UCSD

UNIVERSITY OF CALIFORNIA, SAN DIEGO

GENERAL CATALOG
1974-1975

JUNE, 1974

Correspondence Directory

UNIVERSITY OF CALIFORNIA, SAN DIEGO

P.O. Box 109, La Jolla, California 92037, Telephone: (714) 453-2000

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
Off-campus Housing	Office of Housing Services	250 Matthews Campus
Residence Status	Registrar & Admissions	102 Matthews Campus
Financial Aids	Student Financial Services	213 Matthews Campus
Scholarships (for Undergraduates)	Student Financial Services	213 Matthews Campus
Fellowships	Office of Graduate Studies and Research	108 Matthews Campus
Teaching and Research Assistantships	(Address the appropriate Department of Instruction)	
Employment	Student Employment Office	210 Matthews Campus
Student Activities	Student Center	Cluster Center
Foreign Students' Affairs	Office of International Education	Matthews Campus
Educational Opportunity Program (EOP)		215 Matthews Campus
Graduate Minority 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	Second Floor Humanities-Library Building	Revelle Campus
Dean of Graduate Studies	Office of Graduate Studies and Research	108 Matthews Campus
General Information	Public Affairs Office	Matthews Campus

UCSD

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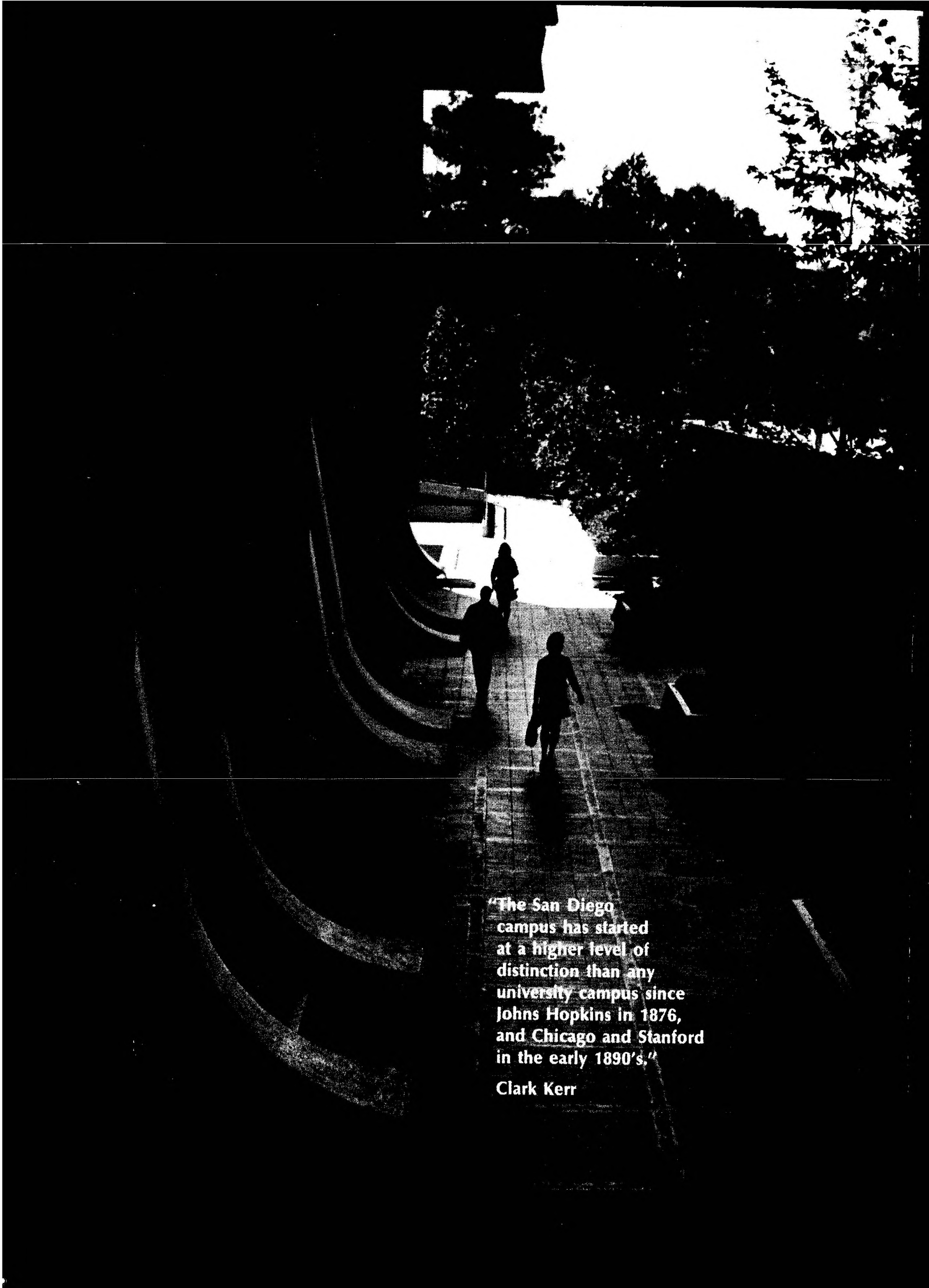

"The San Diego campus has started at a higher level of distinction than any university campus since Johns Hopkins in 1876, and Chicago and Stanford in the early 1890's."

Clark Kerr

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Academic Cale

	FALL QUARTER 1974	WINTER QUARTER 1975	SPRING QUARTER 1975
UNDERGRADUATE STUDENTS: DEADLINE FOR APPLICATIONS FOR SCHOLARSHIPS	Jan. 15		
GRADUATE STUDENTS: APPLICATIONS FOR FELLOWSHIPS			
Deadline date for filing application materials	Feb. 1		
Notice of Awards	Mar. 15		
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			
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GRADUATE STUDENTS: ADMISSION			
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Domestic students: Deadline date 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			
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With penalty	Sept. 23	Jan. 6	Mar. 31
Payment of Fees			
Without penalty	Sept. 24	Jan. 7	Apr. 1
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Paying of Fees			
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With penalty/petition	Oct. 4	Jan. 17	Apr. 11
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Without penalty	Sept. 24	Jan. 7	Apr. 1
With penalty/petition	Oct. 4	Jan. 17	Apr. 11
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Dropping courses without penalty of "F" grade	Nov. 1	Feb. 14	May 9

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	FALL QUARTER 1974	WINTER QUARTER 1975	SPRING QUARTER 1975
GRADUATE STUDENTS: DEADLINES FOR CHANGE OF PROGRAM			
Adding or dropping courses without penalty/petition	Oct. 4	Jan. 17	Apr. 11
GRADUATE STUDENTS: MASTERS DEGREE			
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Filing approved thesis	Dec. 6	Mar. 21	June 13
GRADUATE STUDENTS: DOCTOR OF PHILOSOPHY DEGREE			
Filing for advancement to candidacy	Oct. 4	Jan. 17	Apr. 11
Filing draft dissertation with doctoral committee	Nov. 8	Feb. 21	May 16
Filing approved dissertation and related materials	Dec. 6	Mar. 21	June 13
GRADUATE RECORD EXAMINATION (GRE) TEST DATES	Oct. 26 Dec. 14	Jan. 18 Feb. 22	Apr. 26 June 21
GRADUATE SCHOOL FOREIGN LANGUAGE TEST (GSFLT)	Oct. 26	Jan. 18	Apr. 26 June 21
THANKSGIVING VACATION (ACADEMIC & ADMINISTRATIVE HOLIDAYS)	Nov. 28-29		
GRADUATE STUDENTS: REMOVING INCOMPLETE GRADES (E) ASSIGNED IN PREVIOUS QUARTERS	Nov. 27	Mar. 12	June 4
UNDERGRADUATE STUDENTS: REMOVING INCOMPLETE GRADES (I) ASSIGNED IN PREVIOUS QUARTER	Nov. 27	Mar. 12	June 4
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QUARTER ENDS	Dec. 7	Mar. 22	June 14
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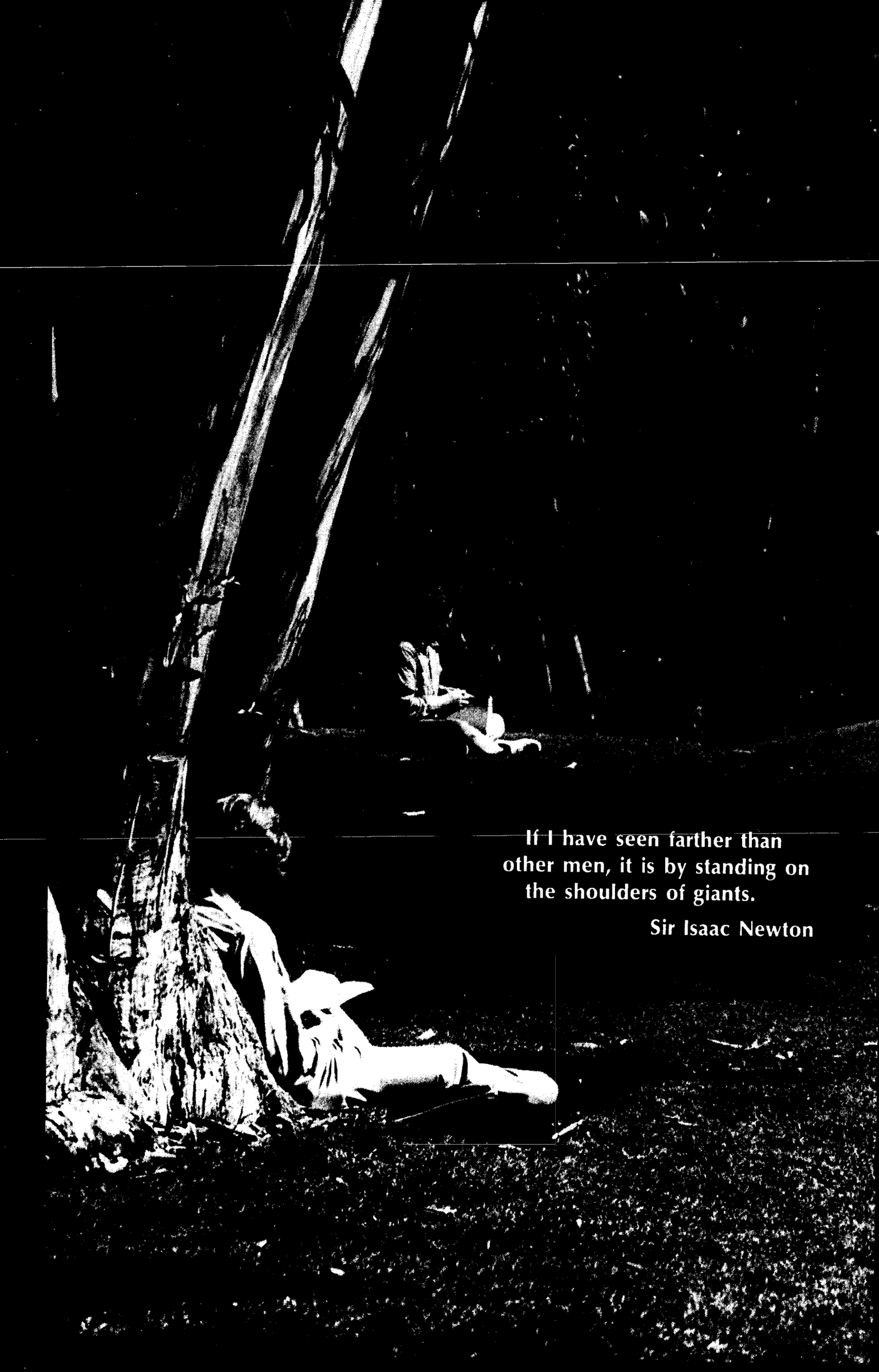
Final date for completion of all requirements for degrees to be awarded at end of quarter	Dec. 6	Mar. 21	June 13
Final date for completion of all requiremens for degrees to participate in commmencement	—	—	June 13
CHRISTMAS HOLIDAYS (ADMINISTRATIVE HOLIDAYS)	Dec. 23-24-25 Jan. 1		
ACADEMIC AND ADMINISTRATIVE HOLIDAY	—	Feb. 17	—
MEMORIAL DAY (ACADEMIC AND ADMINISTRATIVE HOLIDAY)		Mar. 24	May 26
GRADES MAILED TO ALL STUDENTS (APPROXIMATE)	Dec. 27	Apr. 7	July 1
ADMINISTRATIVE HOLIDAY		Mar. 24	

An Introduction to the University of California San Diego

1974-1975



If I have seen farther than other men, it is by standing on the shoulders of giants.

Sir Isaac Newton

EXPLORERS WELCOME

Your experience at UCSD — should you qualify, and elect to come here — will be largely what you choose to make of it.

If you are genuinely interested in stretching your mind, and in acquiring knowledge which will serve you well for the rest of your life, the University of California at 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, UCSD probably can help you to find your way.

But if you are considering UCSD solely because someone else wants you to come here, or as a place to hibernate, we suggest you forget us. Because at UCSD, all of us — including the great majority of the students — are really serious about education.

College students are inquisitive individuals. They are explorers, looking for answers. Most of all, they are looking for themselves.
Counselor, Muir

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. These are years for exploring, for unfolding, for living with other young explorers who — like yourself — are searching for answers to certain very fundamental questions.

UCSD is a good place to make this search — and, frankly, that's why most of our students come here. Very few young people truly know where they are going, or what they want to do a decade from now.

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 careers in occupations that haven't yet been invented!

—the average American changes occupation five times during a working career.

When I first came here from high school I was psyched out, scared I wouldn't be able to do the work. But I found it's not too hard if you keep up and don't fall behind. Keeping up is the main thing.
Freshman, Muir

UCSD welcomes explorers.

What's so special about UCSD?

For one thing, this is an exciting place. It's intellectually stimulating to live, day to day, close to men and women who are making headlines in the arts, sciences, humanities, medicine, oceanography. It's a rare experience to share a campus with a Nobel prize-winner who foresees the day when men may sail to distant planets by riding their spacecraft on the solar wind. It's a privilege to study under scholars who are carving frontiers in biology and physics, chemistry and computer science, music and literature, and a score of other disciplines.

The first and foremost reason for choosing UCSD, then, is its faculty.

THE COLLEGES OF UCSD

A second feature which makes UCSD a "special" place is its "small-college" structure. Here's how it works to 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 UCSD; the other is UC-Santa Cruz.

In adopting the small-college structure, planners of the San Diego campus decided to capitalize on the advantages of "bigness" while retaining the virtues of "smallness." To become great, 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 teeming with students, they would create several more compact campuses. They would thus establish an environment in which students might retain their individualities and feel a sense of belonging. The planners were aware that many students prefer such an intimate, informal setting to the crowded, hurly-burly world of the big-city campus.

These were the qualities which the planners of UCSD had in mind when they organized, first, Revelle College in 1964, and later, in 1967, when John Muir was launched, and again four years later when Third College was founded. They are also the attributes which will shape the newest member of the UCSD family — Fourth College — which will accept its first students in the Fall of 1974.

In the paragraphs which follow, you will find brief descriptions of each of these Colleges. Greater detail about each of them appears in the next chapter, titled "Choosing a College at UCSD."

REVELLE COLLEGE

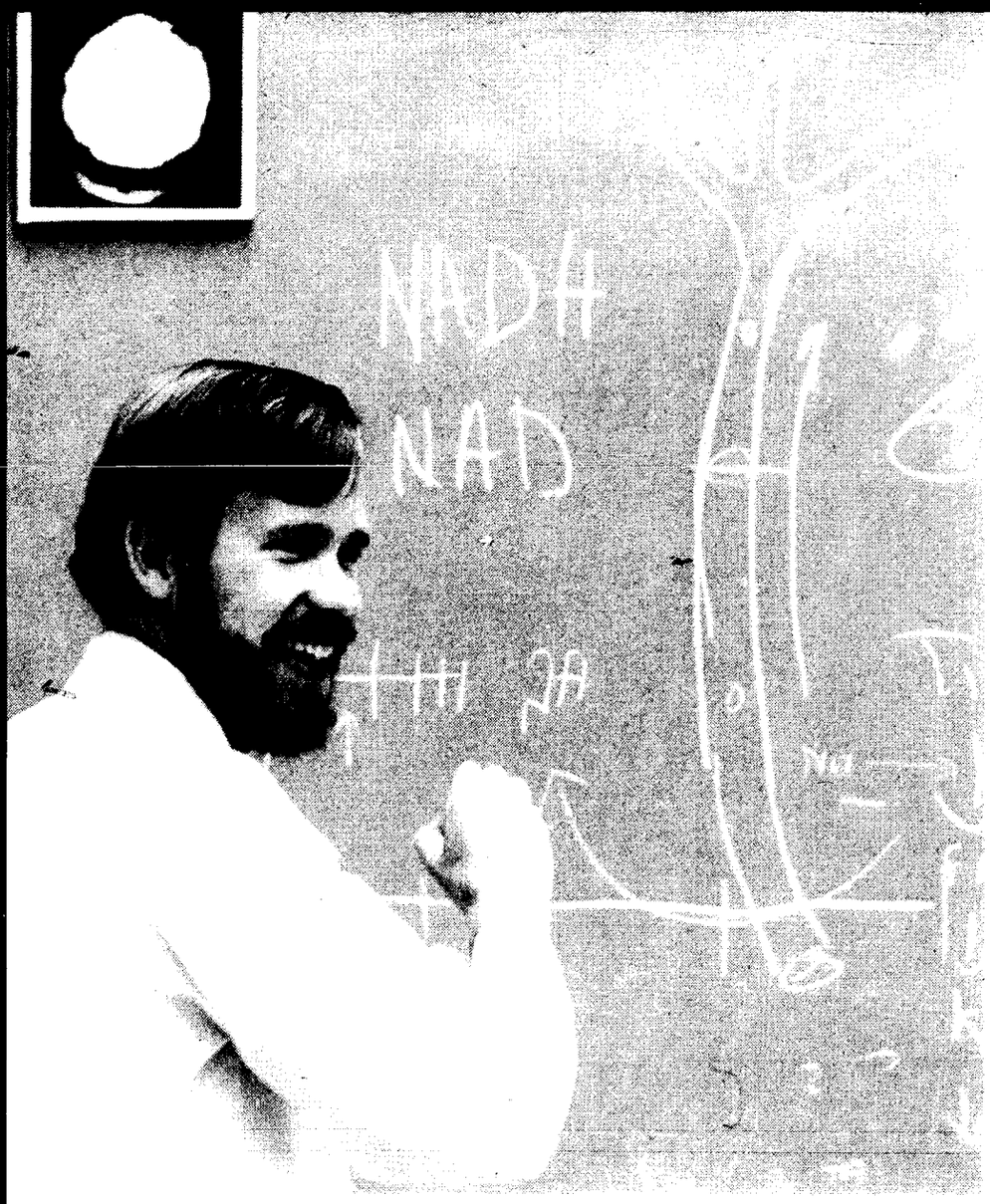
Revelle's roots go back to 1958, when a School of Science and Engineering was established at Scripps Institution of Oceanography (now a department of UCSD). Revelle enrolled its first undergraduates in 1964. As Revelle was an outgrowth of a school which stressed science and engineering, the emphasis at first was on these disciplines. Over the years, however, Revelle has developed into a college in the tradition of the Renaissance Man, a college "aware and concerned with the full spectrum of man's intellectual and creative endeavor." During his first two years, the Revelle student is expected to attain an acceptable level of general education in mathematics, foreign language, physical, biological and social sciences, fine arts, and the humanities. The student does not need to declare his major until the junior year. The last two years are devoted to intensive work in his major field of interest. In the words of Revelle's Provost, "this is certainly not a comfortable environment for dullards, or for those who just want to get by with a little work."

Close to one-half of Revelle's students live on campus in Revelle residence halls, which are named for famed ships of discovery (examples: Beagle, Atlantis, Challenger.) Like all UCSD colleges, Revelle has its own Provost, Deans, Academic Advisers, and administrative staff.

JOHN MUIR COLLEGE

Muir defines itself as "a liberal arts college in which the student is encouraged to define his goals and take responsibility in determining how to realize them." At Muir, a balanced program of instruction is offered in all of the principal areas of learning, but the student has wide latitude in fulfilling the general-education requirements. Superior students may pursue independent study and participate in research and creative work, according to their interests and aspirations. They may select and focus on an interdisciplinary major in preparing for a bachelor's degree.

Muir College is particularly proud of its Special Projects program. These projects are undertaken in the place of ordinary departmental majors. Working with a faculty adviser, a student either may put together a pattern of courses amounting to a one-man, one-time interdisciplinary major, or he may choose to do in-depth work within a limited field in ways that permit greater time in the laboratory, the library, the field, or the studio than can be managed under an ordinary major. Under this program, Muir has had students on projects devoted to such diverse subjects as the ecology of Antarctica (with on-the-spot field work), the writing of original poetry (since published), the writing of fiction, cloisonne, biological research, and the philosophy of education. In the end, the student submits a piece of something — a volume of verse, a musical composition, an essay in literary criticism, or some other highly individual work. Only students with a more-than-average measure of self-direction and determination qualify for the program, and faculty advisers turn away those who are looking for an easy option or who lack the qualities needed for much independent study.

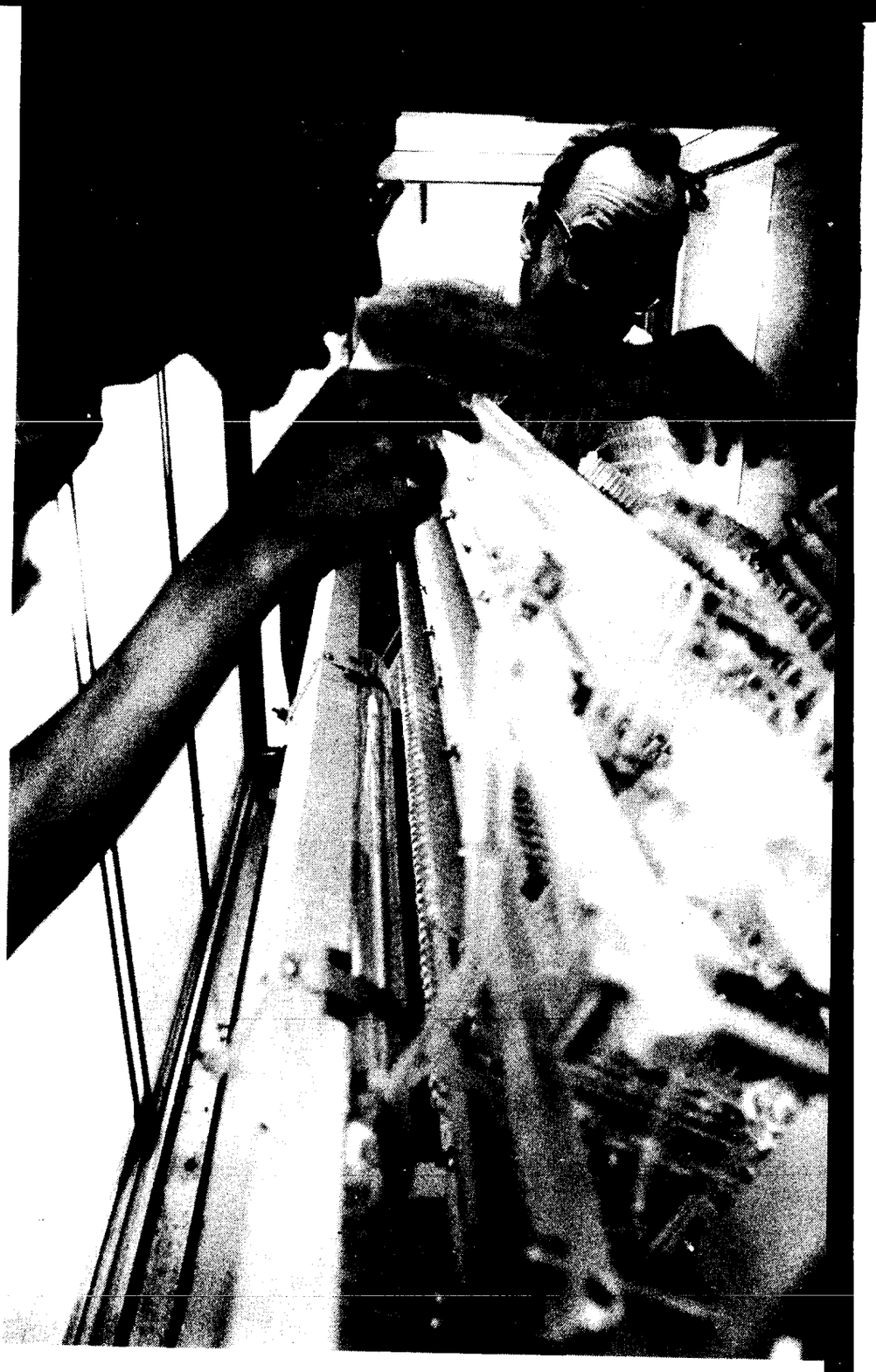


If there's one thing UCSD has a lot of, it's brains. This is a brainy place. If tough, hard thinking turns you on, UCSD will turn you on. Otherwise, go somewhere else.

