.

1C. History and Cultural Development in the Third World
The colonization and conquest of Third World peoples by the West were accompanied by certain ideological assumptions which negated the equal human status of the colonized, devalued their indigenous cultures, and negated the validity of their past. The struggle of Third World peoples against colonization has therefore necessarily implied the negation of these assumptions, through political struggle, and through cultural movements — popular, 'native' religions, popular culture, theoretical formulations, the rewriting of history and the creation of art and literature.

7A-B-C. Race and Ethnicity in the United States (4)
A lecture-discussion course on the comparative ethnic history of the United States. Of central concern will be slavery, race, oppression, mass migrations, ethnicity, city life in industrial America, power and protest in modern America. Attention is focused on Native American, Mexican-American, The Black, Asian American, and white ethnic groups.

9. Reading and Interpretations: Spanish for Native Speakers (4)
Spanish for Native Speakers is designed to emphasize the development of greater speaking and writing abilities, as well as reading skills by means of lectures, class discussions, composition and readings from Chicano and Latin American authors. Equivalent to Lit/Sp 10. *Prerequisite: consent of instructor.* (W)

10. Institutions of Third World Societies (4)
A survey of pre-colonial Third World social and cultural systems, with emphasis on the family, the political and economic institutions and their inter-relationships.

11. The Third World and Europe (4)
An introduction to theories and paradigms of social and cultural change through a study of contact and exchange between Europe and the Third World, with special attention to the development of new institutional forms and social patterns.

12. Development in the Third World (4)
An analysis of development in the Third World, with special emphasis on social and economic change.

24. Composition and Conversation: Spanish for Native Speakers (4)
This course is designed for native speakers who have had formal training in the language but who need to expand their knowledge of grammar, vocabulary, and idiomatic expressions at both the speaking and writing level. Readings will be from Chicano and Latin American authors. Equivalent to Lit/Sp 25. *Prerequisite: consent of instructor.* (S)

Upper Division

101A. History and Theory of Imperialism (4)
The course is an introduction to Western expansion and colonization of the Third World, the rise of capitalism and the meaning of Imperialism as the foundation of the common modern historical experience shared by all Third World peoples. It fulfills the Third College general education requirement in Third World Studies and, as such, can be taken as a complete one quarter course or as part of a three quarter sequence. A required prerequisite for all Third World Studies majors. Students who have completed 1A will not receive credit for 101A. *Prerequisite: upper-division standing.* (F)

101B. Social Change in the Third World
An analysis of social relations in colonial institutions with special emphasis on the impact of alien domination on the cultures, and self-definition of colonial subjects.

101C. Modernization, Revolution, and Authorization
This course will be an examination of the different political consequences of modernization—liberal democracy, right-wing authoritarian and fascist regimes, and socialist regimes. The course will aim at testing propositions that link different types of industrialization with the emergence of these outcomes. An effort will be made to inquire at which stages of modernization, and in which type of social structures, each of these regimes is more likely to succeed. *Prerequisites: upper division standing.*

102A. The U.S. Territorial Expansion Policy and its Effect on Indian Removal: 1492-1865 (4)
This course will cover the territorial expansion of the U.S. and the forced removal and conflict during the year 1492 to 1865. The Indian Removal Act of 1830 and the Civil War will be discussed in detail.

102B. The U.S. Territorial Expansion Policy and its Effect on Indian Removal: 1865 to the Present (4)
This course will cover the history of native Americans from 1865 to present. The major topics to be discussed are: 1) Indian participation in the Civil War, 2) the assault against the Plains Indians, 3) the treaty period, 4) the Reservation Period, 5) Indian participation in World War I and World War II. Also to be discussed will be major legislation affecting Indians in contemporary times.

103. The Native American in Contemporary Society (4)
The instructor plans to give the student a working knowledge of problems and issues faced by Native Americans in contemporary society. The major topics will be the Bureau of Indian Affairs, the U.S. Public Health Service, the Relocation System, and Indian Education.

104. Biographies of Great Native Americans (4)
This course will examine the accomplishments and lives of outstanding Native Americans, both past and present, who have left their mark on history. Students will be required to research the lives and personal accounts of one or more prominent Native Americans and present the details in class. Students will be graded upon their classroom presentation, as well as on a term paper resulting from their personal research.

105. The History of Indian Education: 1568 to Present (4)
This course will cover the history of Indian education starting from the first school established for Indians in 1568 to the present. Some of the major topics to be discussed are: 1) reservation and off-reservation boarding schools, 2) mission schools, 3) Carlisle Indian school, the first off-reservation boarding school established for Indians. Also to be discussed will be federal funds that support Indian education and contemporary problems faced by Indians in colleges and universities.

110. Introduction to Fiction Writing (4)
Writing skills are as varied as the individual's background, experience, or inclination. This course aims at bringing the fundamental aspects of fiction writing to the beginning writer's work so that he may explore and develop his own potential. *Prerequisite: consent of instructor.* (F)

M113. Novels of the Third World (4)
The novels of African, Caribbean, and Indian writers and the works of Latin American novelists will be studied.

115. Writing Workshop: Short Story
A workshop for students seriously interested in writing the short story. Intensive study of the means of expression provided by the different literary forms. Discussion and scrutiny of original work of student. May be repeated for credit. *Prerequisites: Submission of original work already completed, upper-division standing and consent of instructor.*

116. Writing Workshop: Long Narrative
A workshop for students seriously interested in writing the long narrative. Intensive study of the means of expression provided by the different literary forms. Discussion and scrutiny of original works of students. May be repeated for credit. *Prerequisites: submission of original work already completed, upper-division standing and consent of instructor.*

130. Political Ideology and the Third World (4)
This course studies the concepts of ideology and political consciousness with special attention to their application to the situation of Third World peoples abroad and the black national minority within the U.S.

131. Selected Topics in Latin American Politics (4)
A comparative analysis of contemporary political issues in Latin America. Material to be drawn from two or three countries. Among the topics: nationalism; neo-imperialism; political change. *Prerequisites: juniors and seniors only or consent of instructor.* (F)

132. Literature and Third World Societies (4)
This course will investigate novelistic and dramatic treatments of European society in the era of nineteenth century imperialism. Third World societies under the impact of colonialism, and the position of national minorities inside the United States to the present day. Attention will center on the interplay between the aesthetic merits and social-historical-philosophical content of the works read.