Junior, Revelle

The Humanities came to life for me here. That's surprising, because Humanities were never my bag.

Junior, Muir



It's small enough so you can know enough people to feel comfortable, but large enough so you can be anonymous when you need to be.

Junior, Third College

THE THIRD COLLEGE

The Third College accepted its first students in the Fall of 1970. It is a College conceived, developed and evolving on the basis of close student, faculty and staff cooperation — a cooperation which stems from deep personal commitments to the educational philosophy and goals of Third College.

Third College has taken advantage of the UCSD college system to initiate and foster new and exciting interdisciplinary programs: Third World Studies, Urban and Rural Studies, Communications and Health Sciences. The College has pioneered in the integration of career objectives into academic programs by offering courses on the law and field-placement internship programs.

The Third College is a liberal-arts and sciences College with academic

programs and majors in the humanities and social sciences, and in the natural sciences and mathematics. The College has a special academic focus on the scholarly investigation of social well-being, change and development. As an integral component of its academic goals, Third College has a special commitment to the education of minority students.

General-education course requirements for Third College encompass the humanities, the social sciences, the natural sciences and mathematics. Third College students have two options for satisfying the general-education course requirements of the college. These general-education options are designed both to reflect the academic focuses of the College and to prepare students for the pursuit of any of the great variety of departmental and interdisciplinary majors available at UCSD.

Don't let it bug you if you don't seem to learn much your first year. You're learning a lot more than you think. For instance, you're learning how much there is to learn.

Sophomore, Third College

FOURTH COLLEGE

The Fourth College, newest member of the UCSD family of Colleges, will enroll its first students in the Fall Quarter of 1974.

A lot of what you'll learn here you won't learn in the classrooms. Like those long rap sessions at the Coffee Hut or the Five-and-Dime.

They teach you a lot about people. Including yourself

Freshman, Revelle

Like other Colleges at UCSD, Fourth College will be a liberal-arts College in the finest sense of the term. While recognizing that its fundamental obligation is to provide an undergraduate education of the highest order, Fourth College is committed also to helping its students to plan for their careers after graduation. Thus, Fourth College will seek to integrate its academic program with career-planning counseling services. The College is developing also a field-placement program which will permit students to obtain direct involvement with and experience in career activities of their choice.

At Fourth College, therefore, the emphasis will be on professional and pre-professional training which will be applicable in a wide variety of post-college careers including medicine, the performing arts, administrative sciences, law, and architecture. Comparable training is available at Revelle, Muir, and Third College. The feature which distinguishes Fourth College is that, through counseling, special weight will be given to the student's career plans.

THE "OTHER" UCSD

UCSD'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 boasts some of the finest bathing beaches and coves, restaurants, art galleries and other recreational and cultural attractions in the nation.

Naturally, then, much of the social life at UCSD centers around the waterfront, with surfing and scuba-diving high among the favorite after-class and week-end diversions.

Inland from the beaches, student social life ranges from the pizza parlors and pubs of Del Mar southward to the open-air markets of Tijuana and the primitive wilderness of the Baja California peninsula in old Mexico.

The City of San Diego, some 12 miles from the campus, offers a rich array of recreational opportunities including Old Town ("Where California was born"), Sea World in Mission Bay, the

If you like the beach - and who doesn't - there are miles of it here. The surfers are out there every day, rain or shine. If you dig mountains or deserts, they're about an hour's drive away.

Sophomore, Third College

world-famed San Diego Zoo, and the Sports Arena and San Diego Coliseum, sites of a year-round calendar of major-league sporting events.

For theater-lovers there's Balboa Park's Old Globe, home of the National Shakespeare Festival every summer. Next door to Old Globe, the Cassius Carter Center Stage Theater presents a lively season of plays, while downtown the Off-Broadway Theater brings big-name entertainers to San Diego in revivals of long-time hits. The Civic Theater, downtown, also schedules a full season of opera and cultural events, including ballet and the San Diego Civic Orchestra.

On-campus entertainment includes a series of Friday and Saturday night flicks throughout the year, at attractively low prices. The Drama Department presents plays throughout the school year in the new UCSD Theater on Matthews Campus, and many concerts ranging from rock to Bach are programmed annually. Free dances in the cafeterias and gym, street dances, noon concerts and appearances by prominent jazz groups also are scheduled regularly.

Informal meeting places such as Revelle's Coffee House and Muir's Five-and-Dime are favored by students throughout the day and evening for dates and rap sessions. The new University Student Center provides many meeting rooms and recreational facilities for students. In the Fall of 1974, UCSD's new $5.2-million Fine Arts Building (the Mandeville Center) is scheduled for completion. This massive structure will house offices, classrooms and work spaces for the Departments of Music, Visual Arts and Drama, and a 900-seat auditorium. The three-level structure, north and east of the gymnasium, will provide a center for a greatly expanded program of art exhibits, concerts, and other cultural events.

Mountains, Deserts and Beaches

Southern Californians live out-of-doors. The San Diego metropolitan area — which includes UCSD — boasts 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 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, awe-inspiring Borrego Desert with its breathtaking displays 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 rough-road auto races each year, is still largely unexplored wilderness, despite recent termination of a trans-peninsular highway.

There are weekend movies, plays, concerts and trips to the desert. People like Eric Hofer and Michael Crichton come here as Guests-in-Residence, and we talk with them. If you really want something to do, you can usually find activity. But sometimes you have to take the initiative.

Junior, Revelle

"MOST SPORTS-MINDED CAMPUS"

UCSD Athletic Director Howard Hunt calls this campus "The most sports-minded in America." And Mr. Hunt has statistics to prove it. UCSD fields more intercollegiate athletic teams — 31 — than any other college or university in the nation. The total is all the more remarkable in light of the fact that UCSD has no big-time football or basketball team, and that the student body recently voted four-to-one against athletic scholarships.

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

Special emphasis is placed on coed sports teams (more women than men turn out for soccer at UCSD!).

More than half the kids here take part in sports. The money they spend at other colleges for big-league athletes they spend here in everything from coed soccer and water polo to karate and sailing.
Junior, Revelle

SELECTING YOUR MAJOR

Your major course of study at UCSD will be determined by a number of things, including your interests, skills, abilities and needs. Your student experience here also will be of help. Which courses do you enjoy? What activities are exciting? Do you work more easily with verbal problems, mathematical models, in a laboratory, in a library, with others, by yourself? What things seem to come with little effort, and — of equal importance — what things seem impossible no matter how much time you put in?

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 Provost's 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 UCSD, and perhaps will change it as your student experience continues.

Nobody really expects you to know exactly what you want to do with your life. Few college kids really know, and most people change careers three, four, five times before they are 40. The main thing in college is to try things on for size.

Sophomore, 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 day, 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.

THE MAJORS

Every major is available in each of the four colleges. The basic alphabetical listing below shows the formal names of departmental majors in capitals; the lower-case subheads are the available concentrations within majors, or the general terms to help you locate a major in your desired field of study. Details will be found in the UCSD General Catalog.

ANTHROPOLOGY
APPLIED MECHANICS AND ENGINEERING SCIENCE (AMES)
- Applied Mechanics
- Bioengineering
  - Bioengineering with Engineering emphasis
  - Bioengineering with Premedical emphasis
- Systems Science

APPLIED PHYSICS AND INFORMATION SCIENCE (APIS)
- Applied Physics
- Information Science
- Systems Theory
- Electronics and Communications
- Acoustic Signal Processing
- Optical Signal Processing
- Computer Science

Art — see VISUAL ARTS
Biochemistry — see BIOLOGY, CHEMISTRY
Bioengineering — see AMES
BIOLOGY
- Biochemistry
- Biology
  - Cell Biology
  - Genetics
  - Human Biology
  - 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
Computers — see APIS
DRAMA
Earth Sciences — see CHEMISTRY, MATHEMATICS, PHYSICS
ECONOMICS
Education — see Teacher Education Program
Engineering — see AMES
English — see LITERATURE
French — see LITERATURE
Geology — see Earth Sciences
German — see LITERATURE
HISTORY
- European History
- Western Hemisphere History

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

MATHEMATICS
- Earth Sciences/Mathematics
- Mathematics

MUSIC
PHILOSOPHY
PHYSICS
- Biophysics
- Biophysics with Premedical emphasis
- Earth Science/Physics
- Physics

Pre-Law (any major prepares for law

school)
Pre-Medical — see AMES, BIOLOGY, CHEMISTRY
PSYCHOLOGY
Russian — see LITERATURE
SOCIOLOGY
Spanish — see LITERATURE
Systems Science — see AMES
Systems Theory — see APIS
Teacher Education Program (partial elementary credential only)
THIRD WORLD STUDIES
URBAN AND RURAL STUDIES
VISUAL ARTS

Need More Information? Check the following:

- ☐ How do I apply for admission? Page 63. (See also "Note," below.)
- ☐ How much does it cost? See "Fees and Expenses," Page 67.
- ☐ How does UCSD grade? Page 70.
- ☐ What about scholastic requirements? Page 56.
- ☐ How do I go about choosing a college at UCSD? Page 25.
- ☐ What kinds of services and facilities are available at UCSD for students? Page 105.
- ☐ Who are the top people at UCSD? Page 300.
- ☐ How do I find my way around on campus? Page 296.
- ☐ What's the history of UCSD? See inside the Back Cover.
- ☐ How many students and faculty were there at UCSD in 1974? Page 301.
- ☐ Where do I write for more information? See inside the Front Cover.

Note: An Admissions Packet for students interested in entering UCSD 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 Admissions Office on any University of California campus.

Choosing a College at UCSD

As a member of the nine-campus family of the University of California, UCSD 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. UCSD'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. UCSD's undergraduate programs also have been singled out for special honors in national surveys, despite the comparative youth of UCSD as a general campus.

So UCSD 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 UCSD'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 UCSD.

The concept was launched at UCSD 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 UCSD, with such advantages as a major library (UCSD'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 UCSD, 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 UCSD 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 personalities.

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

Much of the success you will enjoy at UCSD — 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 UCSD campus, was named in honor of Dr. Roger Revelle, former University-wide Dean of Research, and for many years Director of UCSD'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 a student who is 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 his major field.

To this end, a lower-division curriculum has been established which should enable the student 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 an undergraduate should not concentrate heavily in a special field until he has had a chance to learn something about the various fields that are open to him. His general education must, then, be thorough enough for him to see the possibilities of those fields. Early in his career, he should know, as it were, three languages: his own, a foreign language, and the universal language of mathematics. He will learn more about his own culture in a two-year humanities sequence, an introduction to major literary, philosophical, and historical documents which requires the regular writing of essays. He will study a foreign language as a spoken, vital means of communication; studying that language, he will come to know something of the general nature of language itself. And he will study mathematics as part of general education and as preparation for a required sequence of courses in the physical and biological sciences. Finally, he will, as a sophomore, study the social and behavioral sciences. He will also have some elective time in which he can take courses in disciplines that he would like to explore further. Once he has completed this program, he will be ready for the relatively more specialized work of the upper division.

During the student's upper-division years (junior and senior), his main effort will be devoted to intensive work in his major field at a level of competence that will enable him to continue his study in the graduate division.

The student's ***general*** education will not, however, stop at the end of the sophomore year; in addition to his major, every upper-division student will do a substantial fraction of his course work in an area 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.) The courses that the student elects for this noncontiguous minor must compose an integrally related complex which will equip him for continued informal study in adult life.

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 the student so that he 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 (first two years).

Students are encouraged to meet the requirements of the lower division and the major requirements of the upper division 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 that give them an opportunity to complete degree requirements in fewer than four years.

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.
6. Seven courses in humanities and the fine arts.

Subject A Satisfaction of the University requirement in Subject A (see ***Undergraduate Admissions, Policies, and Procedures).***

Mathematics Mathematics has for centuries held an important place in education, in the sciences, and in the humanities. As an integral part of his or her liberal education, the student will be brought into contact with a significant area of mathematics. Furthermore, he/she will gain the facility to apply mathematics in the student's studies of the physical, biological and behavioral sciences.

Two beginning-year course sequences are offered for Revelle College students. Freshmen enrollment in these sequences is dependent on the student's high school and college preparation in mathematics as well as future plans.* Both sequences include integral and differential calculus and linear algebra. (See ***Courses, Curricula, and Programs of Instruction: Mathematics.***)

* 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.

Social Sciences* Students will choose a lower-division course sequence offered by the Departments of Anthropology, Economics, Linguistics, Political Science, Psychology, or Sociology.

* 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. A student enrolls in one sequence or the other depending on his prior preparation in mathematics. Five courses in one sequence will satisfy the natural sciences requirement. (See *Courses, Curricula, and Programs of Instruction: Natural 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 language. Programs are currently offered in French, Spanish, Russian, German, Chinese, and Hebrew. Students who have preparation in other modern languages or classical languages should see the Office of the Provost, Revelle.

A. Oral proficiency. By the end of his sophomore year the student is expected to have demonstrated his ability to carry on ordinary conversation comfortably in a modern foreign language. The skill aimed at is what would be adequate for the student to continue his education by participating in substantive courses conducted in the foreign language, e.g., the courses offered by the Department of Literature on this campus or courses offered to native speakers of the language in their own country.

B. Reading proficiency. By the end of his sophomore year the student is expected to have demonstrated his ability to read ordinary material — e.g., newspapers and popular literature — in a foreign language.

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 the student in attaining the required language proficiencies, three special kinds of aid are offered:

1. Self-instructional materials and equipment, which the student can use to advance his proficiency at his 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 the student's education as well as to assist him in his own language study.

A student who is not yet proficient after completing Language 1, 2, 3 or 4, 5, 6 may gain the requisite proficiency by taking one of the Literature 10 courses.

* The Revelle Faculty is reviewing its language requirement. For possible alternative ways of meeting this requirement, students should see the Office of the Revelle Provost.

Humanities* The humanities sequence introduces the student to his cultural heritage. It rests on the principle that this heritage is best found in the great documents of Western Civilization in which it has assumed concrete form. The student is invited to confront these literary, philosophical and historical documents directly; through lectures, group discussions, themes, and conferences he will learn to interpret them, to discover their interrelations, and to perceive their continuity.

The sequence opens with the study of Judaeo-Grecian beginnings and traces the development of Western Civilization forward again to the present. **Essential to the course are the student's themes;** in these he will be asked to come to direct and personal terms with what he has read, and to acquire the skills of clear and cogent expository writing. For the courses to be taken in fulfillment of this requirement see ***Courses, Curricula, and Programs of Instruction: Humanities.***

Fine Arts* One course is required and is usually taken in he freshman or sophomore year. Students may choose a course from Drama, Music, or Visual Arts. (See ***Courses, Curricula, and Programs of Instruction.***)

* The Revelle Faculty is reviewing its Humanities and Fine Arts requirements. For possible alternative ways of meeting these requirements, students should see the Office of the Revelle Provost.

Freshman Year

FALL	WINTER	SPRING
Humanities 2	Humanities 3	Humanities 4
Language	Language	Language
Mathematics 1A or 2A	Mathematics 1B or 2B	Mathematics 1C or 2C
Fine Arts* or Elective or Natural Science 1A	Natural Science 1B or 2A	Natural Science 2B or Elective

Sophomore Year

FALL	WINTER	SPRING
Humanities 5	Humanities 6	Humanities 1
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

* A student 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 he has room to schedule a class that interests him.

Upper Division

The Major All undergraduate majors offered at UCSD 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/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.

The Noncontiguous Minor* In addition to the major and any restricted electives, Revelle College students are required to complete a noncontiguous minor, a coherent grouping of six 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 either of the following ways:

1. *Project minor.* Such a minor centers on a problem or period chosen by the student after consultation with his minor adviser. It may be interdepartmental, so that the courses constituting it may be selected from various departmental offerings. However, the "center of gravity" of such a minor must be in a given department, that department being in an area other than the student's major. Every minor program of this kind must be approved by a minor adviser.

2. *Departmental minor.* Such a minor consists of six courses taken within one department outside the area of the student's major. The student will consult with the minor adviser of the chosen department and determine with him which courses will constitute the minor. Every departmental minor must be approved by the minor adviser of the department.

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 Revelle Faculty is reviewing the noncontinguous minor. It is possible that other options will be made available. For information on the status of the minor, students should consult the Office of the Revelle Provost.

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

1. Satisfy the lower-division general education requirements (including Subject A).

2. Complete a major consisting of at least 12 upper-division courses.

3. Complete a noncontiguous minor consisting of 6 courses (no more than 3 may be lower division).

4. Satisfy the University of California requirement in American History and Institutions. (See ***Undergraduate Admissions, Policies, and Procedures: American History and Institutions.***)

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). Individual departments may require a C average in all upper-division courses in the major attempted in the University.

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.

*A maximum of twelve units of approved 300 or 400 series courses from

University Extension may be applied on the B.A. degree in Revelle College.

Honors in Revelle College Provost's Honors will be awarded each quarter to students who complete the previous quarter's program 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 his 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 to 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: Admission 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
Anagnostopoulos, Georgios, Ph.D.	Assistant 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	Pyysics
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	History
Chen, Joseph Cheng-Yih, Ph.D.	Associate Professor	Physics
Chodorow, Stanley A., Ph.D.	Associate Professor	History
Clark, Leigh B., Ph.D.	Associate Professor	Chemistry
Conlisk, John, Ph.D.	Associate 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
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
Fahey, Robert C., Ph.D.	Associate Professor	Chemistry
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
Fredkin, Donald R., Ph.D.	Associate Professor	Physics
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.	Associate Professor	Physics
Goodman, Murray, Ph.D.	Professor, Acting Provost of College	Chemistry
Gould, Robert J., Ph.D.	Associate Professor	Physics
Granger, Clive W. J., Ph.D.	Professor	Economics
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
Harris, Seymour E., Ph.D.	Professor Emeritus	Economics
Harrison, Newton A., M.F.A.	Associate Professor	Visual Arts
Hartline, Daniel K., Ph.D.	Assistant Professor	Biology
Hawkins, James W., Ph.D	Associate Professor	SIO
Hayashi, Masaki, Ph.D.	Associate Professor	Biology
Hegemier, Gilbert A., Ph.D.	Associate Professor	AMES
Helinski, Donald R., Ph.D.	Professor	Biology

Hooper, John W., Ph.D.	Professor	Economics
Intaglietta, Marcos, Ph.D.	Associate Professor	AMES
Jackson, Gabriel, Ph.D.	Professor	History
Kamen, Martin D., Ph.D.	Professor	Chemistry
Kaplan, Nathan O., Ph.D.	Professor	Chemistry
Kaplan, Robert M., Ph.D.	Assistant Professor-in-Residence	Psychology/Community Medicine
Kirkpatrick, Susan, Ph.D.	Assistant Professor	Literature
Kohn, Walter, Ph.D.	Professor	Physics
Kraut, Joseph, Ph.D.	Professor	Chemistry
Kroll, Norman M., Ph.D.	Professor	Physics
Langacker, Ronald W., Ph.D.	Associate Professor	Linguistics
Lee, Edward N., Ph.D.	Associate 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
Longino, Helen E., Ph.D.	Assistant Professor	Philosophy
Loomis, William F., Jr., Ph.D.	Associate Professor	Biology
Lovberg, Ralph H., Ph.D.	Professor	Physics
Luft, David S., Ph.D.	Assistant Professor	History
Ma, Shang-keng, Ph.D.	Associate Professor	Physics
Malmberg, John H., Ph.D.	Professor	Physics
Mandler, Jean M., Ph.D.	Associate Professor	Psychology
Mark, Thomas, Ph.D.	Assistant Professor	Philosophy
Marti, Kurt, Ph.D.	Assistant 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
Mehlhop, Werner A. W., Ph.D.	Assistant Professor	Physics
Miles, John W., Ph.D.	Professor	AMES
Miller, David R., Ph.D.	Associate Professor	AMES
Miller, Stanley L., Ph.D.	Professor	Chemistry
Mosshammer, Alden A., Ph.D.	Assistant Professor	History
Nachbar, William, Ph.D.	Professor	AMES
Newmark, Leonard D., Ph.D.	Professor	Linguistics
Nguyen-Huu, Xuong, Ph.D.	Associate Professor	Physics/Biology/Chemistry
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
O'Neil, Thomas M., Ph.D.	Associate Professor	Physics
Patterson, Richard R., Ph.D.	Assistant Professor	Mathematics
Pawula, Robert F., Ph.D.	Associate Professor	AMES
Pearce, Roy, H., Ph.D.	Professor	Literature
Penner, Stanford S., Ph.D.	Professor	AMES
Perrin, Charles L., Ph.D.	Associate Professor	Chemistry
Peterson, Laurence E., Ph.D.	Professor	Physics
Piccioni, Oreste, Ph.D.	Professor	Physics
Pirages, Dennis C., Ph.D.	Assistant Professor	Political Science
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
Rice, John A., Ph.D.	Assistant Professor	Mathematics
Roberson, Robert E., Ph.D.	Professor	AMES
Rumelhart, David E., Ph.D.	Assistant Professor	Psychology
Russell, R. Robert	Associate Professor	Economics
Russo, J. Edward, Ph.D.	Assistant Professor	Psychology
Saltman, Paul D., PhD.	Professor	Biology
Scales, Ronald D., Ph.D.	Assistant Professor	Philosophy
Schane, Sanford A., Ph.D.	Associate Professor	Linguistics
Scheffler, Immo E., Ph.D.	Assistant Professor	Biology
Schmalensee, Richard L., Ph.D.	Assistant Professor	Economics
Schneider, Allan M., Sc.D.	Professor	AMES
Schrauzer, Gerhard N., Ph.D.	Professor	Chemistry
Schultz, Sheldon, Ph.D.	Professor	Physics
Selverston, Allen I., Ph.D.	Assistant Professor	Biology
Sham, Lu Jeu, Ph.D.	Associate Professor	Physics
Shenk, Norman, Ph.D.	Associate Professor	Mathematics
Shore, Herbert B., Ph.D.	Assistant Professor	Physics
Shuler, Kurt E., Ph.D.	Professor	Chemistry
Singer, S. Jonathan, Ph.D.	Professor	Biology
Smallwood, Dennis E., Ph. D.	Assistant Professor	Economics
Smith, Donald R., Ph.D.	Associate Professor	Mathematics
Sommers, Joseph, Ph.D.	Professor	Literature
Sorenson, Harold W., Ph.D.	Associate Professor	AMES
Stein, Wayne A., Ph.D.	Associate Professor	Physics
Stern, Herbert, Ph.D.	Professor	Biology
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
Szanto, George H., Ph.D.	Assistant Professor	Literature
Terras, Audrey A., Ph.D.	Assistant Professor	Mathematics

Thompson, William B., Ph.D.	Professor	Physics
Travis, William P., Ph.D.	Associate Professor	Economics
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.	Associate Professor	AMES
Vernon, Wayne, Ph.D.	Assistant Professor	Physics
Vold, Robert L., Ph.D.	Assistant professor	Chemistry
Walk, Cynthia, Ph.D.	Assistant Professor	Literature
Weare, John H., Ph.D.	Assistant Professor	Chemistry
Wheatley, John C., Ph.D.	Professor	Physics
Wheeler, John C., Ph.D.	Assistant Professor	Chemistry
Wierschin, Martin W., Ph.D.	Professor	Literature
Williams, Forman A., Ph.D.	Professor	AMES
Williamson, Stanley G., Ph.D.	Associate Professor	Mathematics
Wills, Christopher, Ph.D.	Associate Professor	Biology
Wilson, Kent R., Ph.D.	Associate Professor	Chemistry
Wohlleben, Dieter K., Ph.D.	Assistant Professor-in-Residence	Physics
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

Muir College

In the fall of 1967, John Muir College, second of the colleges planned for UCSD, 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 upon 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 oportunities, 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. They are not confined to the last two years, but may be undertaken by students of the college whenever they are ready. 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 University 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 to which they can gain admission. 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 Provost's Honors with the bachelor's degree to students with an exceptional grade-point average in their major and over-all.