133. Contemporary Chicano Issues (4)
The course, interdisciplinary in nature, will study the contemporary Chicano experience from cultural, social, and historical perspectives, and provide students with information and understanding of the important characteristics of the Chicano community by providing a critical analysis of the societal context in which "La Raza" has sought to maintain and develop its culture. *Prerequisite: consent of instructor.*

134. Political Philosophies of Third World Leaders (4)
The course is a study and comparison of the political philosophies of modern Third World leaders. Since a major concern of the course is the problems that such leaders have met within the applications of their theoretical preconceptions to the actual political situations, a biographical approach shall be taken. Particular attention shall be paid to the influence of indigenous non-Western political and religious customs and outlooks upon the political viewpoints of the leaders under study. (S)

135. Bilingualism: Research and Field Studies
A study of sociolinguistic findings on bilingualism throughout the world and an evaluation of bilingual education theories. The students will also engage in surveys of local communities to assess bilingualism and educational needs of bilingual communities. *Prerequisites: advanced standing.*

141. Literary Images of the Black Woman
This course is structured around the idea that there are three basic images of the Black woman: that held by society; that held by Black men; and the one held by the women themselves. The course will explore all three views with special emphasis on the way Black women view themselves. *Prerequisite: upper-division standing.*

148. Culture Contact and Change (4)
Analysis of patterns and problems of socio-cultural persistence and change with a special focus on the impact of the West on Third World societies. *Prerequisites: Sociology 1A and 1B or equivalents, or Anthropology 22 and 23 or equivalent; or permission of instructor.*

153. Introduction to Chicano Literature (4)
Course introduces students to Chicano literary works. Central to this study are the particular life experiences of the Chicano and the unique expression given that experi-

ence by Chicano authors, whether in novels, short stories, poetry, or dramatic works. *Prerequisites: speaking and reading knowledge of Spanish or consent of instructor.* (S)

198. Directed Group Studies (2-4)
Directed group study on a topic or in a field not included in the regular curriculum, by special arrangement with a faculty member. *Prerequisites: upper-division standing and consent of instructor.* (F,W,S)

199. Independent Study (2-4)
Tutorial; individual guided reading and research projects (to be arranged beetween student and instructor) in an area not normally covered in courses currently being offered in the department. *Prerequisites: upper-division standing and approval of instructor.* (F,W,S)

Tutoring/Aide Program
(See Teacher Education Program)

Urban and Rural Studies

OFFICE: Building 411, Matthews Campus

Professor:
Charles W. Thomas, Ph.D.

Associate Professors:
Rae L. Blumberg, Ph.D. *(Acting Assoc. Prof., Sociology)*
Robert J. Heifetz, Ph.D.
Faustina Solis, M.S.W. *(Community Medicine, Coordinator of Urban and Rural Studies Program)*

Assistant Professor:
Alonzo B. Anderson, Ph.D. *(Psychology)*

Lecturer:
William J. Siembieda, M.P.A., *Lecturer*

* * *

The Undergraduate Program The undergraduate program in urban and rural studies is designed to provide a broad educational experience for persons who wish to become actively engaged in a variety of professional careers requiring a broad understanding of the problems of urban and rural life, including participation in advanced degree programs, programs of research and other educational and community activities. The program is interdisciplinary in its orientation, emphasizing the contributions that the social sciences and related professions can make to an understanding of urban and rural problems. It provides the student the opportunity to understand the relationship between research and the practices of other social sciences and professions.

For students planning to go on to graduate studies it is recommended that undergraduate programs include courses such as statistics, quantitative research methods and at least introductory courses in economics.

The curriculum in urban and rural studies will provide students with a broad exposure to the theoretical constructs and empirical applications of various disciplines as they relate to the human problems of our society. The goal of the curriculum is to train action-oriented students who can bridge the apparent gaps between disciplines and begin to provide an interdisciplinary synthesis of the complex dimensions of the urban and rural environment.

Lower Division Lower-division offerings in urban and rural studies are designed to provide a comprehensive orientation to the urbanization process as approached from the social-science disciplines of anthropology, economics, political science, psychology, sociology, and history. Any three of these courses meet the Third College general-education requirement and in addition may serve as lower-division social-science electives for Revelle and Muir Colleges.*

The Major To receive the A.B. degree with a major in urban and rural studies, the student must meet the requirements of Muir, Revelle or Third College and the following requirements in urban and rural studies.**

15 upper-division courses to be distributed as follows:

5 specially designated courses taken from the departmental offerings in sociology, anthropology, economics, political science, psychology. (All five to be in the same discipline.)
2 courses from another social science, or history.
8 URS courses to include: 111, 120A and 120B, 130, 186 (Field Studies), 190 (Senior Seminar).

In the senior seminar, URS 190, seniors will construct a final paper or other document which will be in the form of a "senior thesis" acceptable for filing in the URS Resources Reading Room.

* The field component is seen as a test of theory, concepts and strategies learned in the classroom through the above course sequence, as well as serving in part as a service to the community. In so relating students and faculty to community issues, university education and

research will be kept relevant to the issues of the day, testing theory with practice, while developing new and innovative relations with communities traditionally underserved by institutions of higher education.

**The faculty will encourage individualized educational programs leading to the A.B. degree in urban and rural studies brought to them by students. Such programs will be reviewed by the faculty and will serve to promote innovation within the established educational norms of the University. As soon as possible after the student has declared a major in urban and rural studies, a faculty adviser will be assigned to assist the student in developing a program of study.

Courses

Lower Division

20. The Concept of Community (4)
A modular examination of urbanization in contemporary life styles with reference to mobility, crowding, density and environmental space, as well as human territoriality. Demographic and social-psychological determinants are used to explore identification, role-performance, social processes and stress. Staff.

21. Urban American Society (4)
A sociological introduction to urban America, touching on the following topics: cultural tradition, industrialization, capitalism and the welfare state; careers, work and leisure; changing family forms; stratification, distribution of wealth, power and prestige; ethnic and racial groups; predicting future trends. Staff.

22. Urban Economics (4)
Topics to be included: (a) an overview of capitalistic free-market economy ("economics in a nutshell"); (b) economic reasons for the existence of cities; (c) factors influencing the location of people and firms within and between cities (migration); (d) urban problems (pollution, housing, transportation, crime, poverty); (e) urban government (revenues and expenditures, taxes, governmental service.)

23. Contemporary American Ethnography (4)
An introduction to anthropological perspectives on urbanization. Topics to include: family and kinship, poverty and affluence, community and neighborhood, spatial location of groups and sub-groups.

41. Introduction to Human Care Services (4)
The course provides an overview of human care services with emphasis on social, legislative and political factors in the organization and distribution of programs and services under public or voluntary auspices. Impact of professionalism and consumerism. Selected fields: social services, health care and special institutional services. Instructors: Solis and Ngubo.

Upper Division

107A-B. Research in Policy Formation (4)
Use of technical methods in the analysis of urban problems and policy development. Stress of the course is on quantitative techniques used for problem identification and solution. Analytical tools in the course are grouped by subject matter as a means of operationalizing research as it relates to public policy. *Prerequisites: URS major and upper division standing, and an introductory course in statistics or consent of instructor.*

108. Introduction to Research Methods (4)
Introduction to methods of studying human phenomena in urban and rural settings. Lectures will give critical expositions of the uses of observation, personal/official documents, problem identification, hypothesis generation, sampling procedures and research design. Familiarity with statistical techniques unnecessary. *Prerequisite: consent of instructor.*

109. Urban Social Problems (4)
A research-oriented course focusing on institutions and sub-communities in the urban area. Readings will be drawn from sociological studies of urban communities and from studies of public policy and planning. Students will work on individual or joint projects. *Prerequisites: URS major, upper-division standing and consent of instructor.*

111. Community Dynamics and Ethnicity (4)
An examination of the interaction of migration and urbanization on community as a social system. Characteristics of agencies and organizations which deliver services or influence changes will be approached from the use of ethnicity as a conceptual model. *Prerequisite: consent of instructor.*