To be eligible for College Honors, a student must have completed at least 80.0 quarter units in the University of California and have the recommendation of his 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 most easily described in terms of the following table:

SOCIAL SCIENCES	FINE ARTS
Psychology 10, 11, 14, 16, 17 (3 of 5)	Music 1A, 1B, 1C
Linguistics 1A, 1B, 1C	Drama 41, 42, 43
Economics 1A, 1B, 1C	Drama 11, 12, 13, 16
Economics 2A, 2B, 2C	Visual Arts 15A, 15B, 15C
Anthropology 22, 23, 24	Music 11A, 11B, 11C
Sociology 1A, 1B, 10	
Political Science 10, 11, 12	
MATHEMATICAL SCIENCE	HUMANITIES
Math 1 A, B, C,	
Math 2 A, B, C	Literature 1 A, B, C
Math 2 B, C, D	Literature 3 A, B, C
	Literature/English 21, 22, 23
Math 2 B, C, E	History 1 A, B, C
Math 5 A, B, C	History 3 A, B, C
	History 5 A, B, C
	Philosophy 20, 21, 22
	Philosophy 30 A, B, C
NATURAL SCIENCE	LANGUAGE LEARNING
Biology 6, 7, 8, 10, 11 (3 of 5)	
Science 3 A, B, C	
Science 4 A, B, C	Language 1, 2, 3, 4, 5, 6,
APIS 20 A, B, C	(3 courses in sequence)
	Literature 10, 11, 11
EXPERIMENTAL AND INTERDISCIPLINARY COURSES	
Cultural Traditions:	
Judaic Studies	used only as a Humanities sequence
Chicano-Latin American	used only as a Humanities sequence

Each student is required to complete one-year sequences from four of the six categories: two from the right side (Fine Arts, Humanities, Language) and two from the left (Mathematical Science, Natural Science, Social Science). A sequence from the Interdisciplinary and Experimental

group may be substituted for one in the category to which it is assigned.

The courses listed are those that are currently 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. The sequences offered in the Interdisciplinary and Experimental category will generally change each year. Other sequences on the approved list may also change. Students should consult with the Office of the Provost 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.

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 the student for careful planning. Almost all of the major programs at UCSD have a pattern of prerequisites, some of them quite extensive. A student who does not plan well could find, in his junior year, that he has access to few majors without doing additional lower-division work. With careful planning, he 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 choices which must be made are given in the paragraph ***Major Programs***.

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. The Office of the Provost makes an evaluation of prior work for each student at the time of his first enrollment.

Major Programs and Special Projects Students in Muir College may attempt any major to which they can gain admission. It was remarked

above that many majors have precise and often extensive lower-division prerequisites. This means that the student should plan his 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) and many others recommend each student to their majors.
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 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; 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 Faculty of Muir College

NAME	TITLE	DEPARTMENT
Alazraki, Jaime, Ph.D.	Professor	Literature
Alfvén, Hannes, Ph.D.	Professor	APIS
Altman, Allen B., Ph.D.	Assistant Professor	Mathematics
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
Axford, W. Ian, Ph.D.	Professor	APIS
Bailey, Frederick G., Ph.D.	Professor	Anthropology
Banks, Peter M., Ph.D.	Associate Professor	APIS
Barkan, Leonard, Ph.D.	Assistant Professor	Literature

Barnouw, Jeffrey, Ph.D.	Assistant Professor	Literature
Barrera, Mario, Ph.D.	Assistant Professor	Pol. Science
Benamou, Michel, Ph.D.	Professor	Literature
Berger, Bennett, Ph.D.	Professor	Sociology
Booker, Henry G., Ph.D.	Professor	APIS
Bowles, Kenneth L., Ph.D.	Professor	APIS
Brody, Stuart, Ph.D.	Assistant Professor	Biology
Brown, Natalie, Ph.D.	Assistant Professor	Literature
Burkhard, Walter, Ph.D.	Assistant Professor	APIS
Campbell, James L., M.S.	Assistant Professor	Music
Campbell, Laughlin A., Ph.D.	Assistant Professor	Mathematics
Chapin, Paul G., Ph.D.	Assistant Professor	Linguistics
Chen, Mathew, Ph.D.	Assistant Professor	Linguistics
Chrispeels, Maarten J., Ph.D.	Assistant Professor	Biology
Christmas, Eric C.	Professor	Drama
Cicourel, Aaron, Ph.D.	Professor	Sociology
Cohen, Alain J. J., Ph.D.	Assistant Professor	Literature
Cohen, Harold	Professor	Visual Arts
Coles, William A., Ph.D.	Assistant Professor	APIS
Collins, Randall, Ph.D.	Associate Professor	Sociology
Cooper, Lynn, Ph.D.	Assistant Professor	Psychology
D'Andrade, Roy G., Ph.D.	Professor	Anthropology
Deutsch, J. Anthony, Ph.D.	Professor	Psychology
Douglas, Jack D., Ph.D.	Professor	Sociology
Dryden, Daniel, M.F.A.	Assistant Professor	Drama
Ebbesen, Ebbe B., Ph.D.	Assistant Professor	Psychology
Erdelsky, Philip J., Ph.D.	Assistant Professor	Mathematics
Erickson, Robert, M.A.	Professor	Music
Evans, John W., M.D., Ph.D.	Associate Professor	Mathematics
Fantino, Edmund J., Ph.D.	Professor	Psychology
Farber, Manny	Professor	Visual Arts
Farrell, Peter, M.M.	Professor	Music
Fejer, Jules A., D.Sc.	Professor	APIS
Fillmore, Jay P., Ph.D.	Associate Professor	Mathematics
Fussell, Edwin S., Ph.D.	Professor	Literature
Gaburo, Kenneth L., D.M.A.	Professor	Music
Gaffney, Floyd, Ph.D.	Associate Professor	Drama
Gilpen, Michael, Ph.D.	Assistant Professor	Biology
Golber, David L., Ph.D.	Assistant Professor	Mathematics
Gragg, William B., Ph.D.	Associate 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.	Associate Professor	Physics
Helstrom, Carl W., Ph.D.	Professor	APIS
Holland, John J., Ph.D.	Professor	Biology

Hood, Donald, Ph.D.	Associate Professor	Psychology
Howell, Stephen H., Ph.D.	Assistant Professor	Biology
Humble, Keith, Dip. in Music	Associate Professor	Music
Jameson, Fredric R., Ph.D.	Professor	Literature
Jennings, Kenneth, M.A.	Assistant Professor	Sociology
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
Korevaar, Jacob, Ph.D.	Professor	Mathematics
Kuroda, Sige-Yuki, Ph.D.	Associate Professor	Linguistics
Langdon, Margaret H., Ph.D.	Associate Professor	Linguistics
Ledden, Patrick J., Ph.D.	Assistant Professor	Mathematics
Levy, Robert I., Ph.D.	Professor	Anthropology
Lewak, George J., Ph.D.	Associate Professor	APIS
Lowe, Keith D., Ph.D.	Assistant Professor	Literature
Lugannani, Robert, Ph.D.	Assistant Professor	APIS
Luo, Huey-Lin, Ph.D.	Associate Professor	APIS
Manaster, Alfred B., Ph.D.	Associate Professor	Mathematics
Mandler, George, Ph.D.	Professor	Psychology
Marin, Louis, Agrégation	Professor	Literature
Masry, Elias, Ph.D.	Associate Professor	APIS
Metzger, Thomas A., Ph.D.	Assistant Professor	History
Mills, Stanley E., Ph.D.	Professor	Biology
Mitchell, Allan, Ph.D.	Professor	History
Munsinger, Harry L., Ph.D.	Associate Professor	Psychology
Nee, Thomas B., M.A.	Professor	Music
Ngubo, Anthony, M.A.	Assistant Professor	Sociology
Obeyesekere, Gananath, Ph.D.	Professor	Anthropology
Oesterreicher, Hans K., Ph.D.	Assistant 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
Pickowics, Paul G., Ph.D.	Associate Professor	History
Price, Paul A., Ph.D.	Assistant Professor	Biology
Ramos, Reyes, Ph.D.	Assistant Professor	Sociology
Rappaport, Armin, Ph.D.	Professor	History
Reynolds, George S., Ph.D.	Professor	Psychology
Reynolds, Roger, M.M.	Associate Professor	Music
Ritchie, Robert C., Ph.D.	Assistant Professor	History
Rodin, Burton, Ph.D.	Professor	Mathematics
Rohrl, Helmut, Ph.D.	Professor	Mathematics

Rosenblatt, Murray, Ph.D.	Professor	Mathematics
Ross, Lola R., Ph.D.	Assistant Professor	Community Medicine
	Director	Interdisciplinary Sequences
Rotenberg, Manuel, Ph.D.	Professor	APIS
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, Johathan, Ph.D.	Associate Professor	Literature
Savitch, Walter J., Ph.D.	Assistant Professor	APIS
Scheiber, Harry N., Ph.D.	Professor	History
Schwartz, Theodore, Ph.D.	Professor	Anthropology
Sharpe, Michael J., Ph.D.	Assistant Professor	Mathematics
Silber, John J., Ph.D.	Professor	Music
Small, Lance W., Ph.D.	Associate Professor	Mathematics
Smith, Douglas W., Ph.D.	Assistant Professor	Biology
Smith, Timothy, Ph.D.	Assistant Professor	Linguistics
Soule, Michael E., Ph.D.	Assistant 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
Swartz, Marc J., Ph.D.	Professor	Anthropology
Teilhet, Jehanne H., M.A.	Assistant Professor	Visual Arts
Todd, Michael C., M.A.	Assistant Professor	Visual Arts
Tschirgi, Robert, M.D., Ph.D.	Professor	Neurosciences
Turetzky, Bertram J., M.A.	Assistant Professor	Music
Van Fleet, Ellen, M.A.	Assistant Professor	Visual Arts
Wagner, Arthur, Ph.D.	Professor	Drama
Warschawski, Stefan E., Ph.D.	Professor	Mathematics
Wavrik, John J., Ph.D.	Assistant Professor	Mathematics
Wesling, Donald T., Ph.D.	Associate Professor	Literature
Wilden, Anthony G., Ph.D.	Associate Professor	Literature
Williams, Ben A., Ph.D.	Assistant Professor	Psychology
Wills, Christoper, Ph.D.	Associate Professor	Biology
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 activities are the lecture series and symposia sponsored by Third College and its four course groups: Communications, Third-World Studies, Urban and Rural Studies, and Science and Technology.

It is fundamental to the philosophy of Third College that student, 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 UCSD.

To insure and facilitate the offering of 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 four course groups: 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; and Communications, covering the social sciences with a focus upon the analysis of small group and mass communications.

These four course groups 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 180 units of work with at least a "C" average;
4. satisfy the core courses (general education requirements) by satisfactorily completing either Program A or Program B (see general education requirements); and
5. complete a departmental or interdisciplinary major.

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 UCSD.

Students must complete one of the following programs:

Program A

1 quarter Composition
2 quarters Mathematics
3 quarters Natural Science covering Biology, Chemistry and Physics
3 quarters Third World Studies
3 quarters Urban and Rural Studies
2 quarters Communications

Program B

1 quarter Composition
2 quarters Mathematics
3 quarters Natural Science covering Biology, Chemistry and Physics
3 quarter introductory sequence made up of one course each of
Communications
Third World Studies
Urban and Rural Studies
3 quarter sequence in any humanities or social-science discipline

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 of graduation. However, a given major may require one or more foreign languages. Students should establish which foreign language(s), if any, are required of 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. Transfer without penalty will be authorized upon approval of the Provost and the responsible department.

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 choose from any of the departmental or interdisciplinary majors offered at UCSD. 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
Blanco, Carlos, Ph.D	Professor	Literature
Brown, Willie C., Ph.D	Assistant Professor	Biology
Diaz, Arthur, Ph.D.	Assistant Professor	Chemistry
Doolittle, Russell F., Ph.D.	Professor	Chemistry
Dutton, Richard, Ph.D.	Professor	Biology
Emmerson, Richard, Ph.D.	Assistant Professor	Economics
Fortes, P. A. George, M.D., Ph.D.	Assistant Professor	Biology
Frazer, William R., Ph.D.	Professor	Physics
Haff, Leonard R., Ph.D.	Assistant Professor	Mathematics
Harper, Elvin, Ph.D.	Associate Professor	Chemistry
Heifetz, Robert J., Ph.D.	Associate Professor	Urban and Rural Studies
Justus, Joyce E., Ph.D.	Assistant Professor	Anthropology
Kleinberg, Susan J., Ph.D.	Assistant Professor	History
Lindenberg, Katja, Ph.D.	Assistant Professor	Chemistry
Lumpkin, Oscar, Ph.D.	Assistant Professor	Physics
McMorris, Trevor, Ph.D.	Associate Professor	Chemistry
Mehan, Hugh B., Ph.D.	Assistant Professor	Sociology
Nachbar, William, Ph.D.	Professor	AMES
Ngubo, Anthony, Ph.D.	Assistant Professor	Sociology
Ogawa, Roy, Ph.D.	Assistant Professor	Mathematics
Orr, Daniel, Ph.D.	Professor	Economics
Penn, Nolan E., Ph.D.	Professor	Psychiatry
Peterson, Laurence E., Ph.D.	Professor	Physics
Pinon, Ramon, Jr., Ph.D.	Assistant Professor	Biology
Ramanathan, Ramachandra, Ph.D.	Associate Professor	Economics

Real, Michael R., Ph.D.	Assistant Professor	Communications
Reynolds, Edward, Ph.D.	Assistant Professor	History
Schiller, Herbert I., Ph.D.	Professor	Communications
Schultz, Sheldon, Ph.D.	Professor	Physics
Shore, Herbert B., Ph.D.	Assistant Professor	Physics
Simon, Melvin I., Ph.D.	Associate Professor	Biology
Solis, Faustina, M.S.W.	Associate Professor	Community Medicine
Thiess, Frank B., Ph.D.	Lecturer with Employment Security	Mathematics
Thomas, Charles W., II, Ph.D.	Professor	Urban and Rural Studies
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
White, James, Ph.D.	Assistant Professor	Mathematics
Williams, Sherley, M.A.	Assistant Professor	Literature
Wong, Paul, Ph.D.	Assistant Professor	Sociology
* Wright, Will H., Ph.D.	Assistant Professor	Sociology
Wulbert, Daniel E., Ph.D.	Assistant Professor	Mathematics
Yguerabide, Juan, Ph.D.	Associate Professor	Biology

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Anderson, Alonzo, M.A.	Acting Asst. Prof.	Psychology
Arneson, Richard, B.A.	Acting Asst. Prof.	Philosophy
Fenner-Lopez, Claudio, M.A.	Lecturer	Communications
Kaye, Stanton	Lecturer	Visual Arts
Moss, Robert C., Jr., B.A.	Assistant Supervisor	Physical Education
Newport, Elissa, M.A.	Acting Asst. Prof.	Psychology
Philips, Susan U., B.A.	Lecturer	Communications
Romo, Richard, M.A.	Acting Asst. Prof.	History
Sanchez, Rosaura, Ph.D.	Acting Asst. Prof.	Literature
Siembieda, William J., M.C.P.	Lecturer	Urban and Rural Studies
Somero, Meredith G., Ph.D.	Lecturer	Biology
Tolbert, Emory, B.A.	Acting Asst. Prof.	History
Wallace, Cynthia L., B.S.	Supervisor of Teacher Education	Teacher Ed. Program
Galarza, Ernesto, Ph.D.	Honorary Fellow of Third College	(Novelist and Educator)
Gilliam, Earl, L.L.B.	Senior Lecturer	Urban and Rural Studies
Miles, E. Walter, L.L.B.	Lecturer	Lawyer
Ruffin, Roger, L.L.B.	Lecturer (Senior)	Lawyer
Smythe, Dallas, Ph.D.	Visiting Professor	Communications

*Sabbatical Leave (Fall Quarter)

Fourth College

The Character of the College Like the other Colleges of UCSD, the Fourth College is a liberal-arts college in the best sense of that term. Its faculty will represent all the disciplines offered on the campus, and its students will pursue majors in all departments. Exceptionally 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.

The College will seek to provide an academic program appropriate to the career needs of each student. It is considered important that where possible students obtain direct experience in their prospective professions during their College years, and the College is developing a field-placement program to provide these opportunities.

The Graduation Requirements

To receive a bachelor's 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. Pass 45 four-unit academic courses or their equivalent (180 units). Of these, 18 must be upper-division courses.
3. Fulfill the general-education requirements described below.
4. Attain a C average (2.0) or better in all work attempted at the University of California.
5. Satisfy the college residency requirement that nine of the last 11 courses passed must be taken as a student in the College.

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. This 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 will work with 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 begun 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 UCSD. 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. 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, 1B, 1C, or 2A, 2B, 2C) 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 an 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 major. It is anticipated that many students will combine their major and one program of concentration to form a program 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 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.

The following is a list of courses which may be taken in fulfilling this minor. The *Schedule of Classes* should be consulted for the course from this list which will be offered in each quarter.

Physics 31A, 31B, 31C	The Perspective of Physics
AMES 32	Computer Models of Complex Systems
AMES 33	Management of Air Environment
AMES 34	Energy: Demand, Resources, Technology and Policy

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.

Honors in the College

Students of the College who complete at least 80 units of course work at UCSD are eligible to graduate with honors. To receive such honors the student must have an excellent grade-point average both in his major and in his over-all course work. The levels are: Honors, High Honors, Highest Honors. 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, Ph.D.	Associate Professor	Philosophy
D'Andrade, Roy G., Ph.D.	Professor	Anthropology
Davis, Fred, Ph.D.	Professor	Sociology
Deak, Frantisek, Ph.D.	Assistant Professor	Drama
Farrel, Peter, M.M.	Professor	Music
Granger, Clive W. J., Ph.D.	Professor	Economics

Holland, John J., Ph.D.	Professor	Biology
Kaprow, Allan, M.A.	Professor	Visual Arts
Kerr, Norbert, Ph.D.	Assistant Professor	Psychology
Magde, Douglas, Ph.D.	Assistant Professor	Chemistry
Nee, Thomas, M.A.	Professor	Music
O'Neil, Thomas M., Ph.D.	Associate Professor	Physics
Rappaport, Armin, Ph.D.	Professor	History
Rudee, M. Lea, Ph.D.	Professor	APIS
Schneider, Alan M., Ph.D.	Professor	AMES
Selverston, Allen I., Ph.D.	Assistant Professor	Biology
Sham, Lu Jeu, Ph.D.	Associate Professor	Physics
Shapiro, Barbara, Ph.D.	Associate Professor	History
Smallwood, Dennis E., Ph.D.	Assistant Professor	Economics
Wadsworth, Adrian R., Ph.D.	Assistant Professor	Mathematics
Wills, Christopher, Ph.D.	Associate Professor	Biology

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 92037.

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 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.

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.

Undergraduate Colleges and Majors

In the preceding chapter, which describes the educational philosophies of the four Colleges presently in operation at UCSD, 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 basic alphabetical listing below shows the formal names of departmental majors in capitals; the lower-case subheads are the available concentrations within majors, or the general terms to help you locate a major in your desired field of study.

Following is a list of the majors and areas of concentration available at UCSD:

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

APPLIED PHYSICS AND INFORMATION SCIENCE (APIS)
- Applied Physics
- Information Science
- Systems Theory
- Electronics and Communications
- Acoustic Signal Processing
- Optical Signal Processing
- Computer Science

Art — see VISUAL ARTS
Biochemistry — see BIOLOGY, CHEMISTRY
Bioengineering — see AMES
BIOLOGY
- Biochemistry
- Biology
- Cell Biology
- Genetics
- Human Biology
- 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
Computers — see APIS
DRAMA
Earth Sciences — see CHEMISTRY, MATHEMATICS, PHYSICS
ECONOMICS
Education — see Footnote 1
Engineering — see AMES
English — see LITERATURE
French — see LITERATURE
Geology — see Earth Sciences
German — see LITERATURE
HEALTH SCIENCES
HISTORY
  European History
  Western Hemisphere History
Information Science — see APIS
Languages — see LITERATURE
LINGUISTICS
LITERATURE
  English — American
  French
  German
  Russian
  Spanish
  General
MATHEMATICS
  Earth Sciences/Mathematics
  Mathematics
MUSIC
PHILOSOPHY
PHYSICS
  Biophysics
  Biophysics with premedical emphasis
  Earth Science/Physics
  Physics
Pre-Law — see Footnote 2
Pre-Medical — see Footnote 3

PSYCHOLOGY
Russian — see LITERATURE
SOCIOLOGY
Spanish — see LITERATURE
Systems Science — see AMES
Systems Theory — see APIS
Teacher Training 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 in education. UCSD offers a program leading to the Elementary Credential within the framework of academic departments; there is no separate department of education. The emphasis in the program is in multi-cultural education. The program ends with placement of the student as a cadet teacher with a partial credential; a fifth year of college is to be completed within seven years in order to earn the complete credential.

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 (Biology, Biochemistry, Health Sciences); CHEMISTRY (Biochemistry, Chemistry); PHYSICS (Biophysics).

Undergraduate Admission

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

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 apply 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 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.

Please note that these entrance requirements are selected for their predictive value and for providing a ***minimum*** preparation for the University. They are not intended as an outline of a valid high school curriculum.

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 are not a legal resident of California, your grade-point average in the required subjects must be 3.4 or higher. (A 3.0 average is equal to a B average.)

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 acceptable 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 for the fall quarter, you should take the tests no later than January of your senior year. The following tests are required:

1. Scholastic Aptitude Test. The verbal and mathematics scores you submit 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 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 1,725 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. Also, your final notification of admission cannot be released until your scores from the CEEB tests have been received by the Admissions Office. The testing schedule is listed below:

TEST DATES	TESTS SCHEDULED
October 12, 1974	SAT only
November 2	SAT only
November 23	ACHIEVEMENT only
December 7	SAT only
January 11, 1975	ACHIEVEMENT only
February 1	SAT only
April 5	SAT only

May 10	ACHIEVEMENT only
June 28	SAT only

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 in Advanced Standing

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 college record and apply for admission as a freshman.

Admission Requirements 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 credit 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.

How to Determine 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; I 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. Established an overall grade-point average of 2.0 or better in another college or university,

b. Completed 12 or more quarter or semester units of transferable college credit since high school graduation or have successfully passed 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 transferred quarter units, your high school record will not affect your eligibility.

Nonresident Applicant A nonresident applicant who meets the admissions requirements for freshman admission must have a grade-point average of 2.8 or higher in the college courses he 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 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.

Students 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 will be expected to demonstrate adequate preparation for his chosen field. Only those applicants who present evidence of above average scholarship achievement will be considered for admission.

Courses at UCSD are conducted in English, 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 to pursue his 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, the foreign student must have sufficient funds to cover all fees, living and other expenses, and transportation connected with his stay in the United States. He 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 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 each examination 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. Latin examinations earn five quarter units each. 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 College, Room 228, Administration Building, 5402 College Avenue, San Diego 92115. The test officer is Michael Irwin. Candidates should apply to CEEB for information, but should direct their registration forms to the test centers 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 his decisions are binding upon all U.C. campuses; (2) applicability of transferred units to breadth (general education) requirements is decided for each UCSD College by its Provost; (3) applicability of units toward the major is decided by the appropriate UCSD Department. Information about these matters may be obtained, before transfer, from the Office of Relations with Schools at UCSD.

Students who have earned more than 135 quarter units before transfer should consult with the Provost of the UCSD 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 applica-

tion 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 1975	November 1, 1974
Winter Quarter 1976	July 1, 1975
Spring Quarter 1976	October 1, 1975

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. Each campus has enrollment quotas that limit the number of new freshman and new advanced standing students that may be admitted. 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.

For freshman applicants in particular, past experience shows that the three northern California campuses (Berkeley, Davis, and Santa Cruz) exceed their quotas of applications early in the filing period. The campuses at Irvine and San Diego have experienced similar requests for admission. Should you file on one of these campuses, you are advised to list one of the remaining campuses of the University (Los Angeles, Riverside, or Santa Barbara) as one of your next alternate choices.

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 on 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 from which he graduated and each college he has attended send official transcripts of his work promptly to the Office of Admissions where his 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 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, have your graduating high school send a transcript of your record immediately to the Office of Admissions, which will also need a transcript from each college you have attended. A preliminary transcript from your present college should list the courses you are now taking and those you plan to take before transfer.

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 four to six 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, 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 was admitted and who thereafter applies and is admitted to a subsequent quarter, must return a new Statement of Intention to Register together with the nonrefundable fee of $50.00.

Student Health Requirement Entering students are required to complete a medical history form prior to registration and to send it to 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 to submit also 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 in effect and the space available on the campus.

Application For Readmission The deadline for all returning students to file an application for readmission is eight weeks prior to the first scheduled day of the quarter (see *Academic Calendar*). Transcripts for work taken at other institutions must be submitted as part of the application.

A nonrefundable fee of $20 is charged for each application for readmission filed. Remittance by bank draft or money order, payable to *The Regents of the University of California*, must be attached to the application.

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 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 Regist-

ration Procedures Letter for specific registration and fee-payment instructions. A Schedule of Classes is published prior to each quarter and may be purchased at the Campus 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 and must apply for readmission.

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.

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).

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.

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 $2,600 for residents of California and $4,100 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 budget is to indicate certain and probable expenses. For information regarding student employment, loans, scholarships and other forms of financial aid at UCSD, 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*	475.00	475.00	475.00	1425.00
Books (Approx.)	75.00	75.00	75.00	225.00
Personal Expenses+	150.00	150.00	150.00	450.00
Total	$912.00	$912.00	$912.00	$2736.00

* Figures given for each quarter are approximately one-third of estimated total; actual payments vary according to the quarter and depend upon type of room, type of meal plan, and method of payment.

+Includes laundry, clothing, medical costs not covered by student health insurance, recreation, transportation, etc.

In addition to the above expenses, undergraduate nonresidents are required to pay an additional nonresident tuition fee of $500 per quarter or $1500 per year.

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 one or more student centers in the near future.

Educational Fee The Educational Fee was established for all students beginning 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.

NonResident Tuition Fee

(The following statement was 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 $500 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 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 actually 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 law 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 continuous full-time attendance at the University who had resident classification on May 1, 1973, 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 upon 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.

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" or "E"	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.

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 (passed) and NP (not passed) 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 non-credit courses. NR indicates that the instructor has not reported a grade. When an NR appears, the student should contact his 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

Passed/Not Passed The Passed/Not Passed 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 Passed/Not Passed basis. Enrollment under this option must take place within the first two weeks of the course. A grade of Passed 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. 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.

Muir College policy regulations state that:

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

2. Courses taken to be counted toward a special project (in lieu of a departmental major or toward an interdisciplinary major) may be taken on a Passed/Not Passed basis only with the consent of the faculty adviser of the project (or interdisciplinary major) and the Provost.

Revelle College policy regulations state that a student registered in Revelle College shall have the privilege of enrolling, with the permission of the instructor, on an average of one course each quarter on a Passed/Not Passed basis, with the following provisions:

1. The course may not be used in satisfaction of any lower-division Revelle College breadth requirement except Fine Arts. For example, students who have completed the requirement of one year of calculus (through Mathematics 1C or 2C) may take other Mathematics courses on a P/NP basis. (Language 1, 2, 3, 4, 5, and 6 may not be taken for P/NP.)

2. The course may not be an upper-division course in the student's major department. Individual departments and/or advisers may authorize exceptions to this regulation, particularly for contiguous-area courses (required for the major, but given outside the major department).

In general, the Revelle faculty feels that students should be encouraged to use this option for courses taken in fulfillment of the minor. All courses taken as electives may be taken on a Passed/Not Passed basis consistent with the restrictions above.

Third College policy regulations state that:

1. Courses to be counted toward a departmental major as prerequisites to the major should not be taken on a Passed/Not Passed basis.
2. All courses taken as electives may be taken on a Passed/Not Passed basis while at the same time, the restrictions on the majors must be observed.

All Third College students must comply with the University of California ruling which allows an average of one course per quarter, or three courses per academic year on a Passed/Not Passed basis.

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, the original course, grade and grade points will be expunged from the student's permanent record. 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 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 student and approved by his 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. An I grade not removed by the mutually agreed upon time will be lapsed into F by the Registrar.

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.

General Degree Requirements

Each of the undergraduate Colleges on the San Diego campus has specific requirements for a degree. (See ***Choosing a College at UCSD.***) 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 ½ high school unit in American History and ½ high school unit in Civics or American Government.
2. By passing any one-quarter course of instruction accepted as satisfactory by the Committee on American History and Institutions. 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 American History and Institutions. 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 temporary residence in the United States, petition for exemption from this requirement through the office of his 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.

Application for Degree Every undergraduate, at the beginning of each quarter during his 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.

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.

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.

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.

Scholastic Requirements The scholastic status of all UCSD undergraduates is governed by the following provisions:

1. A student is subject to probation if at the end of a term his grade-point average or his cumulative grade-point average is less than 2.0 (C).
2. He is subject to disqualification for enrollment if his grade-point average for the quarter is below 1.5, or if he 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 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 academic deficiency, he 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 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.

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 and Third Colleges. A student is expected to complete the requirements for graduation within this minimum unit requirement.

Under special circumstances, a student may extend his 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 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 is entitled to no further services of the University, except assistance toward reinstatement.

An undergraduate student wishing to have his 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.

Withdrawal from the University If a student decides to withdraw from the University after he has paid his registration fees, he 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 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 Day One, the registration fee is refunded minus the $50.00 Statement of Intention to Register Fee.

Continuing and Readmitted Students There is a service charge of $10.00 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 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 claim.

Readmission to the University An undergraduate student in good standing may elect to be absent from any one quarter of the academic year without losing his continuing-student status, as long as he does not attend another college or university during his period of absence. To register for the quarter following the absence, students should contact the Registrar's Office, 102 Matthews Campus. An undergraduate student absent for more than one quarter must apply for readmission as a returning student (see *Application for Readmission).*

Intercampus Transfer An undergraduate who is now, or was previously, registered in a regular season 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 his 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.

At the present time, course work is offered leading to higher degrees in the following listed departments or groups as indicated.

Graduate Degrees Offered as of 1974-75

Anthropology	M.A., Ph.D.
Applied Physics	M.S., Ph.D.
Biology	M.S., Ph.D.
Chemistry	M.S., Ph.D.
Comparative Studies in Language, Society and Culture	Ph.D.
Earth Sciences	M.S., 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	M.A., Ph.D.
Literature, Comparative	Ph.D.
Literature, English and American	Ph.D.
Literature, French	Ph.D.

Literature, German	Ph.D.
Literature, Spanish	Ph.D.
Marine Biology	M.S., Ph.D.
Mathematics	M.A., Ph.D.
Music	M.A., Ph.D.
Neurosciences	M.S., Ph.D.
Oceanography	M.S., Ph.D.
Philosophy	M.A., Ph.D.
Physics	M.S., Ph.D.
Physiology and Pharmacology	Ph.D.
Psychology	M.A., Ph.D.
Sociology	M.A., Ph.D.
Theatre	* M.F.A.
Visual Arts	M.F.A.

* Pending

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, procedures, requirements and standards. Its members are selected to give proper representation to the academic departments, colleges, and interdepartmental programs.

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. In turn, the Adviser appoints individual advisers for each graduate student. The Graduate Adviser is expected to function in the following manner:

1. To advise the Dean on admission of graduate students.
2. To advise graduate students regarding their programs of study and other matters pertinent to graduate work.
3. To approve official study lists.
4. To act on the petitions of graduate students.
5. To insure that adequate records on all graduate students in the department or group are maintained and to supply relevant information as requested by the Dean.
6. To assist the Dean in the application of University regulations governing graduate students, graduate study, and graduate courses.
7. To advise the Chairman of the Department and the Dean in the planning and construction of the graduate program in the department/group.

Graduate Student Council

Graduate students in each department or program elect two of their

number to the Graduate Student Council (GSC). The Council has as its charge academic, administrative, and general campus-wide matters as they affect graduate students. The Council, which is autonomous, appoints graduate-student representatives to the San Diego Division of the Academic Senate, to the Graduate Council, and to such other Senate and administrative committees whose actions and decisions call for graduate-student participation. A quarterly newsletter keeps the graduate student body informed of the GSC's actions. In addition, through the Graduate Senate of the University of California and the UC Student Body Presidents' Council, the GSC participates in University-wide decisions and affairs.

Fees And Expenses

The cost of attending the University of California, San Diego will vary according to the personal tastes and financial resources of the individual. For the 1974-75 academic year quarterly expenses may include the following fixed costs:

Fees Per Quarter*

	RESIDENT	*NONRESIDENT*
Tuition		$500
Registration Fee	$100	$100
Educational Fee	$120	$120
Student Center Fee	$ 6	$ 6

There is no dormitory housing available on campus. The cost of housing varies according to type of accommodations and distance from campus. See off-campus or married student housing brochure.

Students should also be aware of the following charges:

Application fee for admission	$20
Books per quarter, approximately	$100
Changes in study list after announced deadline dates	3
Duplicate registration and/or other cards from enrollment packet	3
Duplicate student card	3
Application for readmission	20
Removal of Grade E	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

* Subject to change without notice. All receipts of 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.

University Registration Fee The University Registration Fee is a quarterly fee required of all students regardless of number of courses taken and must be paid at the time of the student's registration. This fee 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 who believe they may qualify for the exemption on this basis must consult with the Student Financial Services Office for a ruling.

Educational Fee The Educational Fee required of all students was established beginning with the Fall Quarter, 1970. A resident student in financial need may defer payment of the Educational Fee by accepting an obligation to repay, at a later date, the sum deferred, if he/she is enrolled in at least one-half (six units) the normal full-time academic program. Students interested in this provision should communicate with the Student Financial Services Office, Building 213, Matthews Campus at least two months before the first day of the quarter.

Nonresident Tuition Fee (The following statement was 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 $500 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 actually 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 minum 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.

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

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

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.

The reduction pertains to one-half of the Registration Fee only. A stu-

dent must pay, in addition, the full Educational and Student Center Fees.

Filing Fee A student on an approved leave of absence who has completed all requirements except for the final reading of his/her dissertation, thesis or the taking of the final examination is eligible to petition to pay a $50 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 the Registrar. See circular for ***Student Fees and Deposits*** available from the Office of the Registrar.

Transcript of Records Students may obtain transcripts of record from the Office of the Registrar for $2.00 for the first copy, $1.00 for each additional copy. Transcripts must be requested several days in advance of date needed.

Admission

General Requirements An applicant for admission to the University for graduate study and research must present evidence of adequate preparation and capacity for advanced work in one of the departments of instruction and is expected to declare the intent to earn a graduate degree. He/she should hold a bachelor's degree or the equivalent with background 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, he/she must devote some time to certain undergraduate courses selected in consultation with the departmental adviser. In this case a longer period of residence may be required than would otherwise be necessary.

A minimum scholastic average equivalent to B or better in an acceptable undergraduate program is required. The Dean of Graduate Studies or the prospective major department may deny admission if the applicant's scholastic record is undistinguished, if his/her preparation is judged inadequate as a foundation for advanced work, or if the department's facilities are already filled to capaity.

Graduate Minority Program The University of California, San Diego is sincerely interested in attracting educationally disadvantaged students, particularly those from minority backgrounds. A new program is being developed to identify and recruit minority students with outstanding potential for graduate study at UCSD, and to provide financial assistance and other support necessary to permit such students to complete their degree programs. Further information on this program may be obtained from the Coordinator, Graduate Minority Program, 108 Matthews Campus.

Affirmative Action Policy In an effort to insure equal opportunity in its graduate programs and to meet part of the national need for minority and women Ph.D.'s, the University of California, San Diego has made a strong commitment to increase the representation of women and minority students in its graduate programs and to take every possible measure to insure the student's success in meeting his/her degree objective. Affirmative-action principles are being applied in the admission of graduate students, the awarding of financial aid, the advising of graduate students, and the evaluation of graduate-student performance. The administration of the University does not condone discrimination of any kind against individuals on the basis of sex, ethnic origin, age, religion, marital status, or need. Any experience which would indicate that a UCSD department is not following this policy should be referred to the monitor of Affirmative Action in the Office of the Chancellor.

Procedures A prospective graduate student should file with his/her proposed major department a completed application form; a nonrefundable application fee of $20, payable to the Regents of the University of California; three letters of recommendation; scores on the verbal and quantitative tests of the Graduate Record Examination (GRE) if required by the department, and one official copy of the transcript of his/her record from each college and university attended. In addition, the Confidential Financial Statement indicating adequate financial support must be submitted by all foreign students requesting a foreign-student visa. Official admission is contingent upon recommendation by the prospective major department and formal notification from the Office of Graduate Studies. Information concerning the Graduate Record Examination can be obtained from the Educational Testing Service, P.O. Box 1502, Berkeley, California 94701, Phone 415-849-0950, or P.O. Box 955, Princeton, New Jersey 08540.

A single form is used to apply both for admission and for fellowships and assistantships. If seeking financial assistance, applicants must file all materials on or before February 1; otherwise, the application form and all supporting materials must be filed with the applicant's prospective major department at least two months before the opening of the quarter in which he/she plans to enroll. Some departments have deadline dates for admission which coincide with the February 1 deadline for financial assistance and do not accept later applications for admission. Therefore, applicants are urged to communicate with their prospective major departments as early as possible. Forms and detailed instructions may be obtained from the departments, from the Office of Admissions, or from the Office of Graduate Studies and Research.

Non-Degree Admission Status Non-degree study is a student-elected category for the student who chooses to take "Course Work Only" and who does not intend to pursue a degree at UCSD. Applicants must meet the same admission requirements as those who intend to earn a degree and must be admitted for study in a department. Applicants with marginal records or program deficiencies may not be admitted in a non-degree status.

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

Visiting Student A graduate student who is registered at UCSD for a limited period of time, such as a reciprocity student in the Education Abroad Program, must be admitted in regular status even if he/she plans to continue his/her education at some later date at another institution.

Readmission A student applying for readmission whose status has lapsed because of an interruption in registration must submit a new application eight weeks prior to the first scheduled day of the quarter in which he/she wishes to re-enroll. He/she must submit supplementary transcripts for all academic work taken since last enrolled in UCSD and a non-refundable fee of $20.00 (payable to the Regents of the University of California). Readmission is not automatic. A department may bar a student from readmission for any one of several reasons.

Reapplication Students who fail to register in the quarter for which they first applied may petition for reconsideration of their application if reapplication is made within the same academic year. Application for admission to a later academic year may be made only by filing an updated application form and submitting transcripts for any academic work taken since they first applied to UCSD. In no case are application files retained for more than one academic year following the academic year in which the original application is made.

Financial Assistance

Types of Financial Assistance Available The University of California, San Diego administers several kinds of financial assistance for graduate students in all departments. 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.

Application Procedures Application materials with instructions can be obtained from academic department/group offices or from the Office of Graduate Studies, University of California, San Diego, La Jolla, California 92037. Only one application form is needed to apply for admission and for fellowships 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 80 countries by the Educational Testing Service. See Academic Calendar for dates. Direct inquiries to the Graduate Record Examinations, Educational Testing Service, Berkeley, California 94701, or Princeton, New Jersey 08540.

In order for a student to be considered for a fellowship, traineeship, or graduate scholarship for the ensuing academic year, his/her application

and supporting materials, including scores on the aptitude tests of the Graduate Record Examination must be received before February 1. Applications for assistantships will 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.

The award of fellowships and similar awards for the following academic year will be announced not later than March 15. UCSD 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 non-service type 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.

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 and/or fees and are subject to tax withholding for salaries received. 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.

Fellowships Fellowship stipends are tax-free awards granted for scholarly achievement and promise which enable a full-time student to pursue graduate studies and research leading to an advanced degree without requiring him/her to render any services. Part-time students and non-degree students are not eligible. Fellowships usually range from $2,400 to $3,300 and, unless explicitly stated otherwise, do not include tuition and/or fees in addition to stipends. 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. Fellows 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 and/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 may not engage in remunerative employment without the prior approval of the Dean of Graduate Studies.

Students interested in pursuing careers as college teachers, or who are interested in teaching for other reasons, are urged to include some teaching experience in their graduate programs. 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. Dissertation Fellowships (California residents only)
2. Fee Scholarships
3. Tuition Scholarships
4. Tuition/Fee Scholarships
5. Regent Fellowships
6. Fellowships in the form of research assistantships plus non-resident tuition, if applicable.
7. San Diego Fellowships (educationally disadvantaged students)
8. U.S. Public Health Service Predoctoral Traineeships
9. Miscellaneous Fellowships (Special Funds)

Fellowships and Loans from Outside the University In addition to fellowships 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 (108 Matthews Campus). Among the many organizations which have awarded fellowships to students at UCSD are the National Science Foundation, the United States Public Health Service, the Danforth Foundation, and the Ford 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. Application materials and additional information can be obtained from departmental offices, or the Office of Graduate Studies and Research.

Financial Aids For information concerning student employment (services and opportunites), loans or grants-in-aid, and other types of financial aid available, see ***Campus Services and Facilities.***

Registration

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 must enroll during the period designated by the Office of the Registrar; enrollment packets are sent directly to the department.

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:

Procedures

1. Obtain copy of *Schedule of Classes* available from UCSD Bookstore free of charge.
2. Complete all forms in the enrollment packet. Consult with departmental Graduate Adviser on required program of study.
3. Secure Graduate Adviser's signature on completed Preferred

Program Card (Study-list Card).

4. File completed registration packet including Preferred Program Card with the Office of the Registrar prior to the deadline date. NOTE: Deadlines may differ for new and continuing/returning students. See *Academic Calendar*, pp. 4-5, and *Schedule of Classes.*
5. Pay required fees to Cashier's Office 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/registered by the Registrar's published deadline dates.

A $10.00 late filing fee will be assessed if a student does not enroll (file the enrollment packet with appropriate signatures) with Registration and Scheduling, Building 211, Matthews Campus, by the deadline dates published in the *Academic Calendar*, pp 4-5, and in the *Schedule of Classes.*

Additionally, a $10.00 late registration fee will be assessed if the student has not completed registration (paid fees) prior to 3:30 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.

Health Requirements 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 Center. A report of a tuberculin skin test must also be submitted. Information sent to the Student Health Service is held confidential and is carefully reviewed to help provide individualized health care. Students are urged to submit also 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.

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

Identification Card A validated 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 Registrar's Office. (See *Fee Schedule.)* Identification cards must be surrendered to the Office of the Registrar when petitioning to withdraw or to go on leave of absence.

Continuous Registration All graduate students (including part-time 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.

If a student fails to register or to file an approved leave of absence by the Registrar's deadline dates, it will be assumed that he/she has withdrawn from UCSD, and he/she will be dropped from the Official Register of graduate students. If he/she decides to continue his/her education at a later date, the student must apply for readmission, pay the non-refundable readmission fee, and face the possibility of not being accepted by his/her department.

Preferred Program Card (Study List) Each quarter in which he/she registers, a student must complete the Preferred Program Card (Study-list Card) included in the enrollment packet, listing all course work, independent study, or research to be undertaken for the quarter. The Preferred Program Card must be approved by the Graduate Adviser and filed with 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.

Leave of Absence/Extension Prior to leaving the campus, a student who discontinues his/her studies with the intention of resuming them during a later quarter must obtain a formal Leave of Absence/Request for Withdrawal for the period. An approved leave may not exceed three years, except in the case of enlistment in the Armed Services or the Action Corps. 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 Chairman of the (major) department, clear through Special Services, Financial Aids and Loan Office, obtain the certification of the Office of the Registrar and approval by the Dean of Graduate Studies. The Leave of Absence form must be filed with the Registrar together with the validated Identification Card.

A student may request an extension to an approved leave by applying for a new Leave of Absence ***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 three quarters or more.

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 UCSD in any

capacity, nor may he/she 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 Identification Card surrendered.

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 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, and to comply with conditions set at time of admission to a graduate-degree program.

Bar from Registration/Academic Academic disqualification is determined by the Dean of Graduate Studies on recommendation of the Chairman of the student's department. A graduate student thus prevented from further registration at UCSD will have the designation "Academic Disqualification" imprinted on his/her graduate record and on any official copies of that record which are issued.

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 regiter in the final quater in which he /she expects to receive his/her degree.

Grades

Standards of Scholarship 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 E grades are excluded in computing grade-point average. A graduate student is subject to dismissal if his/her overall grade-point average falls below 3.0 at any time, or if his/her work in two consecutive quarters falls below a 3.0 average. Only courses in which grades of A,B,C,P (Pass) or S (Satisfactory) are assigned may be counted in satisfaction of requirements for a higher degree.

By action of the Graduate Council on January 4, 1974 the following procedure was established: "that each department or group prepare, not later than the second week of each Spring Quarter, a detailed, written evaluation of each of its graduate students who have not advance to candidacy; that this evaluation be made available to sudents who will sign it to indicate that they have read it, whether or not they agree with it; and that a copy of this evaluation shall be sent to the Office of Graduate Studies, to be made part of the student's permanent file." This evaluation will indicate: the degree to which students are, overall, progressing satisfactorily in their

studies; their strengths and weaknesses as students and, where applicable, as teaching and/or research assistants.

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

A	Excellent	4.0 grade-points/quarter unit
B	Good	3.0 grade-points/quarter unit
C	Fair	2.0 grade-points/quarter unit
D	Satisfactory (barely passing)	1.0 grade-points/quarter unit
F	Failure (not passing)	0 grade-points/quarter unit
E*	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
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 (graduate students only — used in individual research or study)	No grade-points
NR	No report, (no grade-point reported by instructor	No grade-points

** Legislation is pending to change "E" to "I."*

All grades except "E" (incomplete) are final when filed by an instructor in his/her course report at the end of the quarter. No quarter grade except "E" may be revised by reexamination.

"E" (Incomplete) Grade An "E" is assigned when a student's work is of passing quality but incomplete for reasons beyond his/her control, e.g., illness. An "E" (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" and shall then be computed in student's GPA.

To Remove an "E" (Incomplete) Grade The student must obtain a petition, *Removal of Grade "E"* from the Office of the Registrar, secure appropriate signatures, and pay a required fee of $5. The approved petition must be filed with the Office of the Registrar no later than 5:00 p.m. on the last day of instruction in the quarter following that in which the course was taken. Failure to do so will result in the grade of "E" being automatically changed to an "F".

Pass/Not Pass At the beginning of a quarter and with prior approval of the student's adviser (as indicated on his Study-list Card), a graduate student in good standing may take one approved course per quarter (graduate or undergraduate) outside his/her major department on a Pass/Not Pass basis. Units passed shall be counted in satisfaction of degree requirements, but the grade Pass/Not Pass shall be disregarded in determining the GPA.

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 in the *General Catalog.*

Instructors and students in these courses should agree early in the quarter on the marking basis to be followed, but no indication of this option is necessary until the grade is reported at the end 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.

No report An "NR" listed on a transcript is a computer-produced abbreviation 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/her record.

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 the transcript for omissions and clerical errors and consult with the instructor in case of error.

General Regulations

Student Conduct A graduate student enrolling in the University assumes an obligation to conduct himself/herself 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 *Schedule of Classes,* copies of which are available at the Book Store.

Academic Residence A student establishes academic residence each quarter by the satisfactory completion of a minimum of six units of course work, four of which must be in the 200 series. A total of six quarters of academic residence, three quarters of which must be continuous, at the University of California, San Diego is required for the Ph.D. degree.

The minimum residence requirement for the Master of Arts and Master of Science degrees is three quarters, with six quarters of academic residence required for the Master of Fine Arts degree. At the discretion of the Graduate Council, candidates for a Master of Arts or Master of Science degree may be granted credit for one quarter of residence for work completed at other campuses of the University of California.

Language Requirements Foreign language requirements differ from department to department.

In some departments a general reading knowledge of one or more foreign languages is required as an integral part of the student's preparation for a doctor's degree. The following regulations pertain to these requirements, which are administered by the Graduate Council and recorded on the student's transcript by the Office of the Registrar.