112. Community Conflict and Change (4)
Investigates socio-economic and political phenomena bearing on man's continued coexistence with his environment and institutions. Topics examined include community dynamics, translating information into policy, translating policy into legislation, translating policy and information into programs, techniques for program analysis and evaluation. *Prerequisite: consent of instructor.*

113. Community Resource Development and Organization (4)
Course covers the organization of community resources and political, social, economic and motivational factors related to their establishment and maintenance; will study organizations and services in urban areas of San Diego and make comparative studies of these organizations in rural areas. Field trips and student projects supplement class discussion. *Prerequisite: URS senior majors or permission of instructor.*

114. Community Development and Organization (4)
Analyzes effects of conflicts of institutions, social mobility, individuation, anomie and ethnocentrism on community dynamics. Examines positive interactions between delivery systems and ethnocentrism. Linkages or frames of reference built upon aspects of systems theory applicable to the social sciences. *Prerequisite: consent of instructor.*

120A-B. Social Policy and Social Planning
Introduces concepts, origins, functions, processes, organization and evaluation of social policy and social planning as one form of state response to social costs of economic development. 120B explores comparative social policy and planning and their social consequences as background for considering alternative strategies for more effective mobilization of resources to achieve desired futures. Heifetz.

121A-B. Policy and Planning in Higher Education (4-4)
URS 121A outlines origins and functions of higher education, relationship between labor force needs & educational resources; critically evaluates changing educational, research & service missions of higher education; reviews tactics, strategies & outcomes of student protest & institutional response.

URS 121B continues above themes with comparative analysis of higher education in selected countries, focusing thereafter on student task groups seeking to understand, cope with and influence the direction of various university functions to better meet student-worker-community needs.

122. Health Policy and Planning (4)
Outlines determinants of community health, trends in health needs and resources, evaluates performance in meeting needs, analyzes factors accounting for performance and explores means and prerequisites for improving that performance. Focus on San Diego. *Prerequisiste: upper-division standing or permission of instructor.*

130. Metropolitan Development and Analysis (4)
Analysis of the economic, social and administrative factors of metropolitan development with respect to the relationships of the community to its region (function) and to its internal organization (structure). Particular emphasis on the linkages of the metropolitan subsystems and their roles in the development process. *Prerequisites: upper-division standing in the social sciences and permission of instructor.*

140. The Housing Environment (4)
An introductory course examining the forces controlling housing. Emphasis will be placed upon the definition of the market, social factors, and economic policy. Written case studies will be examined dealing with the development process, and lectures will be supplemented by attendance at relevant public meetings held in the San Diego area.

144. Introduction to Community Health (4)
Defines health determinants of a community; measurement of health and illness: current major health problems, causes and prevention. Course will include basic principles of epidemiology, control of infectious diseases, and control of non-infectious hazards of the physical, chemical, biological, and/or social environment. *Prerequisites: upper-division standing and consent of instructor.*

145. Orientation to Health Care Organization (4)
The focus of the course will be to provide an orientation to the current organization of preventive and curative services—ambulatory, inpatient, and residential care. Focus will be on social, political, and cultural issues related to provisions of care and patterns of delivery. *Prerequisites: upper-division standing and consent of instructor.*

148. Case Studies in Health Care Programs
The purpose of this course is to select identified populations with special needs and review their status of care, factors influencing incidence of disease and health problems, political and legislative measures related to the provision of care. This group would include population at risk (health-wise)—the poor (rural and urban), mothers and children, elderly. *Prerequisites: URS 145, upper-division standing and consent of instructor.*

150. The Black Ghetto (4)
Examination of the Black ghetto from about 1880 to the present. Trends in migration, the patterns of economic and social adjustment, shifts in ideology and protest, and the demand for community control are referenced themes. *Prerequisite: consent of instructor.*

151. Social Psychological Aspect of Black Identity (4)
This course examines formal theory on personality formation in terms of the life style of Afro-Americans. Emphasis is devoted to the interdependence between personal characteristics, Afro-American culture and the social conditions which foster Blackness as a personality construct. *Prerequisite: upper-division standing or permission of instructor.*

159. The Urban Underclass
This course focuses on the marginal peoples making up the surplus labor population in both underdeveloped countries and the United States. Theories of poverty and underemployment stressing structural factors are emphasized. The family structure, life and employment histories of the urban poor are related to the larger political economy.

160. Introduction to Law and the Judicial Process (4)
This course deals with forces influencing the making of the law, expecialily as it is made in the process of adjudication, and with the nature of the judicial process itself. It draws upon the work of lawyers, political scientists, historians, sociologists and moral philosophers.

163. Contemporary Legal Issues
Analysis and discussion of current legal problems and their impact on society. Topics to be covered will include drug laws, the environment, obscenity and free speech, search and seizure and their constitutional implications. Staff.

170A-B. Socio-Economic Change in Developing Areas (4)
This course reviews theories and definitions of development, traces the Industrial Revolution in the West and Japan, and analyzes how the colonialism and world economy fostered by the industrial capitalist countries affected development of Third World nations. Finally, some alternate development paths pursued by underdeveloped countries are examined. *Prerequisites: Upper-division standing or consent of instructor.*

186. Field Work in Urban and Rural Studies (4-16)
In an attempt to define and study some unique process of community life, students will develop and implement projects requiring their participatory involvement in some community. Projects may cover such areas as health (medical and psycho-social), education, housing and welfare. *Prerequisites: junior standing, URS major and consent of faculty fieldwork supervisor.* Required course for urban and rural studies majors. May be repeated for credit.

190. Senior Seminar
Fundamentals of professional and scientific behavior through oral and written reports of students' field experiences. Principles and practices of research design. Ethical issues and professional conduct. Staff.

198. Directed Group Study (2-4)
Directed group study on a topic or in a field not included in the regular departmental curriculum by special arrangement with a faculty member. *Prerequisites: upper-division standing and consent of instructor.* May be repeated for credit.

199. Independent Study (2-4)
Reading and research programs and field-study projects to be arranged between student and instructor, depending on the student's needs and the instructor's advice in terms of these needs. *Prerequisites: upper-division standing and approval of instructor.*

Visual Arts

OFFICE: 214 Mandeville Center for the Arts

Professors:
David Antin, M.A.
Harold Cohen, Diploma of Fine Arts
Manny Farber
Newton Harrison, M.F.A. *(Chairman)*
Allan Kaprow, M.A.

Associate Professors:
Standish Lawder, Ph.D.
Sheldon Nodelman, Ph.D.

Assistant Professors:
Eleanor Antin, B.A.
Fred Lonidier, M.F.A.
Moira Roth, Ph.D.
Philip Steinmetz
Barbara Strasen, M.A.
Jehanne Teilhet, Ph.D.

Lecturers:
Claudio Fenner-Lopez, M.A.
Jean-Pierre Gorin, Licence de Philosophie

Patricia Patterson
Dan Sullivan

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Traditionally, the visual arts have been associated with those esthetic activities resulting in the production of primarily visual esthetic objects such as paintings and sculpture. The domain of the visual arts has since its original definition been subject to constant redefinition in accordance with the demands of art production and consumption in contemporary society and in accordance with continuing re-evaluations of art production in the light of the constantly increasing information concerning other societies. By its composition, the Department of Visual Arts is biased in the direction of actively producing artists and critics whose presence at the center of the contemporary art world necessitates reconsideration and reevaluation of artistic productions, their information structure and significance. Consequently, a flexible introductory program of historically based courses has been devised mainly to provide the student with an opportunity to concentrate on areas involving significantly different esthetic and communication structures. A series of studio courses, in which painting and sculpture are included, is presented to bring the student into direct contact with the real contingencies compelling redistribution of esthetic attitudes and reinterpretation of genres. Because of the explorational nature of our program, the department is prepared to emphasize new media that would traditionally be considered to have scant relation to the visual arts. Thus courses in theatrical events, linguistic structures, etc. are provided. In this context, theoretical courses with a media orientation, as in film, video, or photography, will be offered also.