> Prior to submitting an Application for Advancement to Candidacy for a Master's Degree or Nomination of a Doctoral Committee for the

Ph.D. Degree, the student must satisfy any formal language requirements established by the Graduate Council. To avoid delays in their graduate programs, students are advised to undertake required language study before entering graduate school and to take the necessary language examinations early in their graduate careers. Special non-credit reading courses in French, German and Russian are available for students who wish to prepare for language examinations. The Department of Linguistics is responsible for administering foreign language requirements on behalf of the Graduate Council.

In some departments, special language and/or computer proficiency is required for students in specific programs. Under such circumstances, the testing of proficiency is the department's own responsibility and no record of the results is kept by the Office of Graduate Studies and Research or the Office of the Registrar.

Certification of Native Language A graduate student who wishes to be certified as a native speaker of a language other than English in order to meet a language requirement in his/her department should petition for permission to use his/her native language. After securing necessary approval, the student should arrange for an interview with the Department of Linguistics which will certify as to satisfaction of the language requirement.

Graduate-Student Language Examinations

English A graduate student whose native language is not English and whose department accepts English proficiency in satisfaction of one of his/her language requirements must present a satisfactory score of 550 on the Test of English as a Foreign Language (TOEFL), administered by the Educational Testing Service (ETS). The TOEFL is a graduate admission requirement for a student whose undergraduate education was conducted in a language other than English. (See ***National Admission/Examination Information*** in Appendix, this chapter.)

French, German, Russian and Spanish Graduate students who have taken the Graduate School Foreign Language Test (GSFLT) of the Educational Testing Service (ETS) in French, German, Russian or Spanish within three years of date they first enrolled for graduate study at UCSD may petition to use these scores to satisfy the language requirements. Students who have not taken the GSFLT should take it as soon as possible. (See ***National Admission/Examination Information*** in Appendix, this chapter.)

Other Languages For languages other than French, Spanish, German, Russian or English, the student must take a Special Reading Examination through the Department of Linguistics at UCSD. The student should petition to use a specific language. When approval is granted, he/she should file his/her application with the Department of Linguistics at least 30 days in advance of the proposed date of the examination. In the event he/she fails to pass the test, a student must wait three months before repeating the exam process.

In a department which accepts oral and reading proficiency in one language to satisfy a language requirement, a student must first pass the reading examination. He/she must file an application with the Department of Linguistics two weeks before the end of the quarter and schedule a time to take the oral test during the last week of the quarter.

Exceptions A student may request an exception to the normal procedures and requirements governing graduate studies by submitting a General Petition, available either from his/her department or the Office of the Registrar. The completed petition must state clearly the reason(s) for requesting the exception and bear the required signatures, before being filed with the Office of the Registrar.

Concurrent Enrollment Concurrent enrollment in regular sessions at an institution other than the University of California while enrolled at UCSD, with the intention of transferring credit to UCSD, is permitted only when approved in advance by the Graduate Council. The student should submit a General Petition, with appropriate signatures, detailing reasons for the concurrent enrollment request.

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.

Time Limits for Completion of Higher Degree Studies The following time limits have been established for completion of higher degrees: seven quarters for M.A. and M.S. degrees, 10 quarters for the M.F.A. degree, and 20 quarters for the Ph.D. degree. Exceptions to this rule may be made by the Dean of Graduate Studies only on the basis of a fully-documented request by the Department Chairman.

Graduate Work Completed Elsewhere On the recommendation of the major department and the approval of the Dean of Graduate Studies, a maximum of 8 quarter units of credit for work completed at another institution may be applied toward a Master of Arts or a Master of Science degree at UCSD.

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), submit

it to the Dean of Graduate Studies for action, and file it with the Office of the Registrar.

Teaching units (500 series) above the maximum (12 units) are not considered an overload.

Changes in Study-Lists After the Preferred Program Card has been filed with the Registrar, a student may add/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. Add/Drop Change Cards must be completed in full and 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 $3 fee to the Cashier.

Properly executed changes in study lists and required petitions must be deposited at the Office of the Registrar in order for the student to receive credit for added courses and to relieve him/her of responsibility for dropped courses.

Changes of Name or Address Students must file an official change of name and/or address form with the Office of the Registrar where applicable.

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 his/her return to his/her home country upon completion of his/her studies in the United States. He/she 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.

Postgraduate Appointments A UCSD student is not eligible for any UCSD postgraduate appointment until he/she has completed all requirements for his/her Ph.D. degree. Such appointments may begin the day after the Librarian has accepted the dissertation.

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.

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 UCSD.

Special Programs

Education Abroad Program This statewide program is coordinated by the Office of International Education at UCSD. Study abroad is presently available on campuses in Jerusalem, Beirut, Gottingen, The United Kingdom, Dublin, Bordeaux, Madrid, Hong Kong, Lund, Padua, Tokyo, Mexico, Bergen, Paris, Nairobi and Accra.

A graduate student is eligible 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. He/she 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/enroll at UCSD and also at the host university and must obtain clearance from UCSD's Student Health Service. Full academic credit is received for courses satisfactorily completed.

Costs vary according to location.

Complete information and application forms for the various campuses may be obtained from the Office of International Education, International Center, Matthews Campus, UCSD, or from the Director, Education Abroad Program, 1205 South Hall, University of California, Santa Barbara, which acts as the administering body for all the UC campuses.

See also *Education Abroad Program* in *Campus Services and Facilities.*

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) and faculty have a unique opportunity to acquire fluency in foreign languages through the cooperation of the U.S. Defense Language Institute (West Coast Branch), Presidio of 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, Merrill College, University of California, Santa Cruz, California 95064.

Intercampus Exchange Program A graduate student registered on any campus of the University of California who wishes to seek further oppor-

tunity for consultations with scholars or opportunities for study and research not available on his/her home campus may apply to become an intercampus exchange student at another UC campus.

Informal arrangements between the faculty members and departments involved on the two campuses should be made by the student prior to submitting an application to assure that desired courses, seminars or facilities will be available.

The student must file an application "Intercampus Exchange Program for Graduate Students" and enroll prior to the Registrar's deadline dates on the home campus in order to avoid penalties for late filing of the Preferred Program Card (Study List) on the host campus. The application must be signed by his/her adviser and the Dean of Graduate Studies of his/her home campus and the Chairman of the Department and the Dean of Graduate Studies of the host campus. He/she completes registration by paying required fees on his/her home campus, and presenting a validated Identification Card and Study-list Card to the Registrar's Office of 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 his/her home campus. He/she will have library, infirmary and student privileges on the host campus. Grades obtained in courses taken by the student will be transferred to his/her home campus for entry on his/her 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 UCSD and to carry the required number of units of course work (9-12). Not more than one-half of the total unit and residence requirements for the Master of Arts degree or Master of Science degree may be satisfied by off-campus study.

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 his/her 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 will apply to off-campus study as well as on-campus study.

Ph.D.-M.D. Program Students may meet the requirements for both Ph.D. and M.D. degrees in programs offered by the School of Medicine and the general campus departments. Any student interested in such programs should consult with the Dean of the School of Medicine and the chairman of the department/group in which he/she plans to seek the Ph.D. degree. He/she must obtain approval of and be admitted to both the School

of Medicine and the relevant graduate program; and although most of the work in the first three 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. on the General Campus in accordance with departmental regulations. Students in this program must meet all requirements for the professional as well as the academic 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, and Mathematics, UCSD 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 an additional year of 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 guaranteed if, at the end of their senior year, they have satisfied departmental and Graduate Council requirements for admission to graduate study.

Postdoctoral Study

Postdoctoral studies play a major role in UCSD's teaching and research programs. The Office of Graduate Studies and Research has administrative responsibility for the enrollment and census of Postdoctoral Scholars undertaking training on the UCSD campus. After approval by the faculty sponsor, director or department chairman and the Dean of Graduate Studies, a Postdoctoral Scholar Identification Card is issued. Upon completion of postdoctoral studies at UCSD, the scholar may request a Certificate of Postdoctoral Studies from his/her administrative office. Such certificate will indicate the area of study and the dates enrolled. Such enrollment establishes an appropriate identity and status at UCSD for the scholar and enables him/her to secure the privileges and perquisites of his/her position, as well as providing the scholar with appropriate identification. The scholar is enrolled by means of a form initiated in the office of his/her faculty sponsor and forwarded to the Office of Graduate Studies.

University Extension

Through a reciprocal agreement with University Extension at UCSD, a limited number of spaces in Extension classes are open to UCSD graduate students without payment of additional fees. The number of spaces available for each quarter varies. Priority will be given to those graduate students with academic need for a given class. The student must complete a ***University Extension Course Without Fee*** petition available at the Office of Graduate Studies, and obtain necessary approvals.

If credit is to be offered in partial satisfaction of requirements for a higher degree, a ***General Petition*** must be filed with the Office of Graduate Studies well in advance of proposed enrollment.

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 check with their adviser and their major department before selecting a plan for completion of degree requirements.

Advancement to Candidacy After completing all preliminary requirements of the department and a minimum of two quarters or more of residency, the student must file an Application of Candidacy for the Master of Arts or Master of Science Degree, electing Plan I or Plan II. 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.

Plan I: Thesis Plan The Thesis Committee must consist of at least three faculty memers (two from the department and at least one, preferably tenured, from a department other than that of the candidate's major 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 at least six units in research course work, leading to a Master of Arts or Master of Science 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*** available from the Office of Graduate Studies.

When all members of the committee have approved the thesis, a ***Report on Thesis Examination for the Master of Arts or Master of Science Degree under Plan I*** should 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.

General Requirements Only courses with 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. Each program must contain a statement of the maximum number of research units which can be used in satisfaction of the requirements for the degree.

A ***Master of Arts/Master of Science Degree Check Sheet*** is required. All

course work taken under Plan I, Thesis, or Plan II, Comprehensive Examination, must be listed and certified by the chairman of the department.

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, four of which must be graduate level. Normally, the entire program must be completed in residence at UCSD.

The Master of Fine Arts Degree

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.

Plan III: Modified Thesis Program The Thesis Committee must consist of at least three faculty members (two from the department and at least one, preferably tenured, from a department other than that of the candidate's major department).

Seventy-two quarter-units are required: 42 units in graduate courses in the major field, six units in graduate or approved upper-division courses, six to 12 units of teaching courses, six units of graduate seminar and at least 12 units in research course work 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,*** available from the Office of Graduate Studies.

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*** should 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.

General Requirements Only courses with assigned grades "A," "B," "C," "P" or "S" are counted in satisfaction of the requirement for the Master of Fine Arts Degree. Each program must contain a statement of the maximum number of research units which can be used in satisfaction of the requirements for the degree.

A ***Master of Fine Arts Check Sheet*** is required. All course work taken under the Modified Thesis Plan must be listed and certified by the chairman of the department.

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, four of which must be graduate level. The entire program must be completed in residence at UCSD.

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.)*

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 constitutes an affidavit of critical aptitude in scholarship, imaginative enterprise in research, proficiency and style in communication including, in most departments, proficiency in teaching.

Appointment of Doctoral Committee The period prior to the appointment of a Doctoral Committee requires at least three academic quarters of residence at UCSD and is spent in satisfying all preliminary requirements established by the Graduate Council and by the major department, including course work, language requirements, teaching, and examinations.

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 and no fewer than four shall hold professional titles of any rank. The committee members shall be chosen from at least two 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 UCSD 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 Office of the Registrar by the chairman of the student's major department. After certification by the Office of the Registrar and approval by the Dean of Graduate Studies, notification of the newly reconstituted committee membership will be sent by the Dean to all concerned.

Qualifying Examination/Advancement to Candidacy The Doctoral Committee conducts the qualifying examination and authorizes the issuance of the *Report of the Qualifying Examination/Advancement to Can-*

didacy. If the committee does not issue a unanimous report on the examination, the Dean of Graduate Studies shall be called upon to review the case and report his/her findings to the Graduate Council, which shall determine appropriate action. Formal advancement to candidacy requires the student to pay a candidacy fee of $25 to the Cashier prior to submitting the form to the Office of the Registrar for certification and approval 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 UCSD. The C.Phil. degree cannot be conferred after or simultaneously with the award of a Ph.D.

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 may be obtained from the Office of Graduate Studies.

The Doctoral Committee shall conduct the final oral examination (at least three academic quarters or more after advancement to candidacy), supervise and pass on the student's dissertation and conduct the final oral examination which shall be public and so announced in the UCSD publication ***This Week.*** 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 of all requirements by the candidate for a Doctor of Philosophy degree.

The petition, ***Report of 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, chairman of the (major) department and the Librarian, certified by the Office of the Registrar and approved by the Dean of Graduate Studies.

Residence Requirements

The residence requirement for the degree, Doctor of Philsophy, is six quarters, three of which must be in continuous academic residence at UCSD. Residency is established by the satisfactory completion of six units or more per quarter, at least four of which must be at the graduate level.

Appendix

National Admission/Examination Information For admission to

graduate studies and for meeting certain requirements for advanced degrees, there are a variety of nationally-administered examinations. Listed here are several of importance to UCSD students.

Doppelt Mathematical Reasoning Test

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

Purpose: It is a high-level mental test and provides information to support candidates for admission to graduate study.

Application: Information and applications are available at: San Diego State University, Testing Office, Administration Building, Room 8228, 5402 College Avenue, San Diego, California 92115. Telephone: 286-5216 (call for appointment).

Examination Schedule: by Request **Fee:** $4.00

Graduate Record Examination (GRE)

Address: Educational Testing Service, Box 955, Princeton, New Jersey 08540, or Box 1502, Berkeley, California 94701

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 Registrar's Office, UCSD, or the above address.

Applications must be submitted to Educational Testing Service (see above for address) at least ***three weeks*** prior to scheduled examination dates in the United States and Puerto Rico and at least six weeks in all other countries.

Examination Schedule: Six times a year (dates change each year); four times a year at UCSD (Testing Coordinator, Office of the Registrar, UCSD).

Fee:

Aptitude Test	$10.00
One Advanced Test, or	$10.00
Aptitide and One Advanced Test	$20.00
Late Registration Penalty	$3.50

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, or Spanish in order to meet foreign-language requirements for advanced degrees.

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

Application must be submitted to Graduate School Foreign Language Tests (see above for address) at least three weeks prior to scheduled examination dates.

Examination Schedule: Four times a year (dates change each year) (Testing Coordinator, Office of the Registrar, UCSD)

Fee: Test $10.00; Late Registration Penalty $3.50.

Miller's Analogy Test (MAT)

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

Purpose: It is a high-level mental test and provides information to support candidates for admission to graduate study.

Application: Information and applications are available at: San Diego State University, Testing Office, Administration Building, Room 8228, 5402 College Avenue, San Diego, California 92115. Telephone: 286-5216 (Call for appointment)

Examination Schedule: Every 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: $4.00

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, UCSD, or the above address.

Applications must be submitted to Test of English as a Foreign Language (see above for address) at least ***five weeks*** prior to the scheduled examination date.

Examination Schedule: Four times a year (dates change each year) at San Diego State University, Testing Office, Admistration Building, Room 8228, 5402 College Avenue, San Diego, California 92115. Telephone: 286-5216

Fee: Test $10.00; Late Registration Penalty $3.00

Campus Services and Facilities

A broad range of special services and facilities is available to all students at UCSD, undergraduate and graduate alike. (Services limited to either category will be found listed in *Undergraduate Admissions, Policies, and Procedures* or *Graduate Studies* for undergraduates and graduates, respectively.)

Services available to all students irrespective of college affiliation are the following:

Academic Services and Programs

Office of Academic Support and Information Services (OASIS) This program offers a number of free services, with emphasis on teaching learning skills to students. The program staff assists students to develop reading speed and comprehension, and to improve their ability to memorize. Tutorial aid in the math and science areas is provided through the program. In addition, a math-physics clinic and a biology-chemistry clinic provide problem-oriented, short-term aid for students who do not need individual long-term tutoring. A tutorial listing service also is provided. Further information: Building 250, Matthews Campus, Extension 1306.

The Computer Center The UCSD Computer Center operates two major computing systems: The CDC 3600 computer, and a Burroughs B6700, with extensive facilities for communications with remote devices. The Center offers no-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 1681. (See also *Research at UCSD.)*

Educational Opportunity Program (EOP) Students who are considering application for admission to UCSD and who feel they need special support services may contact the Special Educational Programs Office, 215 Matthews Campus, Extension 2162. 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 UCSD.

Foreign Student Adviser (See *Office of International Education*, below.)

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-citizens 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 whenever either a new foreign faculty member is due on campus or a new foreign student has been accepted.

Education Abroad Program The Education Abroad program offers opportunities to undergraduate and graduate students of the University of California to study in universities overseas. It is administered for the entire University by the Santa Barbara campus, but UCSD has its own coordinator, at the International Center, Matthews Campus.

At present, the program is established on campuses in Jerusalem, Beirut, Gottingen, various universities in the United Kingdom, Dublin, Hong Kong, Lund, Bergen, Padua, Tokyo, Mexico, Nairobi and Accra, Pau-Paris, Paris, Bordeaux, Madrid, and Barcelona.

The Study Centers' primary purpose is to provide a sound academic experience in a different education system. It also enables University of California students to become deeply involved in the language and culture of the host country.

Eligibility requirements are: upper-division standing in the University at the time of participation; proficiency in the language of the country plus one year additional study in the language or literature of France, Germany, Italy or Spain. The language requirement varies for all other centers, but all require special preparation; an overall 3.0 grade-point average; seriousness of purpose; and an indication of ability to adapt to a new environment. Transfer students are eligible if they meet the language requirement and have completed at least one language course in the University of California. (The language requirement is not applicable to the centers in Hong Kong, Japan, Israel, Lebanon, Lund and Bergen, but study of the languages of those countries will be required as part of the program.) Special arrangements can be made for the participation of graduate students.

The participants will spend from nine to 11 months abroad, including a special orientation program, six or seven weeks of intensive language preparation where applicable, a full academic year in the university of their choice, and some vacation travel.

The cost is approximately the cost of a year's education in the United States.

Each student will be concurrently enrolled on his home campus and in the host university, and will receive full academic credit for courses satisfactorily completed.

The Regents endeavor to bring this year abroad within the reach of all students, regardless of their financial resources.

Applications for 1975-76 will be accepted from October 1, 1974 through January 10, 1975. (Applications for the United Kingdom and Ireland must be filed no later than November 15, 1974.)

Further information is available from the Dean of International Education, International Center, Matthews Campus, University of California, San Diego or the Director, Education Abroad Program, 1205 South Hall, University of California, Santa Barbara.

Other Overseas Programs Information about other overseas study, travel or work opportunities is available in the Office of International Education. Information about graduate study abroad opportunities is available in the Office of Graduate Studies and Research.

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.

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 of California Extension, P.O. Box 109, La Jolla, CA 92037 or telephone (714) 453-2000, extension 2061.

Concurrent Registration Concurrent registration is a special program which allows University Extension students to enroll in regular UCSD courses on a space-available basis. In exchange for this privilege, an equal number of University students may enroll in Extension courses free of charge. Enrollment of non-students in regular University courses is sub-

ject to the approval of the instructor in charge of the course.

UCSD 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.

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 I Undergraduate Library. The Library contains more than 1,000,000 volumes and receives 20,000 periodical and other serial publications.

The *Central University Library*, occupied in 1970, consists of the general and specialized graduate 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, and Pacific Voyages.

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

Counseling Services

Career-Education Planning Services (Information: Extension 2401) The basic purpose of Career-Education Planning Services is to aid students in making the transition from UCSD to graduate or professional school or the world of work. A variety of counseling and information services is available to help them to gain an understanding of the career-planning process and to develop plans for further education or for the selection and pursuit of a first job. Included are:

1. A pre-medical advisory program to assist students in planning their undergraduate programs and in making application for admission to medical/dental schools. Counseling and information relative to other health-science occupations are also provided.
2. Individual and group counseling to assist students in making career

and job decisions, in making plans to gain admission to graduate or professional schools, and in learning job-seeking techniques. An on-campus interviewing program affords students the convenience of obtaining information about career and education opportunities by talking directly with representatives from business, industry, government, and graduate and professional schools.

3. A library including occupational literature, graduate and undergraduate school guides and catalogs, information on graduate fellowship programs, foreign-study and specialized schools, directories of potential employers, civil-service information, current job listings, information on salary and employment trends.
4. Permanent teacher placement files, set up and maintained for candidates for college teaching positions.

Counseling and Psychological Services (Information: Extension 2715) 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 programs 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 loneliness, inter-personal relationships, sexual issues, concentration difficulties, and a general sense of unhappiness.
2. ***Vocational 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, and educational psychologists. 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.

Financial Assistance

The University of California, San Diego, expects that the student and his family 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, University of California, San Diego, P.O. Box 109, La Jolla, California 92037. (Phone 453-2000, Extension 1945)

No students 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 and/or any form of financial aid are required to provide financial information on the Parents' Confidential Statement. This form must 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.

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:

(A) not have been claimed as an exemption by his parents for federal or state income-tax purposes for the preceding tax year;
(2) not have lived at home for 12 months preceding the time when he 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/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 his parents or guardian. All independent applicants must complete a Student's

Financial Statement. Independent students under 21 must also submit a PCS. These forms are available at the Student Financial Services Office, Building 213, Matthews Campus. All married students are requested to file a Student's Financial Statement, regardless of age; if a married student is under 21, a PCS is also required.

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 his/her application form, appropriate letters of recommendation, official transcripts and the Parent's Confidential Statement, and/or acceptable proof of independence and a Student's Confidential Statement.

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 long-term loans, part-time 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', President's, and Chancellor's Scholarships The highest honor that may be conferred upon an undergraduate student is the awarding of a Regents', President's, or Chancellor'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.

Chancellor's Scholarships, based on scholastic achievement and promise, are issued in the name of the Chancellor. New and continuing students may be considered for this award which consists of a $100 honorarium only. Since need is not a requirement, no financial information is necessary.

All scholarship applicants are reviewed for these three 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/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.

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.

The maximum award a student can receive under this program is $1,400 minus the amount the student and his family are expected to contribute toward the cost of his/her education. (This amount is called the "Family Contribution.") The actual grant, however, may be less than this maximum award. The amount of the grant is based on the Family Contribution and two other factors: (1) the amount of funds actually available for the program for the 1974-75 year; and (2) the cost of the student's education, since the grant cannot exceed one-half that cost. The amount of the grant would decrease as the Family Contribution increases. In addition, since the minimum grant that can be awarded to an eligible student is $200, he/she would not receive a grant if the Family Contribution is more than $1,200.

Due to funding limitations, during the first year of operation (1973-74) eligibility was limited to students enrolling in a post-secondary educational institution for the first time and awards ranged from $50 to $452 for the academic year. New guidelines and payment schedules were scheduled to be established by the U.S. Office of Education on May 1, 1974. Applications and descriptive information about the program are now available at high schools, state employment offices, post offices, and the

Student Financial Services Office.

Educational Fee Grants

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 under-graduates 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 UCSD registration fees. Individuals wishing further information or applications may contact a high school counselor or write directly to the California State Scholarship and Loan Commission, College Opportunity Grant Section, 1410 5th Street, Sacramento, California 95814. The 1974-75 deadline was December 14, 1973. 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 from moderate- and low-income families will be considered. Students who receive work-study awards will receive instructions ands 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 varies from minimum wage to $3.50 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 with demonstrated financial need without reference to grade-point average.

California State Scholarships and Fellowships (Special Application Required) Scholarships are awarded by the State of California to entering and continuing undergraduate students and awards range from $200 to

$636 to be applied toward registration and educational fees. Undergraduates may obtain applications for this program from the UCSD Student Financial Services Office, or the California State Scholarship and Loan Commission, 1410 5th Street, Sacramento, California 95814.

Fellowships are awarded to entering and continuing graduate students and awards usually cover total fees required for registration. Graduate students may obtain applications for this program from the UCSD Office of Graduate Studies and Research and/or their major department. 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 1975-1976 CALIFORNIA STATE SCHOLARSHIP AND FELLOWSHIP DEADLINE IS NOVEMBER 1974.

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 who 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 student who receives financial aid from the University Student Financial services Office will be offered this Educational Fee loan as part of his award.

Repayment of the Educational Fee loan shall begin nine months subsequent to the completion of a student's higher education, including graduate study. A student who terminates his/her higher education will be required to begin payment of his/her loan nine months subsequent to his/her 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/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 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 percent 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 to one year.

Federally Insured 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 eligible will pay the full rate of interest on the loan up until nine months after he/she is no longer enrolled as a full-time student. Interest is calculated at seven percent per annum and accrues from the date of loan issue. To be eligible for the federal assistance in interest payments, the borrower must submit a Parents' Confidential Statement and/or Student's Financial Statement to the Student Financial Services Office for determination of need. Repayment starts between nine to 12 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/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.

Federally Insured Student Loan Applications are available in the Student Financial Services Office, beginning July 1, 1974 for the 1974-75 academic year.

Financial Assistance, Graduate

See *Graduate Studies.*

Office of Special Services

The Office of Special Services provides assistance to students in three areas:

Physically Handicapped Students The Special Services Office coordinates the services provided by the university to students with physical limitations. In addition to mechanical and electronic equipment the office provides an ombudsman role to assist students with handicaps to make whatever changes in their course schedules, living arrangements, etc., that may be required.

Anyone interested in attending UCSD who anticipates any problems in this regard should contact the special Services Office before making application to the school so that an analysis of needs and a plan to meet them can be undertaken.

The office also handles the paper work by which students who are under the sponsorship of the California State Department of Rehabilitation may receive deferments for their fees.

Veterans' Affairs Information regarding Veterans' Educational Assistance and Veterans' Dependents' Educational Benefits may be obtained in the Office of Special Services. If you have any questions before you arrive on campus, contact your nearest Veterans Administration Office. Be certain to check in with the Special Services Office on your arrival at UCSD. Students who are already receiving benefits under the G.I. Bill or dependents' programs should come to the Special Services 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 Special Services Office as soon as possible to obtain needed help.

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 Special Services Office.

Student Employment Office

The Student Employment Office services UCSD students, alumni, and students' spouses for employment opportunities. Many categories of jobs are listed from the campus and the neighboring communities. Only currently registered UCSD students will receive referrals to on-campus jobs. Students interested in employment must complete an information sheet for use in the Student Employment Office. Employment CANNOT be arranged by correspondence as the majority of jobs are available at the time they are listed and must be filled immediately. "Live-in" positions, whereby a student may exchange work for room and/or board in a private home, are listed when available. A file is maintained of students' skills, and lists are kept of students interested in childcare and tutoring.

The Student Employment Office is also the personnel office for students working in nonacademic positions on campus. Undergraduates taking a full course load may not be employed on campus for more than 15 hours per week during academic sessions without an exception from this office. Graduate students may be employed in nonacademic positions up to 45 per cent of their time, i.e. up to 18 hours per week, and must be full-time, registered graduate students taking 9-12 units per quarter. Students may be employed full-time during summer months. Freshmen are encouraged to avoid employment during their first quarter at UCSD. Freshmen with financial difficulties are urged to confer with a counselor in the Financial Aids 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 should report to this office during the first week of classes. A student's persistence in checking jobs posted in SEO is the best guarantee for finding employment.

Student Health Service

Entering students are required to complete a medical history form prior to registration and to send it 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 8:00 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.

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 preexisting 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 forms and physical examination forms are sent to students. Further information on insuranc 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.

Miscellaneous Services and Facilities

The Alumni & Friends of 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 freshman scholarships, legislative relations, and participation in publication of *UC San Diego,* a general-interest "magapaper" published eight times annually.

Members of ***The Alumni & Friends*** enjoy many special benefits, including library privileges on all University of California campuses, a subscription to *UC San Diego,* a discount on the first enrollment annually in a University Extension course, use of UC vacation centers throughout California, participation in special-rate charter flights, and others.

Students and friends are invited to visit the Alumni Office, 212 Matthews Campus, Extension 2986.

Art Gallery Mandeville Center, Extension 1980 Art Gallery exhibitions cover a wide range of fields, from German Expressionism to contemporary works. The Gallery also sponsors performances by modern dancers and readings by contemporary poets. Gallery hours are from 12:00 noon to 5:00 p.m. daily, and Wednesday evenings from 8:00 to 10:00.

Bookstore 201 Matthews Campus, Extension 1355 The University Bookstore makes available an extensive selection of all types of books including textbooks required for UCSD 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 8:00 a.m. to 4:30 p.m., Monday through Friday, with special hours during rush periods, the first two weeks of every quarter.

Bus Service The San Diego Transit Corporation operates a bus from downtown San Diego to Mesa Apartments via Mission Beach, Pacific Beach, La Jolla, and UCSD. Students and their dependents may ride the bus between SIO and Mesa Apartments without charge by showing their UCSD identification.

A bus service is provided from Urey Hall to Leucadia via the Pacific Coast highway. For current information on the bus, contact Student Information Center: EDNA, Extension 1176.

Campus Programming Board, Extension 1391 The Campus Programming Board is a Chancellor's committee composed of students, faculty, and staff of UCSD. In fulfilling its objective, the Board strives to bring to the campus balanced, high-quality programming and entertainment consistent with educational objectives of the UCSD community.

Check Cashing With proper identification, students may cash personal checks up to $25.00 for a small charge at the Cashier's Office, 401 Matthews Campus (Hours: Monday through Friday, 8 a.m. - 3 p.m.), the Bookstore, 201 Matthews Campus (Hours: Monday through Friday, 8:00 a.m. - 4:30 p.m.), and the Notions Store, Blake Hall, Revelle Campus (Hours: Monday through Friday, 11 a.m. - 3 p.m.).

Day Care Center UCSD Day Care Center offers full day care (part-time also available) for UCSD 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 2891, Ms. Foulks, or visit the Center, which is located across the street from Graphics and Reproduction, Bldg. 510, Matthews Campus.

Duplicating Services 510 Matthews Campus, Extension 1593 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 5 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 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.

Food Services A variety of food services is available on the UCSD campus. Winzer Commons in the Basic Science Building, the Coffee Hut

on Revelle Campus, Revelle Cafeteria and Snack Bar, Muir Cafeteria and Snack Bar, and the Matthews Campus 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.

Housing Revelle, John Muir, Third and Fourth College each has 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 $1,400.00 plus a $45.00 deposit for the 1974-75 school year (Fall-Winter-Spring quarters), and will vary depending upon meal plan chosen and type of room accommodation.

Single and double rooms in apartments at John Muir College and also in like apartments at Third College are available. A board plan is available on an optional basis.

A housing brochure is sent to all interested applicants. A housing application is sent to all students who are accepted at UCSD.

The resident dean of the applicable college assigns rooms and apartments in the residence halls. The Housing 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. 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. Typical monthly rentals, which include utilities, are $100 for the one-bedroom units, and $120 for the two-bedroom units.

Accommodations for single graduate students are limited to 19 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 all apartments.

You may write to the Office of Housing Services, Building 250 Matthews Campus, for brochures and applications for Coast or Mesa apartments at UCSD.

The Office of Housing Assistance, Building 250 Matthews Campus, Extension 1263, can also assist others in finding suitable accommodations

in the surrounding communities of Clairemont, Del Mar, La Jolla, Pacific Beach, and Solana Beach.

Lost and Found **501 Matthews Campus, Extension 1333** 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.

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 source for the educational enterprise. For further information: 250 Matthews Campus, Extension 1943.

Parking on Campus **202 Matthews Campus, Extension 2626** Parking permits are required on the UCSD main campus from 7:00 a.m. to 5:00 p.m. Monday through Friday and at Scripps Institution of Oceanography from 7:00 a.m. to 5:00 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 vary from $3 to $4 per month and must be paid in advance from date of purchase through June 30.

Post Office **104 Argo Hall, Revelle Campus, Extension 1074** 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:

Academic Year: 10:30 a.m. - 1:00 p.m., 1:30 - 4:00 p.m., Monday-Friday
Summer: 11:00 a.m. - 12:00 noon, 1:00 - 3:30 p.m., Monday-Friday

Recreational Facilities **Department of Physical Education, Gymnasium, Extension 2275** 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 UCSD students.

The Recreational Athletics office (Extension 2285) administers broad programs in intramurals, club activities and special events, all of which are available to all students who wish to participate.

Student Information Center: EDNA **Urey Hall, Telephone: 453-EDNA. Open 9:00 a.m.-8:00 p.m., Monday-Friday; 11 a.m.-5 p.m., Saturday and 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 location.
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, plane schedules, etc. They also give suggestions for recreational activities and have information on the San Diego Zoo, Disneyland, Sea World, etc.

University Police Department 500 Matthews Campus, Extension 1333 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.

University/Student Center Telephone: 453-EDNA. University Center Director: Extension 2336. Open 9 a.m.-noon, Monday-Friday; 9 a.m.-2 p.m. Friday-Saturday; 10 a.m.-10 p.m. Sundays. The University/Student Center is the central meeting place for members of the UCSD 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, including the Undergraduate Student Council, the Student Lobby Annex and various administrative units in Student Affairs. Among these units are the Student Activities Office, Vice-Chancellor of Student Affairs, Director of the University/Student Center, and Student Legal Aid.

Should students desire to create a student organization or need advice on creating a program, the staff of the University/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.

Research at UCSD

Several institutes, centers and projects at UCSD 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 UCSD are described below.

Organized Research Units — University-Wide Institutes

Institute of Geophysics and Planetary Physics 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 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 The Institute of Marine Resources was established in 1954 to provide a center at the University of California concerned with marine resources. Its programs involve research as well as education and public service. Marine resources are considered to include not only the materials which come from the sea, such as the minerals, fish, and seawater itself, but also the capacities of the sea for transportation, recreation, waste disposal, and production of energy, and the processes and conflicts that extend or limit these uses. The broad objective of the Institute is to accumulate and disseminate knowledge of the sea's resources. This requires study not only of the contents and nature of the ocean and its boundaries, but also the social, legal, economic, and political aspects and constraints of its uses. There are a great many opportunities for graduate students, as the diversity of these subjects indicate.

Organized Research Units — Campus-wide Institutes

Institute for Information Systems The 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 This institute is an interdisciplinary research unit which brings together members of the Departments of Applied Physics and Information Science, Applied Mechanics and Engineering Sciences, Physics, and Scripps Institution of Oceanography. The Institute is concerned with aerospace sciences, nuclear physics, hydrodynamics, molecular and solid-state physics, theory of liquids, spectroscopy, radiation transport, 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, ionospheric and atmospheric physics, laser physics, atomic and molecular structure and reactions, and numerical analysis.

Institute for Studies in Developmental Biology The object of this Institute is to promote teaching and research in the field of developmental biology. Various disciplinary groups within the biomedical sciences are associated with the Institute. 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.

Centers

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 Professor S. S. Penner, Department of Applied Mechanics and Engineering Sciences.

Center for Human Information Processing The Center is an autonomous unit of the Institute for Information Systems. It is intended to provide facilities for research and to sponsor 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.

Center for Music Experiment and Related Research The Center for Music Experiment (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 will attempt 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 The Center for Research in Language Acquisition is an independent unit of the Institute of 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 A Center for Iberian and Latin American Studies The University of California at San Diego is establishing a Center for Iberian and Latin American Studies (CILAS) which will guide and sponsor work and research of students and faculty in the history, culture and current realities of societies and regions within the Iberian tradition. This includes, of course, the Iberian Peninsula and the Spanish- and Portuguese-speaking

countries of the New World, as well as those sections of the U.S.A. linked to the Hispano-Mexican tradition like California and the Soutwwest, and the far-flung Judeo-Hispanic communities, whose long and social memories offer such a remarkably preserved record of early Iberian history. Some of the concerns of the Center will be directed to such immediate and tangible questions as bilingualism and biculturalism of the Mexican-American borderlands, the ***Frontera.*** CILAS as a teaching and research ***ensemble*** (in San Diego and in the affiliated Centers which it has established and plans to establish in Spain and Latin America) will engage in the study of the whole of Iberian and Neo-Iberian culture, intellectual, social, political, aesthetic, and from the point of view of history, literary criticism, philology, and the sociology and anthropology of culture.

Campus-wide Research Facilities

The Computer Center The UCSD Computer Center operates two major computer systems, both located on the first floor of Building AP/M (building 2A) 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. Through the B6700 computer users may reach a variety of computers located at other universities by using the B6700 connection to the national ARPA Information Network.

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 book store, while smaller write-ups are available at no charge through the Center's consulting office.

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 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 I Undergraduate Library. The Library contains more than 1,000,000 volumes and receives 20,000 periodical and other serial publications.

The *Central University Library*, occupied in 1970, consists of the general

and specialized graduate 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, and Pacific Voyages.

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

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 seventh Freshman Class will be enrolled in September, 1974. The Basic Science Building, Administrative Wing, and Biomedical Library of the Medical School Complex on the La Jolla campus are completed, the Veterans Administration Hospital opened in February, 1972, and the Clinical Sciences Building is being planned. As the building program and faculty acquisition approach "steady state," undergraduate student enrollment will increase to 96, in 1974, for a total annual enrollment of almost 400.

The UCSD 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, Biochemistry, Organ Physiology, 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 specialties taught in hospital settings, clinics, and diverse health-centered programs in the community. The student is involved in the clinical facilities for much of the time he is engaged in learning diagnosis and therapy. The role of medicine and of the physician in society are 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 needs, and combining didactic, clinical, field, library and research experiences at UCSD or elsewhere. Electives occupy about a fourth of the student's time in the first two years and more than half his time in the last two years. A written report covering work in the Concentration Area and prepared as though for publication must be presented before the end of the fourth year as a requirement for graduation.

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 in a specially designed program.

A complete catalog and information on the foregoing programs are available upon request to:

The Office of Student Affairs
UCSD School of Medicine
University of California, San Diego
La Jolla, California 92037

Programs for Prospective Medical Students

UCSD 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 elects those additional courses which the medical school of his 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.

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 between 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 1974-75, R/V ***Thomas Washington*** will operate at sea for 11 months in Pacific and Southeast Asian waters, R/Vs ***Melville*** and ***Alexander Agassiz*** off the Pacific coasts of North and South America, and R/V ***Alpha Helix*** in the Eastern Pacific, the Gulf of California, and the Bering 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 70 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 cean 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 Advanced Ocean Engineering Laboratory and the Deep Sea Drilling Project, and by the Marine Life Research Group, sponsored by the State of California. A scientific support unit provides essential services and facilities to all research units of the Institution.

Organizationally separate, but sharing close affiliation with the 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 Program, with 49 projects supported on seven of the nine campuses; and the Center for Marine Affairs (CMA), established in 1970 with a grant from the Ford Foundation. Located on the Scripps campus, CMA supports research in science, technology and public policy. Interdisciplinary teams including specialists in the social sciences investigate important problems in marine pollution, marine resource management and environmental modification. The Southwest Fisheries Center, located on the San Diego campus, is one of 30 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 UCSD 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 180) 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
University of California, San Diego
P. O. Box 1529
La Jolla California 92037

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.	Assistant Professor	SIO
Benson, Andrew A., Ph.D.	Professor	SIO

Berger, Wolfgang H., Ph.D.	Assistant 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	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.	Associate Professor	SIO
Epel, David, Ph.D.	Associate Professor	SIO
Fager, E. W., Ph.D., D. Phil.	Professor Emeritus	SIO
Faulkner, D. J., Ph.D.	Assistant 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.	Assistant Professor	SIO
Gilbert, J. Freeman, Ph.D.	Professor	SIO
Goldberg, Edward D., Ph.D.	Professor	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.	Associate 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
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
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.	Associate Professor	SIO
Nierenberg, William A., Ph.D.	Professor, Director of the Institution Physics	
Parker, Robert L., Ph.D.	Associate Professor	SIO
Peterson, Melvin N. A., Ph.D.	Associate Professor	SIO
Phleger, Fred B Ph.D.	Professor	SIO
Raitt, Russell W., Ph.D.	Professor	SIO
Rakestraw, Norris W., Ph.D.	Professor Emeritus	SIO
Revelle, Roger R., Ph.D.	Professor Emeritus, 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	SIO
Van Atta, Charles W., Ph.D.	Associate 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

Courses, Curricula and Programs of Instruction

Anthropology

OFFICE: 8012 Humanities and Social Sciences Building

Professors:
F. G. Bailey, Ph.D.
Roy G. D'Andrade, Ph.D.
Robert I. Levy, M.D.
Gananath Obeyesekere, Ph.D.
Theodore Schwartz, Ph.D.
Melford E. Spiro, Ph.D.
Marc J. Swartz, Ph.D. *(Chairman)*

Associate Professor:
David K. Jordan, Ph.D.

Assistant Professors:
Joyce E. Justus, Ph.D.
Donald Tuzin, Ph.D.

* * *

The Department of Anthropology offers an undergraduate major program, and a graduate program leading to the Ph.D. The Department concentrates on cultural, psychological, and social anthropology. Within these areas, the present emphasis is placed on stability, change, and conflict in cultural, social, and personality systems. Courses are offered in a wide variety of topics, examined within a comparative perspective, using materials from a variety of culture areas, especially (in the present phase of the Department's development) from Sub-Saharan Africa, Asia, the Caribbean, Europe, and Oceania.

Lower Division Lower-division offerings in anthropology are concentrated in two three-quarter introductory sequences, given in different years, and numbered AN 22-23-24 and AN 22-24-25. Both sequences 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 socieities, and both meet the Muir College option in Social Sciences. In addition, courses in the sequence or in combination with other lower-division anthropology offerings may be used to fulfill the Social Science requirement in Revelle College or may be applied to a Revelle minor in anthropology. The 22-23-24 sequence focuses more intensively upon varieties of social structure and on social change, while the 22-24-25 sequence uses the final quarter to present comparative evidence from non-human primatology.

Until Spring Quarter 1972, a one-quarter introduction numbered Anthropology 20 was offered. That course has been discontinued at least temporarily. Students who have already taken Anthropology 20 will not receive academic credit for Anthropology 22. Effective Fall Quarter 1971, students who have already completed Anthropology 105, 106 and 107 may not receive academic credit for Anthropology 20, 22, 23, or 24.

The Major To receive a degree of A.B. with a major in anthropology, the student must meet the requirements of Revelle, Muir, or Third 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. (For students who have declared a major in anthropology prior to January 1, 1970, up to four of these 12 courses may be taken in other departments with the ***prior*** approval of an anthropology undergraduate adviser. This approval must be ***in writing*** in the student's file in the departmental office. Forms for such permission are available from the undergraduate advisers.)
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

(The prerequisite to this series is Anthropology 20 or 22. Note that, effective Fall Quarter, 1971, students who have already completed Anthropology 105, 106, and 107 may not receive academic credit for Anthropology 20, 22, 23, or 24.)

3. Beginning Fall Quarter, 1972, no courses taken in fulfillment of the above requirements may be taken on a pass/not pass (P/NP) basis. (An exception is made for some courses accepted from other schools or from concurrent registration credits from University Extension. 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.)
4. Not more than two Special Studies courses (197, 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.

The Graduate Program The Department of Anthropology provides broad training in social, cultural and psychological anthropology. The aim of the graduate program is to train students in that range of theory and method necessary for the study of human communities in their cultural, social, and psychological aspects, and in their interrelationships. Consistent with this aim, our program stresses a broad approach to social behavior, social, cultural and personality organization, and systems of human thought.

Degree Program For Ph.D. candidacy, the Department requires no fewer than three continuous quarters of residence (with a minimum registration of six units — or two courses per quarter), and an additional and subsequent six courses (typically requiring an additional academic year) exclusive of T.A. or R.A. credit. The Department also requires demonstration of competence in a scholarly language other than English. (See Plan A, below, for language requirement.) With respect to subject matter, the Department stipulates that students must complete the following minimal schedule of requirements, if they have not already had their equivalents, before being advanced to Ph.D. candidacy:

1. three quarters of Systems (Anthropology 205, 206, 207);
2. three quarters of Research Seminar (Anthropology 208, 209, 210);
3. requirements under Plan A or Plan B, described below, and
4. six other, elective courses.

Additional courses may be required, depending upon the needs and special interests of particular students. Any courses taken outside the Department of Anthropology (including courses required by Departmental regulations) must be approved by the student's adviser. Departmental requirements may be reduced in view of substantial previous anthropological training (normally equivalent to one year of training in anthropology). Students entering with a B.A. in anthropology can typically expect to spend a minimum of two years in residence prior to advancement to candidacy; those entering with an M.A. in anthropology can typically expect to spend a minimum of one year. In either case, the student will be advanced to Ph.D. candidacy when the student has completed his/her Qualifying Exam (see below), the above-mentioned Departmental requirements, and the minimum residence of no fewer than three continuous quarters.

Requirement Plans A and B The Plan A and Plan B requirements mentioned above 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 times as he/she receives approval for his/her project under Plan B, as described below.

Plan A consists of one quarter of linguistics*, successful completion of examination at a prescribed level in a scholarly language, and successful completion of the department's statistics examination**. Every student must have the prior approval of his Departmental Committee for the language on which he/she wishes to be examined. Students submitting French, German, Russian, or Spanish for examination will take standardized Educational Testing Service Tests administered several times a year through the Registrar's Office. A passing score is 500. Students submitting other languages for examination will be examined by the Linguistics Department so long as personnel are available to administer the

test. All tests are based on reading knowledge only.

A student who elects Plan B will advise his/her Departmental Committee in writing of an intellectual skill which the student needs for research work and of a very precise procedure for acquiring that skill, including a standard of performance by means of which the committee can establish that the student has or has not acquired the skill. This proposal, after approval by the student's Departmental Committee, will be presented to the faculty as a whole. If the faculty approves the project, the student may substitute successful completion of this plan for Plan A, described above.

* A number of options are provided each year in the Department of Linguistics. Consult the Graduate Adviser for details.

** Students entering prior to Fall, 1974 may fulfill this requirement by successful completion of one quarter of statistics or of Anthropology 212. The level of competence required to pass the statistics examination is approximately that of one quarter of introductory statistics for use in social-science research.

Progression to the Degree The first year: This period is devoted to general studies in anthropology, including the Systems sequence (Anthropology 205, 206, 207), and the Research sequence (Anthropology 208, 209, 210).

At the end of the first year the student will stand for a written General Examination covering the materials presented in the Research and Systems sequences. The examination will be prepared by the instructors of the Research and Systems courses and will be read by the entire faculty. The results of this examination, together with the competence displayed in the student's course work, will determine whether the student will be permitted to proceed with the doctoral program.

Assuming satisfactory progress in the degree program and adequate fulfillment of academic responsibility, the student will continue with the doctoral program after this point, although he/she may be required to repeat some subsequent work.

The second year: Normally early in the second year the student, in consultation with the Graduate Adviser, will select a Departmental Adviser in consultation with whom the student will form his/her Departmental Committee somewhat later in the year. (See below: ***Student's Committees.***) Under the supervision of the Departmental Committee, and following a time schedule agreed upon with them, the student will prepare a written research proposal.

The research proposal will set forth a specific research project (normally involving field work). At a time to be determined in consultation with the Departmental Committee, the student will stand for an ***Oral Qualifying Examination*** before his/her Doctoral Committee, accompanied by other members of faculty attending optionally. (See below: ***Student's Committees.***) This examination will question the student over general areas of anthropology related to the specific issues raised by his/her research proposal. The proposal presentation will typically occur during the third year. The ***Oral Qualifying Examination*** may be taken several times as may be necessary to attain the required level of success.

Upon completion of the research project the student will write a dissertation. He/she 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, all students are required to participate in the teaching activities of the Department at least one quarter a year in every year of residence.

Student's Committees During their first year of residence, students will normally discuss their training and consult with the Graduate Adviser. During the second year the student will choose a Departmental Adviser, and then a Departmental Committee consisting of his/her adviser as committee chairman and at least two other faculty members. Typically all three members will be from the Anthropology Department. The Departmental Committee will be the student's primary advisory group.

In addition, each student will have a Doctoral Committee which will serve as an examining board and be responsible for conducting the Oral Qualifying Examination and the Dissertation Orals. The Doctoral

Committee will consist of five or more members, normally including the student's Departmental Committee and two members from outside the Department.

Courses

Lower Division

7. The Individual and Culture (4)
Anthropological perspectives on the effects of various socio-cultural contexts on individual experience. The emphasis will be on data from non-Western and technologically simple societies. (Not to be offered 1974-1975)

12. Chinese Society and Culture (4)
A description and interpretation of the major institutions and culture patterns of traditional China. (Not to be offered 1974-75)

15. Society and Culture in West Africa (4)
An introduction to West Africa, with particular emphasis on the role of pre-existing society and cultures in the emergence and development of the modern African States. (Not to be offered 1974-75)

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. Not open to students who have completed Anthropology 20.