College Requirements The Department of Visual Arts teaches courses applicable toward the Muir general education requirements, the Revelle fine arts requirement, and the Revelle minor. Third College students may satisfy the humanities & arts requirement under program B of the general education requirement. An honors program is being designed for Fourth College.

Art Majors A total of 18 courses will be required for the major. Courses to be completed before graduation are: three introductory art courses, Beginning Painting, Beginning Sculpture, Intermediate Painting or Intermediate Sculpture, Beginning Photography, six quarters of upper-division Art History/Theory/Criticism and five advanced-level studio art courses. Art majors have the option of choosing a concentration in either art history/criticism or studio.

Master of Fine Arts Program The program is designed to provide an intensive professional training for the student who proposes to pursue a career within the field of art — including art-making, criticism, theory. The UC San Diego program is unusual in that, while encouraging the full development of the student's particular interests, it seeks to provide an integrated and comprehensive introduction to the possibilities available in the most diverse and challenging form of contemporary artistic production, to the intellectual strategies which underlie them and to the implication of these strategies and the choices which they entail. The word "art" is used here to denote a broad range of activities, and we do not differentiate between students in terms of traditional technique — and media-based classifications (painting, sculpture, graphics, etc.). All art-making activities are considered as serious intellectual endeavor, and all students in the program find themselves confronted by the need to develop their intellectual and critical abilities and their verbal skills in the working out of their artistic positions. There are no craft-oriented programs, nor facilities for doing any; nor do we have any courses in art education or art therapy. The scope of the courses offered is wide. Much of it is aimed at developing in the student a coherent and informed understanding of the past and of recent developments in art and art theory. Much, again, is intended to establish a confident grasp of contemporary technological possibilities, including those involved in film, photography, and the electronic media. For reasons of efficiency, much of the teaching and learning is done in structured courses — lectures, seminars, study groups. Attendance to these requirements is not intended to replace the student's individual work, nor to underestimate the central importance of that work and its development. That aspect of the student's activity is expected to be continuously self-motivated, and to form the dynamic background against which the program of study operates and makes sense, just as faculty do their teaching against a background of continuous professional activity. No two students will

necessarily follow the same path through the degree program, and the constitution of individual programs of courses will depend upon the analysis of individual needs and interests, worked out by the student in collaboration with his or her faculty adviser. A certain number of theory oriented courses will generally be required.

Admission Requirements

Grade-point Average — An over-all GPA of 3.00 and a 3.50 in a student's major is required.

Graduate Record Examination — Students are required to submit scores for the Graduate Record Examination.

Personal Interview — Interviews may be requested for prospective candidates.

Art History — Students are expected to have at least six art-history courses at the undergraduate level. Those who have broader art-history background will have a better chance of being awarded teaching assistantships. Students without this requirement can be admitted, but they will be expected to make up the six courses in excess of the 72 units required for the degree.

Statement — Students are required to submit an essay of approximately three pages on the direction of their work and its relationship to contemporary art. This essay should be critical in nature, refer explicitly to the student's own work, and may refer to other artists, recent events in art history and issues in domains other than art that have bearing on the student's process, thought, and work.

Work — Students are asked to submit documentation of their best work in the form of slides, video tape or film. These will be returned upon review of the application. Please include a self-addressed, stamped envelope for return of work.

Regular University Admission Policies

Please note that no application will be processed until all required information has been received. Students should submit applications to the graduate admissions office on or before January 15, 1977. Work and statement may be sent directly to the department.

Requirements for the Degree The M.F.A. is considered the terminal degree in studio work. The program normally requires a two-year term of study (although in some cases a given student may be advised to take all or part of a third year to complete requirements). The following requirements must be completed in order to receive the M.F.A.:

Departmental Review — This review may take place anytime between the third and fifth quarter in residence. Students make a formal presentation of their work to a faculty committee. This includes a paper and an oral examination. This presentation is considered a departmental examination; if the work is judged not to be adequate at that time, students can be dismissed regardless of their GPA.

Seventy-two units of course work — An apprentice teaching course is required; minimum one quarter — 3 units. (Specific information on course distribution requirements can be obtained from the department).

M.F.A. final presentation — During the last quarter in residence, each student is required to present to the public a coherent exhibition of his or her work.

Oral examination — A committee of four faculty members will administer an oral examination to each student covering the student's work and its relationship to the field of art.

Thesis — Students are required to submit some form of written work for the M.F.A. degree. Four options are available.

1. Catalog — The student would design and have printed an actual catalog. This would include a critical essay of approximately 1500 words.
2. Critical paper — The student would write a critical paper of 3,000 words analyzing his or her process and the relationship of his or her work to recent art history with references to recent styles and specific artists.
3. Analytical essay on some phase of art — Students who have focused on both art production and art criticism would write a 3,000 word critical essay on any current art position. A brief discussion (750 words) of the students' work would also be included.
4. Critical thesis — Students whose emphasis is essentially criticism and who do not present an M.F.A. exhibition will write a 40-50 page thesis — the topic to be decided by the student and his or her adviser.

Applications and additional information can be obtained from the Office of the Department of Visual Arts.

Courses

Lower Division

5. Introduction to Drawing (4)
An elementary course in drawing designed to prepare students for upper-division studio classes.

6. Introduction to Painting (4)
An elementary course in painting designed to prepare students for upper-division studio classes.

7. Introduction to Sculpture (4)
An elementary course in sculpture designed to prepare students for upper-division studio classes.

8. The Art/Life Game (4)
A sweeping view of the avant-garde of (mainly) the last fifteen years, in which life is purposely mixed with art. Lectures will particularly emphasize the works and ideas of Marcel Duchamp, John Cage, Rauschenberg, Gertrude Stein and conceptual art and happenings. Students will be required to practice a variety of artistic exercises (requiring no talent) and submit short reports each week.

10. Representation and Presentation: Introduction to Art (4)
Introduction to the significant structure of art works. If an art work "means something" it is possible to ask "how" it means it and "what" it means. These questions will be asked in relation to examples of representational and non-representational art works from a great variety of periods and culture. The course will deal with photography, architecture and performance as well as painting, sculpture and drawing.

11. Prehistoric and Ancient Art (4)
The origins of our figurative tradition in the art of the European palaeolithic, the constitution of monumental form in the Bronze Age in the Near East, and the classical achievements of Greece and Rome. Will fulfill humanities requirement — 2,000 written words required., Formerly 15A.

12. Medieval Art (4)
The nature and function of art in the service of a new spiritual order in the last phase of antiquity; its efflorescence in Byzantium and the interaction of the antique heritage with Northern traditions in the Romanesque and Gothic to form a new, distinctively European Art. Will fulfill humanities requirement — 2,000 written words required. Formerly 15C.