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. *Prerequisites: Anthropology 20 or 22 or introductory anthropology at another university.*

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. *Prerequisites: Anthropology 23 or introductory anthropology at another university.*

25. Man's Place in Nature (4)
A consideration of research on primates in relation to functional requirements and structural features of human groups. This will include a review of problems in human evolution. *Prerequisites: Anthropology 20 or 22 or introductory anthropology at another university.*

Upper Division

103. Problems in Chinese Ethnology (4)
Course will consider a different general area of the ethnology of China each year. In 1972-73 the focus was on the analysis of the Chinese family. In 1973-74 the focus was on the analysis of Chinese folk religion. In 1974-75 the focus will be on Chinese personality. *Prerequisite: Anthropology 12, or 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 20, 23, or 24 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. *Prerequisites: Anthropology 20, 22, 23, 24, 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 20 or 22, or 105; and 106.*

108. Psychological Aspects of Modernization (4)
A consideration of the experiences of individuals undergoing modernization. Emphasis is on working through life-history materials that reveal the fantasies, symbols, ideologies, mental illnesses, and cultural movements of individuals experiencing modernization in varied societies. *Prerequisite: Anthropology 20, 22, 23, or 24 or introductory anthropology at another university; major in anthropology; Anthropology 105, 106, 107; and senior standing. (Not to be offered 1974-75.)*

109. Political Anthropology (4)
A critical evaluation of the major anthropological works on political behavior and political systems with an emphasis on establishing more adequate means for understanding the dynamics of politics as seen at the local level. *Prerequisite: Anthropology 105 or permission of the instructor.* (Not to be offered 1974-75.)

112. Formal Methods in Anthropology (4)
An introduction to the use of formal methods in anthropology. Applications of probability theory, set theory, and statistics to the analysis of cultural and social data will be presented. *Prerequisites: Anthropology 20, 22, 23, or 24 or introductory anthropology at another university; upper-division standing; Anthropology 105, 106, 107.*

113. Evolution of Consciousness (4)
A survey of stages in the evolution of society and of such forms of consciousness as religion, the arts, and ideology. Writings considered include those of Durkheim, Erikson, Levi-Strauss, and Weber. *Prerequisite: Anthropology 20, 22, 23 or 24 or introductory anthropology at another university.* (Not to be offered 1974-75.)

114. Family, Childhood and Society (4)
A comparative and analytic study of the relationship between family structure and childhood experience, and their effects on social and cultural systems. *Prerequisite: Anthropology 107 or equivalent.* (Not to be offered 1974-75.)

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. *Prerequisites: AN 22 or 23 or 24 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 perspectives 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. *Prerequisites: AN 20, 22, 23, or 24 or introductory anthropology at another university.*

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 20, 22, 23, or 24 or introductory anthropology at another university.*

119. Social and Cultural Change (4)
Theories of social evolution, diffusion, acculturation, pat-

tern dynamics, innovation, revitalization and revolution, and modernization are examined, and illustrated with cross-cultural materials. ***Prerequisites: Anthropology 22 or 23 and upper-division standing.*** (Not to be offered 1974-75.)

120. Buddhism and Society (4)
Buddhism as an ideology and an institution in relationship to the society, culture, and personality in which it is found. ***Prerequisites: upper-division standing; major in social science or humanities.***

124. Sex and Culture (4)
This course will review and analyze the effect of culture, culture norms and taboos on human sexual behavior as well as the role of sex in culture, social organization and the psychocultural development of individuals. ***Prerequisites: one lower-division course in anthropology and at least one upper-division course in anthropology.*** (Not to be offered 1974-75.)

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. (Not to be offered 1974-75.)

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. (Not to be offered 1974-75.)

131. Social Theory (4)
The course will deal with the social theories of some major figures in social science: Marx, Weber, Pareto, Simmel, Durkhena, G. H. Mead. Their relevance for current theory will be discussed in detail. ***Prerequisites: Anthropology 20, 22, 23, or 24 or introductory anthropology at another university; Anthropology 105, 106, 107; major in anthropology; senior standing,*** **and** ***permission of instructor.***

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 1974-75.)

134. The Cultural Analysis of American Behavior (4)
Selected topics, such as kinship, sex roles, occupational goals, and medical practices, as culturally learned propositional systems. Social and individual functions of these propositional systems also will be considered. ***Prerequisite: Anthropology 20, 22, 23 or 24 or introductory anthropology at another univeristy.*** (Not to be offered 1974-75.)

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 structures which have developed in that area. ***Prerequisites: Anthropology 20, 22, 23, or introductory anthropology at another university.*** (Not to be offered 1974-75.)

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 105, 106, 107; upper division standing.***

142. Interaction of Social Structure, Culture and Personality (4)
This seminar will consider the relationship between social, cultural and personality (especially motivational) forces. The emphasis will be on examining how motives are harnessed by existing social and cultural content and structures rather than on how the latter produce the former. ***Prerequisites: AN 20, 22, 23, or 24 or introductory anthropology at another university; AN 105-106-107; senior standing; major in anthropology.***

143. Education and Society (4)
An examination of the evolution of the school as an institution in non-Western society, with special emphasis on the role of the school as a culture-transmitting agency. ***Prerequisite: Anthropology 20, 22, 23, 24, or introductory anthropology at another university or consent of instructor.*** (Not to be offered 1974-75)

144. Arts of North American Indians (4)
A consideration of the artistic work of the indigenous people of North America. (Not to be offered 1974-75)

145. Arts of Southwestern Indians (4)
A consideration of the artistic work of the indigenous people of the Southwest.

146. Arts of Middle America (4)
A consideration of the artistic work of the indigenous people of Middle America. (Not to be offered 1974-75)

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. ***Prerequisites: AN 20, 22, 23, 24 or introductory anthropology at another university.*** (Not to be offered 1974-75.)

148. Arts of Mexico: Ancient and Modern (4)
A considerideration of ancient and modern art in Mexico.

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. ***Prerequisites: AN 20, 22, 23, or 24 or introductory anthropology at another university.***

150. Himalayan Ethnography (4)
This course studies the history, ecology, and ethnography of the peoples of the Himalayan region. Material will be presented from a psychosocial perspective. ***Prerequisites: AN 20, 22, 23, or 24 or introductory anthropology at another university.***

151. Seminar in Political Anthropology (4)
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: upper-division standing, permission of instructor.*** (Not to be offered 1974-75.)

152. Primate Sociology (4)
A comparative examination of the social arrangements of free-living apes and monkeys and the importance of this examination for understanding human society. ***Prerequisites: AN 22, 23, or 24 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: AN 22 (or equivalent).*

157. Culture, Deviance, and Psychopathology (4)
A consideration of variations in definitions of, responses towards, and variation and frequency and form of deviant behavior and psychopathology in various cultural contexts. *Prerequisite: Anthropology 7 or 20 or 22.* (Not to be offered 1974-75.)

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. *Prerequisites: anthropology major; Anthropology 105, 106 and 107.* (Not to be offered 1974-75.)

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 (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 1974-75.)

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. *Prerequisites: graduate standing in anthropology or consent of instructor.* (Not to be offered 1974-75.)

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.*

208. Methodological Foundations of Anthropological Research (1-6)
This is the first quarter of a three-quarter required sequence in research methods in anthropology. It explores the theoretical and logical foundations of anthropological research with special attention to research design and problems of explanation. *Prerequisite: graduate standing in anthropology.*

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. This course is part of the three-quarter sequence in methodology in anthropology. *Prerequisite: graduate standing in anthropology.*

210 Research Seminar (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. Techniques of Formal Analysis (3)
Application of formal methods in the analysis of anthropological data. Examples involving mathematical analysis and computer simulation will be presented. *Prerequisites: graduate standing in anthropology; a basic course in statistics and computer science or consent of instructor.* (Not to be offered 1974-75.)

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 1974-75.)

214. Family, Childhood and Society (3)
A comparative and analytic study of the relationship between family structure and childhood experience, and their effects on social and cultural systems. *Prerequisites: AN 207 or equivalent.* (Not to be offered 1974-75.)

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.

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.*

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 1974-75.)

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 1974-75.)

226. Research 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 relating to cognition, personality and psychopathology. *Prerequisite: interview with instructor.*

227. Seminar in Methods and Psychosocial Theory (3)
This course deals with the relation between data-gathering and psychological perspective on social experience. *Prerequisites: 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 and family are brought to bear on family problems by different members of the group. ***Prerequisites: graduate standing in anthropology or permission of instructor.***

230. Aspects of Conflict and Unrest (3)
(Satisfactory/Unsatisfactory grades only.)

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.***

234. The Cultural Analysis of American Behavior (3)
Covers a range of topics in American culture focusing primarily on shared propositional systems. Research using informants will be required. (Not to be offered 1974-75.)

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.

241. Religion and Society (3)
A structural-functional analysis of relgious 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.***

243. Education and Society (3)
A structural-functional analysis of education with particular emphasis on the role of education in the processes of modernization and development. ***Prerequisites: Anthropology 205, 206.*** (Not to be offered 1974-75.)

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.

250. Peoples of the Himalaya (3)
An advanced consideration of the applications of social and psychological theory to ethnographic materials deriving from the Himalayan region. Studies in religion, socialization, and social functioning will be emphasized.

251. Conflict and Collusion: Some Theories 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 sicence.*** (Not to be offered 1974-75.)

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 1974-75.)

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 anthrolopogy.*** (Not to be offered 1974-75.)

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 his 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)
(Satisfacotry/Unsatisfactory grades permitted.)

299. Thesis Research (1-12)
Prerequisite: Ph.D. candidate. (Satisfatory/Unsatisfatory 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 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 required is equivalent to the duties expected of a 0.25 Teaching Assistant for three academic quarters. Enrollment for two units in this course documents the requirement for each quarter. (Satisfactory/Unsatisfactory grades only.)

Applied Mechanics and Engineering Sciences

OFFICE: 5202 Urey Hall

Professors:

* H. Bradner, Ph.D.
A. T. Ellis, Ph.D.
** A. Fronek, M.D., Ph.D.
Y. C. Fung, Ph.D.
P. A. Libby, Ph.D. ***(Chairman)***
•• 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, Ph.D.
•• R. E. Roberson, Ph.D.
A. M. Schneider, Sc.D.
F. A. Williams, Ph.D.
B. W. Zweifach, Ph.D.

Associate Professors:

C. H. Gibson, Ph.D.
G. A. Hegemier, Ph.D.
M. Intaglietta, Ph.D.
D. R. Miller, Ph.D.
R. F. Pawula, Ph.D.
S. Rand, Ph.D.
C. W. Van Atta, Ph.D.

* On leave Spring 1975
** On leave Winter and Spring 1975
• On leave 1974-1975
•• On leave Fall 1974

* * *

W. B. Bush, Ph.D., *Research Engineer*
F. H. Champagne, Ph.D., *Associate Research Engineer and Lecturer*
J. M. Covell, M.D., *Associate Professor of Medicine and Bioengineering.*
M. P. Felix, Ph.D., *Assistant Research Engineer and Lecturer*
D. L. Franklin, *Associate Professor of Medicine and Bioengineering in Residence*
C. A. Friehe, Ph.D., *Assistant Research Engineer and Lecturer*
J. T. Howe, Ph.D., *Adjunct Professor of Nuclear Engineering*
K. Fronek, M.D., Ph.D., *Associate Research Engineer and Lecturer*
J. C. LaRue, Ph.D., *Assistant Research Engineer and Lecturer*
S. S. Lin, Ph.D., *Assistant Research Engineer*
S. Nellis, Ph.D., *Assistant Research Engineer.*
J. G. Pinto, Ph.D., *Assistant Research Engineer and Lecturer*
P. Sepri, Ph.D., *Assistant Research Engineer*
K.G.P. Sulzmann, Ph.D., *Research Engineer and Lecturer*
C. P. Wang, Ph.D., *Adjunct Associate Professor*
J. B. West, M.D., Ph.D., *Professor Medicine and Bioengineering*
M.R.-T. Yen, Ph.D., *Assistant Research Bioengineer*

* * *

The current instructional and research programs emphasize bioengineering, gas dynamics, 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, and Chemistry, 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 The Department of Applied Mechanics and Engineering Sciences offers programs of study at the upper-division level* leading to the degree Bachelor of Arts (Applied Science). These programs emphasize engineering science and thus provide basic training for engineers in aero-space, civil and mechanical engineering, systems engineering, and bioengineering.

All AMES graduates 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 which 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.

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 synthesis of complex and broad engineering, physical, and social systems, e.g. as they arise in industry, governmental agencies, and hospitals. The Bioengineering program prepares the student either for the engineering aspects of medical care and/or research or for professional training in medical school.

More flexible undergraduate programs can be arranged, but deviations from any program requirements listed below require approval by the AMES faculty adviser and also, upon petition, by the AMES Department Chairman.

All students who expect to major in one of the AMES programs are strongly advised to take Mathematics 2D and 2E in their sophomore year. Preparation for an AMES major is completion of the Revelle Natural Science sequence or Muir Science 3A-3B and Science 4A-4B-4C. 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.

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. Students are strongly advised to demonstrate this competence by completing APIS 13A; 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, non-credit programming course, computational experience in connection with a laboratory project, or self-study.

As a minimum graduation requirement, a student qualifying for a major in AMES must pass 18 upper-division courses. Normally, nine of these courses must be in the AMES Department (or in Biology or Chemistry, in the case of Bioengineering). The requirement of nine AMES courses is satisfied by the required courses in each regular AMES undergraduate program. The remainder of the 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 Applied Physics and Information Science, Biology, Chemistry, Mathematics and Physics.

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.

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 such 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 a form available from the departmental office for this purpose.

To fulfill the departmental scholastic requirement, the grade-point average for the 18-course, minimum graduation requirement must be at least 2.0.

AMES offers several minors for Fourth College students. In collaboration with the Department of physics, a minor for non-science students entitled Scientific Perspective 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 offered.

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.

* 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.

Applied Mechanics Program A student following the Applied Mechanics program is required to take a coordinated group of eight courses in fluid dynamics (AMES 101A-101B), solid mechanics and structures (AMES 130A-130B), particle and rigid-body dynamics (AMES 121A), thermodynamics (AMES 110), linear systems analysis (AMES 163A), and problem solving methodology in applied mechanics (AMES 105A-105B-105C). The Applied Mechanics program also requires four more advanced courses, normally AMES 101C, 130C, 121B, and 150B, although students with special interests may substitute alternative courses by petition.

Electives to fulfill minimum graduation requirements are to be chosen from among the list of Technical Electives shown below. Superior students are encouraged to supplement the minimum program with additional technical electives. Electives are to be chosen in consultation with the AMES faculty adviser. In special cases, the faculty adviser may recommend a program that differs from that scheduled below.

Applied Mechanics

FALL	WINTER	SPRING
Junior Year+		
AMES 105A	AMES 105B	AMES 105C
AMES 130A	AMES 130B	AMES 130C*
AMES 163A	AMES 121A	AMES 121B*
Senior Year		
AMES 101A	AMES 101B	AMES 101C*
AMES 110	AMES 150A	AMES 150B*
Technical Electives		
AMES 100		AMES 111
		AMES 132

AMES 141A	AMES 141B	AMES 141C
AMES 142A	AMES 142B	AMES 142C
AMES 149A	AMES 149B	AMES 149C
AMES 156	AMES 156	AMES 156
AMES 162A	AMES 162B	AMES 162C
	AMES 163B	AMES 163C
	AMES 171	
AMES 170	AMES 172	AMES 173
AMES 180A	AMES 180B	AMES 180C
APIS 101A	APIS 101B	APIS 101C
	APIS 119A	APIS 119B
APIS 161A	APIS 161B	APIS 161C
CHEM 130	CHEM 131	CHEM 132
Math 2E	Math 2E	Math 2E
Math 131A	Math 131B	Math 131C
Math 170A	Math 170B	Math 170C
Math 180A	Math 180B	Math 180C
	Math 181A	Math 181B
Phys. 100A	Phys. 100B	Phys. 100C
Phys. 130A	Phys. 130B	Phys. 130C

+ 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.

* Students may petition to replace any of AMES 101C, 121B, 130C, and 150B by alternative courses approved by the AMES faculty adviser.

** Mathematics 2D if not completed in sophomore year; Mathematics 2E is a recommended elective.

Bioengineering Program A student following the Engineering program in bioengineering is required, during his junior year, to take a one-year sequence in applied mathematics, AMES 105A-105B-105C, and a one-year sequence in mathematics, with applications to biology and physiology, AMES 100, 172, 173. In view of the growing importance of computer science in modern hospitals and in biomedical research, a one-year sequence APIS 161A-161B-161C also is required. A systematic overview of biology, Biology 101, 117, is essential and can be taken during either the junior or senior year. A student planning to take additional electives in biology, such as neurobiology (Biology 121), or an introduction to physiology (Biology 129), should take Biology 101, 117 during his junior year. It is important that bioengineers have a working knowledge of electronic circuits, and AMES 163A-163B-163C is required during the senior year. The elective course AMES 180A-180B-180C, 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. A student's program is to be selected in consultation with his faculty adviser. Students may petition to make certain substitutions in the program where necessary, with approval of the AMES faculty adviser.

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 +		
AMES100	AMES 173	AMES 172
AMES 105A	AMES 105B	AMES 105C
AMES 142A	AMES 142B	AMES 142C
Senior Year		
AMES 163A	AMES 163B	AMES 163C
Biol. 101*		Biol. 117*
Technical Electives		
AMES 101A	AMES 101B	AMES 101C
AMES 110		
AMES 180A	AMES 180B	AMES 180C
	AMES 271B	AMES 271C
APIS 164A	APIS 164B	APIS 164C
Biol. 129	Biol. 121	
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.

* It is suggested that those students who intend to take additional biology electives take Biology 101, 117 in the junior year.

Bioengineering: Premedical

Fall	Winter	Spring
Junior Year +		
AMES 105A*	AMES 105B	AMES 105C
Biol. 101		Biol. 106
Chem. 140A**	Chem. 140B	Biol. 117
Chem. 143A (lab)		
Senior Year		
AMES 100	AMES 173	AMES 172
Biol. 129	Biol. 121	Biol. 123
		or 172
Technical Electives		
AMES 101A	AMES 101B	AMES 101C
AMES 180A	AMES 180B	AMES 180C
		AMES 297
APIS 161A***	APIS 161B	APIS 161C
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 2D, if not completed in sophomore year.

** Natural Science 2F, 2FL

*** APIS 13A is suggested as prerequisite

Systems-Science Program A student following the System Science program is required, in his junior year, to take a one-year sequence, AMES 163A-163B-163C, dealing with linear systems. He is also required to take a one-year sequence, AMES 105A-105B-105C to extend his knowledge of the mathematical tools utilized in AMES 163A-163B-163C. A third sequence dealing with a physical or engineering system also is required. This requirement can be satisfied by the sequence AMES 100, 121A-121B or by APIS 161A-161B-161C. Students may petition to substitute for these sequences with the consent of the AMES faculty adviser.

In the senior year the student completes his study of linear control systems with AMES 141A and undertakes the study of nonlinear systems in AMES 141B. Linear, stochastic control systems are studied in AMES 141C. Preparation for AMES 141C as well as the study of other stochastic systems is provided in AMES 162A-162B-162C.

Graduation requirements are fulfilled with courses from the list of approved technical electives and are to be chosen in consultation with the AMES faculty adviser. Superior students are encouraged to supplement the program with additional technical electives.

Systems Science

Fall	Winter	Spring
Junior Year +		
AMES 100	AMES 121A	AMES 121B
(or APIS 161A)	(or APIS 161B)	(or APIS 161C)
AMES 105A	AMES 105B	AMES 105C
AMES 163A* **	AMES 163B*	AMES 163*
Senior Year		
AMES 141A	AMES 141B	AMES 141C
AMES 162A*	AMES 162B*	AMES 162C*
Technical Electives		
AMES 101A	AMES 101B	AMES 101C
AMES 130A	AMES 130B	AMES 130C
AMES 142A	AMES 142B	AMES 142C
AMES 146A	AMES 146B	AMES 146C
AMES 180A	AMES 180B	AMES 180C
APIS 164A	APIS 164B	APIS 164C
APIS 165	APIS 166	APIS 167
Econ. 100A	Econ. 100B	Econ. 100C
Math. 131A	Math. 131B	Math. 131C
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 courses AMES 162A-162B-162C and AMES 163A-163B-163C are equivalent to APIS 162A-162B-162C and APIS 162A-163B-163C, respectively. Thus, the stated requirements for AMES 162A-162B-162C and AMES 163A-163B-163C are met with satisfactory completion of APIS 162A-162B-162C and APIS 163A-163B-163C.

**Mathematics 2D and 2E, if not completed in the sophomore year.

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.

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.

In addition, an interdepartmental Ph.D. program in Applied Ocean Sciences is offered jointly with the Scripps Institution of Oceanography and Department of Applied Physics and Information Science. All aspects of man's purposeful and useful intervention into the sea are included. Students in this program receive the Ph.D. with specialization in Engineering Physics upon completion of normal departmental requirements and certain other requirements stipulated by an interdepartmental faculty committee. AMES undergraduate students who contemplate graduate work in Applied Ocean Sciences are advised to take physical science and mathematics electives, 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.

Course requirements are left flexible in order to permit the student and his adviser to develop the most beneficial program. 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 15 quarter-units of AMES 200-level courses, not including AMES 205, 206, and 299. Students studying under Plan I also must obtain credit for six units of AMES 299 (research). 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.

Doctor's 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 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 consisting of four or more AMES faculty members, appointed by the Department Chairman on the basis of nominations made by the student's adviser. To insure the breadth required of a Ph.D. candidate, the committee normally examines the student in four areas of specialization within engineering science.

After satisfactory completion of the de-

partmental 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. A student is expected to master whatever language is needed for the pursuit of his own research.