13A. Introduction to the Arts of Non-Literate Cultures (4)
An introduction to the cultures of Africa, Eskimo, N.W. Coast Indian, Polynesia, Melanesia. Emphasis is placed on the artist, the aesthetic process and the end product, and its relationship to the culture.

13B. Afro/Afro-American Art (4)
A critical aesthetic survey of West African arts in their cultural setting and the subsequent art styles which survived the transplant in the slave areas of the Americas. *Prerequisite: Visual Arts 13A.*

14. 19th and 20th Century Art (4)
A survey of 19th and 20th Century Art (with emphasis on painting) which will be presented on both a chronological and theoretic level. Course begins with art of the French Revolution and ends with art of the 1970's. 2,000 words of written course work required. Course will satisfy Revelle Humanities requirements. Formerly 15C.

16. Renaissance and Baroque (4)
The emergence of a humanist and naturalist art out of the Gothic tradition and the re-awakened ideals of antiquity in the early Renaissance; the diffusion of this art throughout Europe in the Renaissance and its transformation in the proto-modern art of the Baroque. 2,000 words of written course work required. Course fulfills Revelle humanities requirement.

60. Beginning Photography (4)
A general introduction to camera combinations and darkroom techniques in black and white. Emphasis is placed on developing reliable control of the fundamental materials and procedures through lecture, field, and lab experience. Basic discussion of image-making included.

88. First Look at the Movies (4)
An introductory course, examining the formal structure as well as surface detailing in commercial films from Keaton to Godard, offering a syntactic system for separating the various contributions of actor, editor, scriptwriter, director. May be repeated for credit once.

102A. History of Criticism (4)
Significant critical works will be read and discussed. Examples will be drawn from the philosophical, theoretical literature from Plato through Kant, as well as from the craft and conservative traditions exemplified by writings like Dannini, Aretino, Reynolds and Diderot. Required for all art history/criticism majors.

102B. History of Criticism (4)
A continuation of Visual Arts 103A which will deal with work from Kant to Heidegger, with readings in the criticisms of the professional art critics from Baudelaire through Clement Greenberg, Harold Rosenberg and Michael Fried. *Prerequisite: Visual Arts 102A or consent of the instructor.*

103. Art Historical Methods (4)
A critical review of the principal strategies of investigation in past and present art-historical practice, a scrutiny of their contexts and underlying assumptions, and a look at alternate possibilities. Open to art history/criticism majors and visual arts graduate students only. Should be taken in the senior year. Required for art history/criticism majors.

Upper Division

105A-B-C. Drawing (4-4-4)

A — A course in beginning drawing covering line, value, texture, gestures, forms, and composition. These concepts will be introduced by the use of models, still life, and landscapes. The different media that will be used include charcoal, pencil, ink, conte. *Prerequisite: Visual Arts 5.*

B — A continuation of 105A. The student will be exposed to a wider variety of means in representation. The connotational range of different sorts of "marks" and represented "spaces" will be explored. *Prerequisite: Visual Arts 105A.*

C — For advanced students. Students will be given the opportunity to explore the relation between their own energy and idiosyncrasy as draftsmen-artists and the quasi-objective demands of representing various types of real and virtual space. *Prerequisite: Visual Arts 105B.*

106A-B-C. Painting (4-4-4)

A — A studio course focusing on the problems involved in transferring information and ideas onto a two-dimensional surface. Specific assignments to be determined by the professor. May be repeated once for credit. *Prerequisite: Visual Arts 6.*

B — A studio course in painting, stressing individual creative problems. Specific problems to be investigated will be determined by the individual

professors. May be repeated once for credit. *Prerequisite: Visual Arts 106A.*

C — A studio course in painting stressing individual creative problems. May be repeated once for credit. *Prerequisite: Visual Arts 106B.*

107A-B-C. Sculpture (4-4-4)

A — A studio course focusing on the problems involved in transferring information into three-dimensional objects. Specific problems to be investigated will be determined by the individual professors. May be repeated once for credit. *Prerequisite: Visual Arts 7.*

B — An intermediate studio course in sculpture, stressing individual problems. Specific problems to be investigated to be determined by individual professors. May be repeated once for credit. *Prerequisite: Visual Arts 107A.*

C — A studio course for serious students of sculpture on the advanced levels. Stress will be placed on individual creative problems. May be repeated once for credit. *Prerequisites: Visual Arts 107B and the consent of the instructor.*

108. Advanced Projects in Art (4)

A studio course for serious art students at the advanced level. Stress will be placed on individual creative problems. *Prerequisites: 105B (intermediate drawing), 106B (intermediate painting), or 107B (intermediate sculpture).* May be repeated for credit *2.*

109. Materials (4)

A studio -based course involving the exploration of a wide range of materials, both traditional and new. Its purpose is to give a broad understanding of problems relating to the application of materials to specific aesthetic issues. May be repeated once for credit. *Prerequisite: consent of the instructor.* (Not to be offered 1975/76.)

113B. African and Afro-American Art (4)

This course is a critical aesthetic survey of west African arts in their cultural setting and the subsequent art styles which survived the transplant in the slave areas of the Americas. Emphasis will be placed in those west African tribes who were captured into slavery. *Prerequisites: Visual Arts 13B or consent of instructor.*

113C. Polynesian Art (4)

This course serves as a critical analysis of what the arts of Polynesia can tell us about the Polynesian culture at the time of contact with western culture. This course will cover Tonga, Samoa, Society Islands, Marquesas, New Zealand, Hawaii and Easter Island. *Prerequisites: Visual Arts 13A or consent of the instructor.*

113D. Melanesian Art (4)

This course will analyze the role of the arts, artists, and the aesthetic process in the living cultures of Melanesia — Solomon Islands, New Guinea, New Britain, New Zealand, New Hebrides and Australia. *Prerequisites: 13A or consent of instructor.*

113E. Sociology of Primitive Art (4)

This is an advanced course which will analyze theories on what the arts can tell us about a culture, e.g. why do people in pre-literate cultures, who live in rectangular houses tend to emphasize rounded forms in their art. *Prerequisites: Visual Arts 13A and consent of instructor.*

113F. Primitivism of Modern Art (4)

This course will be concerned with the different ways modern artists (Gauguin to Moore) were influenced by primitive art. *Prerequisites: VA 13A or consent of instructor.*

113G. Afro-American Art (4)

This is an advanced course which will examine the subsequent West African art styles that survived the transplant in the slave areas of the Americas, Haiti and Cuba. The process of acculturation, in regards to the visual arts, folk tales and customs will also be emphasized. *Prerequisites: Visual Arts 13A or consent of instructor.*

113H. Non-Western Ceremonies and Rituals (4)

This course will examine the image-making process and contextual use within specific ceremonies and/or rituals from West Africa, Melanesia and Nepal. Films will be used as an adjunct to the course material. *Prerequisites: Visual Arts 13A or consent of instructor.*

115. Series

Generally — 115 course number series designates Western Art History courses. The alphabetical designation only refers to a particular area of art history and students are not required to take these courses in sequence, e.g. 115A before 115B etc.

115A. "Ancient" Art History (4)

An undergraduate seminar emphasizing critical problems in the architecture, painting, sculpture and mosaics of Rome. Readings will include Brown, Kaehler, MacDonald and others on architecture; Hamberg, Wegner, and Nodelman on sculpture; Lavin and Clarke on mosaics. *Prerequisites: Visual Arts 11 or consent of instructor.*

115B. Renaissance in 15th Century Italy (4)

Fifteenth century architecture, sculpture and painting in Italy. *Prerequisites: Visual Arts 16 or consent of instructor.*

115C. Baroque Art (4)

The architecture, sculpture and painting of the 17th century principally in Rome and its trans-Alp expansion. *Prerequisites: Visual Arts 16 or consent of the instructor.*

115H. Pre-History of Western Art (4)

The art of Europe and the Mediterranean in the Paleolithic period in its relationship to human consciousness with consideration of its historical consequences for the later art of the West. *Prerequisites: Visual Arts 11 or consent of the instructor.*

115J. Late Antique Art (4)

This course will deal with architecture, sculpture and painting across the transition from antique to medieval style from the 2nd to the 6th century, A.D. *Prerequisites: Visual Arts 11 or consent of the instructor.*

115K. Narrative Structure in the Visual Arts (4)

An investigation of the strategies of representation of events in time within the visual arts, and their significance for the meaning and effect of the work. Typical cases from a range of art historical periods and situations will be scrutinized; ancient art will be emphasized. *Prerequisites: either: Visual Arts 11, 12, 14, or 16 or the consent of the instructor.*

116. Egyptian Art (4)

A survey of the painting, sculpture and architecture of Egypt; beginning with the pre-historic period through the XX dynasty of the New Kingdom. The course will view these art forms within their historical, social and religious contexts. *Prerequisites: Visual Arts 11 or consent of the instructor.*

117. Eighteenth Century Art History (4)

A general survey of the painting, sculpture and architecture of the eighteenth century in Europe and America. *Prerequisites: Visual Arts 16 or consent of instructor.*

118. Nineteenth Century Art History (4)

A survey of nineteenth-century art in Europe and America, stressing stylistic developments from Neo-Classicism to Post-Impressionism. *Prerequisites: Visual Arts 14 or consent of instructor.*

120. Contemporary Art History (4)
Deals particularly with problems that have arisen in the twentieth century in painting, sculpture, and art criticism. *Prerequisites: Visual Arts 14 or consent of instructor.*

121. A Critical History of Photography (4)
A critical examination of photographs and photographers. Attention will be focused on the ideas and arguments of major movements and important individual artists. The importance of historical ideas in their relation to contemporary photographic issues will be stressed as well as the problems of the medium as an art form.

122. Japanese Prints (4)
A critical and analytical survey of Japanese color woodblock prints of the seventeenth, eighteenth, and nineteenth centuries. The Primitive, Classical, and Decadent periods will be analyzed in relation to Western art and criticism.

123. Media Theory (4)
Introduction to, and history of, the major theories underlying photography. Covers the interaction between media and other art forms such as painting, drama and literature. While traditional forms of criticism will be analyzed, emphasis will be upon semiotic, sociological and communication/information models of inquiry. Overlaps of theory in film and video will also be discussed.

127. Special Projects in Afro-American Art (4)
Involves the application of art historical methods to a specific project to be determined by the instructor. Often this project will extend over the period of a year. May be repeated twice for credit. *Prerequisites: Visual Arts 113B or consent of instructor of Visual Arts 113G.*

141. Collage (4)
Includes collage, decoupage, assemblage. Course will deal with both representational and abstract uses of collage. Reference will be made to traditional forms as well as a more contemporary reconsideration of collage and assemblage as a set of underlying principles for materials gathering, combination and redistribution.

142. Drawing and Painting (Life) (4)
An advanced drawing and painting course with emphasis on individual exploration of mediums and visual interpretations based upon the figure.

145A-B. Representational Painting (4-4)
A — This is a studio course which aims to examine the options open to a painter who wishes to work with pictorial subject matter. Participants will be asked to analyze their artistic directions with respect to format, drawing, subject, and execution. Instruction will be given in all these areas. Students will be expected to research assigned artists and art forms. May be repeated for credit once.

B — A continuation of 145A on the intermediate level. May be repeated for credit once. *Prerequisite: Visual Arts 145A.*

148. Environments and Events (4)
Environments are large-scale works that physically involve the spectator(s). Events are works that physically involve the artist; a studio course in making such works. May be repeated for credit once. *Prerequisite: consent of the instructor.*

166A-B. Camera Techniques (4-4)
A — An intermediate course involving refined control over different films, developers, papers, and other photographic techniques. *Prerequisite: Visual Arts 60.*

B — An advanced-level course involving refined control over different films, developers, papers, and other photographic techniques. *Prerequisite: Visual Arts 166A and Visual Arts 167A.*

167A-B. Photographic Strategies (4-4)
A — An introduction to the aesthetic problems in photography. *Prerequisite: Visual Arts 60.*

167B. Photographic Strategies (4)
An advanced study of the aesthetic problems of photographic image to cultural phenomenen. Students will work on individual projects each quarter and will be evaluated according to the progress made by the student during the quarter. *Prerequisites: Visual Arts 166A and Visual Arts 167A.* May be repeated for credit *2.*

168. Color Techniques in Photography (4)
Instruction in color photography and printing. Lectures on theory and demonstrations in shooting and printing color negatives. *Prerequisites: Visual Arts 60, 166A and 167A.*

183. Art of the Silent Cinema (4)
An intensive investigation into the form and meaning of silent cinema, with particular emphasis on interrelationships between film and other arts during the 'teens' and 'twenties'. The European avant-garde-film will be studied in detail.

184. History of Film (4)
A survey of the history and art of the cinema. The course will stress the origins of cinema and the contributions of the earliest film-makers, including those of Europe, Russia, and the United States.

185A. Film-Making (6)
This course will develop basic familiarity with the 16-mm motion-picture camera and understanding of the grammar and semantics of various shots and takes involving different camera strategies. Attention will be paid also to simple editing techniques and their appropriateness for the students' films. The final project will be a two-minute film and its critical evaluation. *Prerequisites: VA 60, 88, 167A or consent of the instructor.*

185B. Film-Making (6)
This course will stress small three-minute productions. A more critical stance will be taken toward the epistemology and phenomenology of film-making and viewing. The student will make several three-minute films and a final three-minute film, all with an eye to increasing the student's ability to deal with complex artistic intention. *Prerequisite: VA 185A or consent of the instructor.* May be repeated for credit once.

186A. Film Workshop (6)
The course will stress the development of the script, psychological significance of space, viewpoint, and narrative tempo of moving images. Attention will also be paid to sets and the deployment of actors. Students will be expected to spend at least nine hours a week on outside preparation — photographing, processing, editing, and adding sound. The final project will be a five-minute film which will be critically evaluated as the final project. *Prerequisite: VA 185B or consent of the instructor.* May be repeated for credit once.

186B. Film Workshop (6)
A theatrical orientation toward the film. Emphasis will be placed on creating the script and on the complexities of creating space and images to make use of the cinema. The meaning of acting in the context of film will be developed and criticized. Differences between acting for film and stage will be emphasized. A 10-minute film will be required for the final project and it will be critically evaluated. *Prerequisite: Visual Arts 186A or consent of the instructor.* May be repeated for credit once.

187. The Genre Series (4)
A group of related courses exploring the conventions within such generic and mythic forms as the cowboy, shamus, chorus girls, and vampire films. May be repeated for credit twice.

188. Hard Look at the Movies (4)
Examine a choice of films, selected along different lines of analysis, coherent within the particular premise of the course. Films are selected from different periods and genres amongst Hollywood, European and Third World Films. *Prerequisite: Visual Arts 88.* May be repeated for credit once.

189. The Director Series (4)
A course that describes the experiences, looks, and structure of director-dominated films. A different director will be studied each quarter. May be repeated for credit three times. *Prerequisite: Visual Arts 88.*

190. Problems in the Theory of Modernism (4)
Explorations among the central conceptions underlying the practice and effect of the radical art in the modern epoch. *Prerequisites: Visual Arts 14 or consent of the instructor.* May be repeated for credit *1.*

191. Advanced Seminar in Photography (4)
For advanded students who have well-developed projects of their own which can form the core of the course work. Meetings will be held to discuss ideas, work in progress, and relevant outside material. May be repeated once for credit. *Prerequisite: consent of the instructor.*

192. Seminar in Contemporary Art (4)
A seminar dealing with the problems in twentieth-century art, including painting, sculpture and art criticism. May be repeated once for credit. *Prerequisite: Visual Arts 14.*

195. Teaching in Visual Arts (4)
Each student will meet with a section once a week under the direction of the instructor. The student will be required to attend the lecture in the course and to meet with the instructor at least once each week. May be repeated for credit three times. *Prerequisite: consent of the instructor.*

198. Directed Group Study (2-4)
Directed group study on a topic or in a group field not included in regular department curriculum, by special arrangement with a faculty member.

199. Special Studies in the Visual Arts (4)
Independent reading, research, or creative work under direction of a faculty member.

205. Advanced Problems in Drawing (4)
Students will be given the opportunity to explore the relation bewteen their own energy and idiosyncracy as draftsmen artists and the quasi-objective demands of representing various types of real and virtual space. May be repeated for credit.

206. Advanced Problems in Painting (4)
A studio course in painting, stressing individual problems. May be repeated for credit.

207. Advanced Problems in Sculpture (4)
A course in sculpture stressing individual problems. May be repeated for credit.

213. Sociology of Primitive Art (4)
A graduate level primitive art history course which will analyze and question theories on what the "arts" of nonliterate people can tell us about their culture.

215. Primitivism of Modern and Contemporary Art (4)
This seminar will investigate the notions of primitive art, primitivism, modernity and their interrelations in the process of image-making.

216. The Object (4)
An inquiry into the world of artifacts (some of them "works of art") by which man is surrounded, and the ways in which they function as agents of communication and modifiers of conscienceness.

217. Modern Points of View (4)
Course will be structured thematically (Marxist, Psychoanalytic, Formalist viewpoints, etc.) and chronologically — Diderot through the 19th Century (with emphasis on Baudelaire) to the present.

219. Meaning/Medieval Art (4)
A course exploring the meaning of its art-making by interrelation of genres normally treated as distinct disciplines; architecture and sculpture treated in relation to medieval theater; the whole against the background of philosophical and political propaganda.

220. Contemporary Art History (4)
The course will deal with the themes and problems that have arisen recently in 20th Century painting, sculpture, and art criticism.

230. Advanced Problems in Art Criticism (4)
Seminars for advanced students in art criticism and art history in relation to the problems set by the real phenomenon of art production. Specifically advanced, individual projects will be required of graduate students. May be repeated for credit.

231. Semiotics (4)
A structural analysis of art as seen in the context of cultural communication.

232. Tactics and Strategies (4)
A workshop-laboratory class involving a game-theory approach to the making of art in which attempts will be made to define a domain of interaction between a variety of possible players, the simplest of which is a two-person game involving art-audience.

234. Words and Pictures (4)
A course ranging from the hieroglyphs in Egyptian basreliefs to the contemporary use of language in conceptual art, this course investigates the interaction of words and images. Book and manuscript illustrations, scientific illustration, titles, labels and concrete poetry will also be discussed.

236. Art Criticism (4)
This course is largely for people who intend to write criticism. It will attempt to explore various approaches to criticism largely through the writings of contemporary art critics, though literary and film criticism will also be considered. Each student will be expected to write and deliver several short critical papers on subjects within his or her competence. May be repeated for credit.

237. Advanced Projects in Art (4)
A course specifically designed to investigate the many areas existing outside the more formal fields of painting and sculpture, as self-charting and subject matter, a seminar in conceptual art. May be repeated for credit.

238. Art Composition (4)
Discussion of composition, moving from media to media — from a Fra Angelico fresco to a 1930's comic strip. An examination in depth of the chief influences that go into the structuring of modern art works.

245. Representational Painting (4)
A studio course which aims to examine the options open to a painter who wishes to work with pictorial subject-matter. Participants will be asked to analyze their artistic directions with respect to format, drawing, subject and execution.

266. Advanced Problems in Photography (4)
An advanced study of the aesthetic and technical problems of photography and the relationship of photographic image to cultural phenomenon in general. May be repeated for credit.

285. Advanced Problems in Film-Making (6)
For students who have learned the fundamentals of film-making but need to futher refine the skills of the medium on an advanced level. *Prerequisite: Visual Arts 185B.*

286. Advanced Film Workshop (6)
For the most advanced graduate students who have a grasp of the fundamentals of film-making, this course will be primarily concerned with the application of technique to the creation of specific images. May be repeated for credit. *Prerequisite: Visual Arts 186B or consent of the instructor.*

288. Advanced Problems in Film (4)
A film course dealing with all aspects of film criticism and film writing, stressing individual problems.

290. Graduate Seminar (3)
A course in art theory and practice in which graduate students relate their own work to one of the several traditions in present art or develop their rationales for rejecting these traditions and developing differently.

294. Graduate Film Seminar (4)
Designed to deal with a wide variety of practical aspects of the film, including direction, script-writing, criticism, and photography.

295. Individual Studies for Graduate Students (1-12)
Individual research for graduate students in preparation for their comprehensive exhibition for the M.F.A. degree.

297. Seminar in Art Theory (4)
A seminar led by different faculty members each quarter, providing an intensive analysis of the theoretical aspects of the visual arts. May be repeated for credit.

298. Directed Group Study (1-12)
Directed group study on specific topics not covered at present in the normal curriculum. Used as an experimental testing of courses that may be given regular course numbers if proved successful. Special arrangement with faculty member.

299. Graduate Research (1-4)
Graduate-level research under the direct guidance of a faculty member. *Prerequisite: consent of the instructor.*

300. Apprentice Teaching (1-3)
Apprentice teaching in undergraduate courses given or participated in by the Visual Arts Department.

The Regents of the University of California

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Mervyn M. Dymally
Lieutenant Governor of California

Leo T. McCarthy
Speaker of the Assembly

Wilson C. Riles
State Superintendent of Public Instruction

Edward A. Morris
President of the Alumni Association of the University of California

James Collins
Vice President of the Alumni Association of the University of California

David S. Saxon
President of the University

Charles Field and Earl Willens, Regents-designate (non-voting).

Appointed Regents

The term of office of appointed Regents is twelve years, and terms expire on March 1 of the year indicated.

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Edward W. Carter (1982)
William K. Coblentz (1980)
Frederick G. Dutton (1978)
William E. Forbes (1978)
Mrs. Randolph A. Hearst (1990)
Mrs. Edward H. Heller (1976)
DeWitt A. Higgs (1982)
John H. Lawrence, M.D. (1988)
Joseph A. Moore, Jr. (1990)
Robert O. Reynolds (1986)
William M. Roth (1980)
William French Smith (1986)
Dean Allen Watkins (1984)
William A. Wilson (1988)

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689 University Hall
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Vice President — University and Student Relations
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Vice President — Agricultural Sciences and
Director, Agricultural Experiment Station
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University/Student Center
Mark A. Bookman, Director

UC San Diego Facts and Figures (as of May 1, 1976)

On-campus student enrollment (Spring Quarter)	
Undergraduate	7175
Graduate	1241
Medical School (excluding 368 hospital residents and interns)	319
Total	8735
On-campus faculty members	716
Members, National Academy of Sciences	45
Fellows, American Academy of Arts and Sciences	44
Nobel Prize Laureates	3
Total land area — UC San Diego	
Main campus	1232 acres
Outlying areas	652 acres
Total	1884
Books in Library collection (June 30)	1,110,00
University Extension enrollment (spring quarter)	8,970

Appendix

AFFIRMATIVE ACTION POLICY

The University of California is committed to a policy of nondiscrimination on the basis of race, color, national origin, sex, age, religion, marital status, or physical handicap. In addition, Title IX of the Education Amendments of 1972 requires the University not to discriminate on the basis of sex in the educational programs or activities which it operates — including but not limited to admissions and employment. Also, Title VI of the Civil Rights Act of 1964 prohibits any form of discrimination because of race, color, or national origin.

Inquiries concerning the application of the University's nondiscrimination policy, Title IX or Title VI may be directed to the Assistant to the Chancellor, Affirmative Action, 106 Matthews Campus (Q-052), La Jolla, California 92093, telephone 714-452-3340. Inquiries concerning the application of Title IX or Title VI may also be made to the Director of the Office for Civil Rights, Department of Health, Education, and Welfare, Washington, D.C. 20201.

CONFIDENTIALITY OF AND ACCESS TO STUDENT RECORDS

Under the provisions of the Family Educational Rights and Privacy Act of 1974, every student is accorded the right to inspect and review education records directly related to the student's status as a student that are held by any unit or department on the campus.

The right of inspection is available to students who are or have been in attendance and extends to those materials which are intended for university use or which are available to parties outside the university system. Third parties shall not have access to education records or information pertaining to students as students without the written consent of the particular student about whom such information is sought.

Student requests to inspect education records pertaining to their status as students shall be granted within 45 days after the request has been made. (Students shall have an opportunity for a hearing to challenge the content of the records to insure that the records are not inaccurate, misleading, or otherwise in violation of their privacy or other rights, and to provide an opportunity for the correction or deletion of any such inaccurate, misleading, or otherwise inappropriate data contained therein.)

The full text of the Family Educational Rights and Privacy Act of 1974 is available at these locations:

1. Office of the Vice Chancellor and Dean of Student Affairs, Student Center;

2. Office of Admissions and Registration, 102 Matthews Campus;

3. Central University Library;

4. Provosts' Offices of Revelle, Muir, Third, and Fourth Colleges; and,

5. Office of the Dean of Graduate Studies and Research, 108 Matthews Campus.

SALARY AND EMPLOYMENT INFORMATION UNIVERSITY OF CALIFORNIA

FIELD OF STUDY	DEGREE LEVEL OF GRADUATES			PROBABLE OR DEFINITE JOB COMMITMENT[2]
	BACHELOR'S	MASTER'S	DOCTORATE	
	AVERAGE MONTHLY SALARY[1]			
Engineering	$930-1,290	$1,030-1,410	$1,260-1,840	77.4%
Humanities	510- 935	665-1,200		59.2
Life Science	545-1,000			66.0
Management		1,100-1,545		80.7
Physical Science	760-1,260		1,280-1,720	70.5
Social Science	560- 975	730-1,180		56.6

[1]Source: A national survey of a representative group of colleges conducted by the College Placement Council, representing the 80 percent range of offers throughout the country. It should be noted that a wide variation in starting salaries exists within each discipline based on job location, type of employer, personal qualifications of the individual, and employment conditions at the time of job entry.

[2]Source: *The Job Market for UCLA's 1974 Graduates.* Percentages are based only upon those students who planned to work immediately after graduation.

While efforts have been made to assure the accuracy of statements in this catalog, it must be understood that all courses, course descriptions, designations of instructors, and all curricular and degree requirements contained herein are subject to change or elimination without notice. Students should consult the appropriate department, school, college or graduate division for current information, as well as for any special rules or requirements imposed by the department, school, college or graduate division.

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History of the University

The University of California was established in 1868. Initially located in Oakland, it moved to its first campus, Berkeley, in 1873. Today, along with the Berkeley campus, the University has campuses at San Diego, Irvine, Los Angeles, Riverside, Santa Barbara, Santa Cruz, Davis and San Francisco.

Instruction on these campuses covers all of the broad and essential areas of human knowledge, including the arts, sciences and literature. Each campus has its own organization, objectives, and style of academic life. Each offers a unique set of programs and facilities.

The University is governed by a Board of Regents. The Regents appoint the President of the University, who is the executive head of the University, and with his advice appoint the chancellors, directors and deans who administer the affairs of the individual campuses and divisions of the University.

UC San Diego—The University of California, San Diego — is situated adjacent to the community of La Jolla near the northern limits of the city of San Diego. The San Diego Campus traces its origins to the closing years of the nineteenth century when Berkeley zoologists selected La Jolla as the site for a marine station. This project, which eventually was named the Scripps Institution of Oceanography, became a part of the University of California in 1912. When in the late 1950's the Regents decided to establish a general campus of the University at San Diego, the Scripps Institution — with its small though distinguished staff of scientists — formed the nucleus of the new institution.

At first, only graduate studies and degrees in the physical and natural sciences were offered. In the fall of 1964 the campus accepted its first undergraduates, offering a basic lower-division curriculum to prepare students for majors in the humanities, social sciences, biological sciences, physical sciences and mathematics.

Occupying more than 1200 acres, the UC San Diego campus spreads from the seashore at the northern edge of La Jolla, where the Scripps Institution is located, across a large portion of the adjacent Torrey Pines Mesa, high on bluffs overlooking the Pacific Ocean. Much of the land is covered with groves of eucalyptus, grown from seed brought from Australia.

The Master Plan for UC San Diego calls for establishment of a series of interrelated colleges on the bluff site. Each college will be designed to accommodate approximately 2300 students. Together, the various colleges will offer a wide variety of undergraduate and graduate programs. The objective is to give students and faculty the opportunity of working together in small academic units while, at the same time, enjoying the advantages of a major university. Four colleges — Revelle, John Muir, The Third College, and The Fourth College — are in operation.

UC San Diego is accredited by The Western Association of Schools and Colleges.

University of California, San Diego
La Jolla, Ca. 92093

University of California, San Diego

General Catalogs,

1976/1977