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 examination and have advanced to candidacy are awarded the Candidate in Philosophy Degree. (See *Graduate Studies: Candidate in Philosophy Degree.*)

Courses

Lower Division

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. *Prerequisites: none.*

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 citizen. *Prerequisites: none.* (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 economic impacts. *Prerequisites: none.* (S)

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 Division

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 conditions. Four hours lecture. *Prerequisites: completion of the Natural Sciences Sequence or Science Sequence, co-registration of AMES 105A.* Mr. Fung (F)

101A. Fluid Mechanics I (4)
Hydrostatistics with applications to submerged surfaces and structure of atmospheres. Elements of viscous flows. The Bernoulli equation and its extension and applications. Four hours lecture. *Prerequisites: AMES 105B or equivalent mathematics; AMES 110 or co-registration or equivalent thermodynamics.* (F)

101B. Fluid Mechanics II (4)
Momentum theorems, similitude, elements of potential flow, and compressible flow including shock waves. Generalized one-dimensional flow. Four hours lecture. *Prerequisites: AMES 101A.* (W)

101C. Fluid Mechanics III (4)
Viscous flows and boundary layers. Transport phenomena. Heat and mass transfer. Four hours lecture. *Prerequisites: AMES 101B.* (S)

105A-105B-105C. 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)*

110. Thermodynamics I (4)
First and second laws and selected applications, e.g., thermochemistry, heat capacities and heats of reaction, engine cycles, etc. Four hours lecture. *Prerequisite: junior standing, or consent of instructor.* (F)

111. Thermodynamics II (4)
Extension of 110, 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 110, 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 demonstrations. *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. Ex-

tremum 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: Mathematics 2E, AMES 130A, 130B.*

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 multiple-input, multiple-output systems. *Prerequisite: AMES 163C.* (F)

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-163B-163C.* (W)

141C. Introduction to Stochastic Control Systems (4)
Stochastic state models, minimal variance control strategies, prediction and filtering theory, spectral factorization, stochastic linear regulator problem, separation theorem. *Prerequisites: AMES 162A, AMES 141A.* (S)

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-C and APIS 13A, or consent of instructor.* (F)

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 142A.* (W)

142C. Computer Methods in Enginnering Science (4)
Digital simulation of one or more realistic, complex physical systems. This portion of the course has a project format. *Prerequisites: AMES 142A-142B.* (S)

146A-146B-146C. 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 applicatons. *Prerequisites: Mathematics 2E, AMES 105A.* (F,W,S)

149A-149B-149C. Air Pollution (4-4-4)
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. *Prerequisites: Mathematics 2A-2B-2C-2D; any five quarter courses in engineering, physical or biological sciences, upper- or lower-division.*

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. *Prerequisite: 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 applicaton to spacecraft and gyroscopic devices. Four hours lecture. *Prerequisite: Consent of instructor.*

160. Quantitive Studies of Environmental and Social Problems (4)
A course of lectures designed to acquaint undergraduates with factual information on important contemporary issues. Three hours lecture. *Prerequisite: junior standing.*

162A-162B-162C. 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-163B-163C. 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-110B, 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)

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, and other tissues. Mechanics of organs such as the heart, the lung, the arteries, kidney, ureters, microscopic blood vessels, etc. Injury, prosthesis, and compatibility. *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)

180A. Principles of Bioengineering (4)
Principles of biomedical instrumentation. Electrical properties of smooth, skeletal, and cardiac muscle cells. Nervous control. Invivo 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. ***Prerequities: 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.***

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)
All graduate students in AMES are expected to attend the bi-weekly departmental research conference. On alternate weeks, all graduate students should attend a departmental seminar of their choice dealing with current topics in fluid mechanics, solid mechanics, bioengineering, or systems science. (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-210B-210C. 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.***

211C. Propulsion: Nuclear and Electric (3)
Principles of nuclear, electrothermal, electrostatic and electromagnetic propulsion; high-temperature gas flows; electromagnetic momentum and energy equations, Ohm's Law; applications to electric thrusters. ***Prerequisites: AMES 211B, undergraduate electricity and magnetism; or consent of instructor.***

220A. Physical Gas Dynamics (3)
Kinetic theory of neutral gasses; transport properties; principles and applications of statistical mechanics. ***Prerequisites: AMES 210A-210B-210C, 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-130B, or consent of instructor.***

220C. Physical Gas Dynamics (3)
Shock waves and detonation waves; explosions and hypersonic flow; experimental methods in high-temeperature gasses; shock tubes; atomic and molecular beams; selected topics such as chemical reactions and relaxation processes in turbulent flow interaction of radiation with ionized gasses and gas lasers. ***Prerequisite: AMES 220B, or consent of instructor.***

221A. Opacity Calculations (3)
Basic laws for radiant-energy emission from gasses, liquids, and solids; spectral absorption coefficients, line shapes, curves of growth, theoretical and experimental methods for estimating opacities of uniform and non-uniform gasses. ***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 gasses; nonstationary problems. ***Prerequisite: AMES 221A, or consent of instructor.***

221C. Radiation Gas Dynamics (3)
Conservation equations of gas dynamics including a radiation field. The effect of radiative transfer on acoustic waves, shock-wave structure, and boundary layers; radiative cooling in the shock layers of high-velocity re-entry vehicles; radiative transfer effects on convection and turbulence. ***Prerequisite: AMES 221B, or consent of instructor.***

222A-222B-222C. Advanced Fluid Mechanics (3-3-3)
Contemporary problems in broad areas of fluid mechanics, e.g., surface waves, hydrodynamic stability, boundary layers with mass and heat transfer, turbulent-flow theory, multiphase systems, hypersonic-flow theory, shock-wave structure, theory of reacting flows, etc. ***Prerequisites: AMES 210A-210B-210C, 211A-211B-211C, AMES 105A-B-C or consent of instructor.*** (F,W,S)

224A-B-C. Reactive Gas Dynamics: Combustion (3-3-3)
This course covers fundamental aspects of flows of reactive gasses, 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. Not offered every year. (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-220B-220C or equivalent.*** (Satisfactory/Unsatisfactory grades permited.) (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 220A-220B-220C 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: 220A-220B-220C or equivalent.*** (Satisfactory/Unsatisfactory grades permitted.) (S)

231A. Foundations of Solid Mechanics (3)
Cartesian tensors; specification of stress, instantaneous motion, and infinitesimal strain; conservation principles; typical constitutive equations; specification of finite strain. ***Prerequisite: AMES 130B, or consent of instructor.***

231B. Elasticity (3)

Basic field equations; typical boundary value problems; uniqueness of solutions; torsion, flexure, and other simple problems; variational principles. *Prerequisite: 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. Advanced Elasticity (3)
Two-dimensional problems and complex variable methods; fundamentals of plate theory; application of potential theory to some three-dimensional problems; elastic waves, problems involving finite deformations. *Prerequisite: AMES 231B, or consent of instructor.*

233B. Advanced Plasticity (3)
Classification of plastic solids; behavior of plastic structures; limit analysis; plastic design and optimization; finite plastic deformation; application to technological forming processes; dynamic problems. *Prerequisite: AMES 231C, or consent of instructor.*

233C. Advanced Viscoelasticity (3)
Stress analysis problems for mixed and moving boundary conditions; temperature effect and irreversible thermodynamics; creep buckling; wave propagation; nonlinear constitutive equations. *Prerequisite: AMES 231C, 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 gages, 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-235B. 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 revolution; shallow shells; selected static and dynamic problems; survey of recent advances. *Prerequisites: 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. Vibrations of Structures (3)
Free and forced vibration of structural elements; frequency analysis; aeroelasticity and flutter analyses of wings, panels, shells. *Prerequisites: AMES 210A and 233C, 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. *Prerequisites: AMES 231A-231B-231C, or consent of instructor.*

246A-246B-246C. 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-248B-248C. 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. *Prerequisities: 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, Mathematics 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-264B. 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, electrophysiology of heart, pulse waves, descriptions 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, cardiopulmonary reflexes, and integrative action of nervous system on the pulmonary and respiratory system. ***Prerequisite: consent of instructor*** (S)

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 272, and knowledge in applied mathematics and the mechanics of fluids and solids with a minimum at the level of AMES 100, AMES 101A-101B-101C, 130A-130B, AMES 105A-B-C.*** (S)

279. Selected Topics in Biophysics (3)
Selected topics in biophysics with emphasis on the structure and function of biological membrane, electron and ion transport, excited states, wave propagation, muscle contraction, and photosynthesis. ***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-101B-101C, 130A-130B, AMES 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-271B-271C.*** (Satisfactory/Unsatisfactory grade only.) (W)

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.*** (Not offered every year.)

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

OFFICE: 3216 Applied Physics and Mathematics Building

Professors:
Hannes Alfvén, Ph.D.
Victor C. Anderson, Ph.D. *(Chairman)*
* W. Ian Axford, Ph.D.
Henry G. Booker, Ph.D.
Kenneth L. Bowles, Ph.D.
Jules A. Fejer, D.Sc.
Carl W. Helstrom, Ph.D.
Manuel Rotenberg, Ph.D.
Victor H. Rumsey, D.Eng., D.Sc.

Associate Professors:
Peter M. Banks, 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.
Sing H. Lee, Ph.D. *(Acting)*

Assistant Professors:
Walter A. Burkhard, Ph.D.
William A. Coles, Ph.D.
Walter J. Savitch, Ph.D.

* * *

Associated Faculty:
Gustaf O. S. Arrhenius, Ph.D., *Professor, Scripps Institution of Oceanography*
Seibert Q. Duntley, Sc.D., *Professor, Scripps Institution of Oceanography*

Lecturers:
Joe R. Doupnik, Ph.D.
Timothy H. Hankins, Ph.D.
Adolf W. Lohman, Ph.D.
D. Asoka Mendis, Ph.D.
* On leave 1974-75

* * *

The Major Programs For Undergraduates The four-year B.A. degrees prepare students for employment or graduate study in applied physics, computer science, and information science, as well as in the traditional electrical engineering fields. Junior college graduates may enter the programs as junior-year students, and generally are able to receive the B.A. degree after two years of study at UCSD.

More specifically, the B.A. program provides preparation for employment areas such as the following: application of computers to engineering, to information retrieval and to other sciences; compiler design, analysis of algorithms, computer architecture, operating systems, programming languages and artificial intelligence; laser development and applications, holography; radar and communications engineering, microwaves, ionospheric studies, plasma physics, radio astronomy, space science; optical and acoustic information processing, sensing the state of the atmosphere and the sea by acoustic, radio and optical waves; microscopy; materials science, crystals, semiconductors and superconductors.

Courses of study are flexible enough to allow individual programs that may involve a combination of the fields that make up the departmental program. For example, programs marked + in what follows are common to Applied Physics and to Information Science. APIS 13A 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 164A-B-C and APIS 175-B. A grade of C or higher is required in all courses included in the major program.

The department invites junior-year students to petition for direct admission to the graduate division so that they may complete a master's degree within one year of the bachelor's degree.

The Major Program in Applied Physics The required lower-division courses are Mathematics 2A-2B-2C-2D-2E and Science 4A-4B-4C-4F, and Natural Science 2C for Muir College students, or Natural Science 2A-2B-2C-2D-2DL and Science 4F for Revelle College students, or an equivalent group of science courses for Third and Fourth College students.

A total of 18 upper-division courses must be passed in order to satisfy the requirements for the major program. By making a careful choice of courses, a student may find that it is possible to satisfy many of the APIS graduate requirements in his senior year, and if his eventual aim is to take a Ph.D. he will be able to begin his 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.

Five typical major programs are listed below, each involving APIS 130 and four sequences plus electives which may be chosen from the list that follows. The choice of electives should include one three-course sequence.

Programs

+ Acoustics	APIS 105A-B-C, 140A-B-C, 163A-B-C, 142A-B-C, 130
Electromagnetics	AIS 101A-B-C, 105A-B-C, 140A-B-C, 163A-B-C, 130
+ Electronics	APIS 101A-B-C, 105A-B-C, 163A-B-C, 175A-B, or 164A-B-C, 130
+ Optics	APIS 105A-B-C, 140A-B-C, 141A-B-C, 163A-B-C, 130
Solid State	APIS 101A-B-C, 105A-B-C, 164A-B-C, 115A-B-C, 130

+ In common with the Information Science major

Electives

Any of the courses listed above plus
APIS 110, 120, 162A-B-C
AMES 101A-B-C, 121A-B, 130A-B-C, 180A-B-C
Physics 152

The Major Program in Computer Science The student of computer science follows a course of study concerned with fundamental principles of automatic digital processing systems, particularly those principles which apply to the design and utilization of such systems.

The Major Program in Information Science The required lower-division courses are Mathematics 2A-2B-2C-2D-2E, APIS 13A, APIS 15, and a science sequence. For Muir College students the science sequence is Science 4A-B-C; for Revelle College students, Natural Science 2A-B-C; for Third College students, Science and Technology 15A-B-C; and for Fourth College students, Physics 3A-B-C-D.

A total of 18 upper-division courses must be passed in order to satisfy the requirements for the major program. As early as possible, preferably before the beginning of the junior year, the student must discuss his curriculum with the information-science faculty adviser. Recognizing the varied interests of students, the department permits great latitude in the selection of a major program. The required courses are APIS 105A-B-C, 161A-B-C, 163A-B-C, and 162A-B-C. Math 120, 11A, and 110B may be substituted for APIS 105A-B-C. The four major areas are:

+ **Acoustic signal processing**
APIS 140A-B-C, 142AL-BL-CL, and AMES 101A-B.
Communications
APIS 168A-B-C
+ **Electronics**
APIS 164A-B-C and 175B
+ **Optical Information Processing**
APIS 140A-B-C and 141A-B-C
System Theory
AMES 141A-B-C and AMES 146A-B-C

+ In common with the Applied Physics major

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 142A-B-C
Computer Science	13A-B, 151A, and 161A-B-C
Diffraction Informatics	105A-B-C and 140A-B-C or 140A-B-C and 163A-B-C
Electromagnetics	101A-B-C and 163A-B-C
Electromagnetic waves	101A-B-C and 140A-B-C
Electronics	175A-B and 163A-B-C or 101A-B-C and 163A-B-C or 101A-B-C and 164A-B-C
Optics	140A-B-C and 141A-B-C
Solid State	115A-B-C and 164A-B-C
or	115A-B-C, AMES 110, 111 and PHYS. 152
or	115A-B-C, PHYS 140, 141 and 152

Computing For Students in the Humanities and Social Sciences An introduction to the structure and use of automatic digital computers, especially for humanities students, is provided in APIS 10A, Digital Computers: Programming, and APIS 10B, Digital Computers: Non-Numerical Systems.

A Science Program For Students in the Humanities and Social Sciences APIS 20A-B-C forms a sequence of courses intended to introduce students of the humanities and social sciences to the forms of thought and current concerns of the physical sciences. APIS 20A is a survey of an important aspect of physics ranging from the Greeks to modern times. APIS 20B is a course on the nature of matter, acquainting the student with the microstructure of the physical world. APIS 20C is a descriptive course on the nature of the universe. This sequence is suitable for fulfilling the Muir College general education requirements.

The Graduate Program

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 materials analysis (x-ray techniques, optical and electron microscopy, metallography), and when fully developed will also comprise materials 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.

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 algorithms as well as the design of computer systems, especially compilers, architecture, programming languages, operating systems, and the analysis of algorithms. The Master of Science degree can be a terminal degree; in this case, emphasis may be placed on programming and interdisciplinary studies.

3. Information Science

Information processing is an area in which the department is particularly strong at the present time. Information processing 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. Applcations 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, the Department of Applied Mechanics and Engineering Sciences, 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 electrophysics, 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. In appropriate cases provision will be made for graduate students to take, without credit, undergraduate courses required to make up deficiencies.

Department Requirements and Examinations The requirements for the degree of Master of Science are those stated in the *Graduate Studies* section of the catalog. Both Plans I and II are offered. Normally no financial support is offered to students enrolled in the M.S. program.

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. Information Science: Mathematics 210A-210B-210C, and any two of the three sequences APIS 250-251-252, APIS 260A-260B-260C, and APIS 262A-262B-262C.

   b. applied Physics: AMES 294A-294B-294C, hysics 203A,

APIS 208, Physics 203B, Physics 212A-212B, and APIS 206.

c. Computer Science: APIS 264A-264B-264C, 265A-265B-265C, and Mathematics 210A-210B-210C, or Mathematics 200A-200B-200C.

d. Applied Ocean Science students will have the SIO core courses substituted for one sequence of the APIS departmental core courses.

2. ***Paper Examination:*** This examination is held once a year in the Spring Quarter. 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 about two weeks before the examination.

3. ***Thesis Examination:*** 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 commitee of three faculy memers. The thesis examination is held once a year in the Spring Quarter.

4. ***Criterion 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 the core-courses requirement.

A detailed description of the requirements for the Ph.D. program can be obtained from the department office.

Students who have satisfied these depprtmental graduate requirements may register for any APIS course on a Satisfactory/Unsatisfactory basis.

Dissertation In order to be admitted to the 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 $370 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 and Information Science.

Courses

Lower Division

The Department of Applied Physics and Information Science cooperates in the teaching and administration of the Science 4 sequence for Muir College students. (See course listings: *Science.*)

10A. Digital Computers: Programming (4)
Introduction to digital computers for humanities students. Lectures on history of computation, computer organization and operation, algorithms, flow charts, ALGOL programming. Recitations review special problems and assigned ALGOL programs. Two hours lecture, two hours recitation. (Upper-division students must have consent of instructor.) (A student who has taken APIS 10 may not take APIS 10A for credit. Students will normally take 10A or 13A, but not both.) Mr. Banks and Staff (F,S)

10B. Digital Computers: Non-Numerical Systems (4)
Introduction to system programming aspects. Applications: large information-handling problems in the humanities; computer control. Techniques include lists, strings, disk files. Recitations and homework deal with selected projects in text editing, graphics, data storage and retrieval, simulation, programming language processors. Three hours lecture, one hour recitation. ***Prerequisite: APIS 10A or APIS 13A or consent of instructor. (Upper-division students must have consent of instructor.)*** (A student who has taken APIS 11 may not take APIS 10B for credit.) Staff (W)

13A. 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 procedures, flowcharts; principles of programming languages and computing machines; principles of good programming, structured programming; data structures; ALGOL. Three hours lecture, one hour recitation. (Intended for students who plan to take additional science courses.) Staff (W)

13B. Introduction to Numerical Algorithms (4)
Introduction to elementary numerical analysis with emphasis upon computer applications. Solutions of non-linear equations and sets of linear equations. Matrix operations, interpolation, extrapolation, polynomial fits to data, numerical differentiation and integration, and solution of elementary differential equations. Three hours lecture, one hour recitation. ***Prerequisite: APIS 13A.*** (A student who has taken APIS 12 may not take APIS 13B for credit.) taff (S)

15. 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 13A or equivalent.*** (Not offered in 1974-75. Listed to help students plan for later years.) (W)

20A. 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. Mr. Rickett and Staff (F)

20B. 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 20A or consent of instructor.*** (W)

23. 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. (F)

20C. 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. ***Prerequisites: APIS 20B or consent of instructor.*** Mr. Rickett and Staff (S)

Upper Division

101A. Electromagnetism (4)
Gauss' principle, D,E fields. Electrostatic potential. Divergence, curl. B,H fields. Ampere's law. Similarities and differences between electric and magnetic fields. Biot-Savart law. Displacement current. Electromotance, Faraday's law. Maxwell's equations (free space). Scalar, vector, and Hertzian potentials. Radiation. Three hours lecture, one hour recitation. ***Prerequisite: Nat. Science 2B or Science 4C and Math 2C or consent of instructor.*** Mr. Booker (W)

101B. Electromagnetism (4)
Electromagnetic equations in materials. Boundary conditions. Conductivity, electric and magnetic susceptivity. Real and complex dielectric constants and rerctive indices. Models of conducting materials: plasma, metal, semiconductor. Models of dielectric and magnetic materials: nonpolar and polar dielectrics, diamagnetism, paramagnetism, ferromagnetism. Three hours lecture, one hour recitation. ***Prerequisite: APIS 101A.*** Mr. Booker (S)

101C. Electromagnetism (4)
Electromagnetic energy, energy density. Poynting's vector and theorem. Storage and flow of energy in oscillatory circuits. Resistive reactive, and complex power. Circuit impedance. Storage and flow of energy in oscillatory electromagnetic fields. Complex Poynting vector, field impedance. Relativity. Special problems. Three hours lecture, one hour recitation. ***Prerequisite: APIS 101B.*** Mr. Booker (Not offered in 1974-75. Listed to help students plan for later years.)

M105A-105B-105C. 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, two hours recitation. ***Prerequisites: Science 4A-B-C or equivalent and MATH 2D or equivalent.*** Mr. Fejer (F,W,S)

110. Introductory Statistical Thermodynamics (4)
First and second laws of thermodynamics from the microscopic and macroscopic points of view. The method of the most probable distribution. The ideal gas and equations of state. Small departures from equilibrium. Methods of cooling. The Gibbs and Helmholtz free energy. Transport coefficients Phase transitions. Three hours lecture. ***Prerequisites: Science 4 sequence and Mathematics 2D or consent of instructor.*** Staff (F)

115A-115B-115C. Atomic and Quantum Physics (4-4-4)
The origin of quantum theory, the nuclear atom, particle-wave duality. Schroedinger's equation for simple systems, perturbation theory. Electron spin, Pauli principle, Heisenberg principle. Atomic structure and periodic table. Molecular spectra. Properties of condensed matter, elementary nuclear physics, scattering theory. Three hours lecture. ***Prerequisites: Science4C, APIS 105C.*** Staff(F,W,S)

120. 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.*** Mr. Arrhenius (W)

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.*** Mr. Luo (S)

140A-B-C. Diffraction Informatics (4-4-4)
Elementary wave theory with acoustical, optical and radio applications. Wave equation and Fresnel diffraction. Solution for diffraction patterns by Fourier transformation. Imaging in telescopes and microscopes. Acoustical, optical and radio holography. Theory of information stored in diffraction patterns. Three hours lecture, two hours recitation. ***Prerequisite: concurrent registration in APIS 105A-B-C recommended.*** Mr. Rumsey (F,W,S)

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: 140C or consent of instructor.*** Mr. Lee (F) (Not offered in 1974-75. Listed to help students plan for later years.)

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.*** Mr. Lee (W) (Not offered in 1974-75. Listed to help students plan for later years.)

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.*** Mr. Lee (S) (Not offered in 1974-75. Listed to help students plan for later years.)

142AL-142BL-142CL. Acoustics Laboratory (4-4-4)
Experiments in acoustics. Vibrations and wave 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.*** Mr. Anderson (F,W,S)

151A-151B. Foundations of Computer Science (4-4)
Permutations and combinations; generating functions, recurrence relations; introduction to graph theory; introduction to rings and fields; Polya's theory of counting; predicate calculus; applications to topics in computer science including the design and analysis of algorithms. Three hours lecture. ***Prerequisites: APIS 13A and Math 1B or 2A.*** Mr. Savitch (F,W)

151C. Numerical Algorithms (4)
Computational error, Taylor series, interpolation, solution of equations, numerical integration, 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. ***Prerequisites: APIS 13A and APIS 151B or Math 120.*** Staff (S)

161A-161B-161C. 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; corting; compilers, lexical analysis, symbol tables, context-free grammars, parsing, syntax-directed translation, code optimization. Three hours lecture, two hours recitation. ***Prerequisites: APIS 13A, APIS 15, APIS 151A (may be taken concurrently).*** Mr. Burkhard (F,W,S)

M162A-162B-162C. 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, mean-square filtering. Elements of information theory: entropy, mutual information, channel capacity, coding. Four hours lecture. ***Prerequisite: APIS 163C.*** Mr. Masry (F,W,S)

M163A-163B-163C. 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. ***Prerequisites: Mathematics 2D and 2E; APIS 105A-105B-105C or Mathematics 120, 110A-110B taken concurrently. Mr. Helstrom (F,W,S)***

164A. Semiconductor Physics (4)
Brief review of quantum theory. Crystal lattices and semiconductor crystals. Band theory of solids. Electron and hole statistics. Carrier motion in semiconductors. Theory of p-n junctions. Semiconductor devices related to p-n junction diodes. Three hours lecture. ***Prerequisite: APIS 163C or Physics 101B or consent of instructor.*** (concurrent registration in APIS 175 is recommended.) Mr. Lewak (F)

164B. Electronic Circuits and Systems I (4)
The junction diode, transistor and photocell characteristics and circuit models. Applications in common circuits such as regulated power supplies, digital logic circuits, amplitude modulators, detectors, frequency control circuits, amplifiers, oscillators and light detectors. Three hours lecture. ***Prerequisite: APIS 161A or consent of instructor.*** Mr. Lewak (W)

164C. Electronic Circuits and Systems II (4)
High frequency properties of junction diodes and transistors, lumped circuit models. Switching circuits, high frequency amplifiers, the parametric amplifier. Three hours lecture. ***Prerequisite: APIS 164B or consent of instructor.*** Mr. Lewak (S)

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 151A or MATH 160A or consent of the instructor.*** Mr. Savitch

166. 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.*** (Not offered in 1974-75. Listed to help students plan for later years.)

168A-168B-168C. Digital Communication Systems (4-4-4)
Sampling and reconstruction of continuous-time signals, modulation techniques such as PAM, PCM, PSK, and delta modulation, coherent and noncoherent demodulation. Probability of error and signal-to-noise ratio, timing and quantizing errors, intersymbol interference. Optimum system design, adaptive equalization. Three hours lecture. ***Prerequisite: APIS 162 taken concurrently.*** Mr. Lugannani (F,W,S)

169A. Computer Communications: Basic Techniques (4)
Adapting to the voice network; interchange codes; circuit switching, message store-and-forward, multiplexing; error detection and recovery; use of multidrop lines, communication satellites; initial connection protocols; distributed message queues; problems of standardization, use of virtual devices; network topologies. Three hours lecture. (Not offered in 1974-75. Listed to help students plan for later years.) (F)

169B. Computer Communications: Software and Operation (4)
Network control programs (local and distributed); intertranslation of control languages; protocols for interactive terminals; file transfer, remote job entry, graphics, interprocess communication; controlling unauthorized access; distributed resources: data banks, computers, software, front-end processors. Three hours lecture. ***Prerequisites: APIS 169A, APIS 161A-B-C.*** (W)

169C. Computer Communications: Impact on Society (4)
Biggest U.S. industry; privacy invasion; new structures for government and large organizations; wired city (computers with community television); error control; threat of massive failure to society; national data banks, teleconferences, instant mail delivery; computer terminals in every home and office. Three hours lecture. (Not offered in 1974-75. Listed to help students plan for later years.) (S)

170. Systems Simulation (4)
Topics in discrete and continuous simulation; generation of random numbers, design of experiments; simulation of games, digital systems, networks. Three hours lecture. ***Prerequisites: Math 180A-B or APIS 162A-B, and APIS 13A.*** (Not offered in 1974-75. Listed to help students plan for later years.)

171A. Digital Computer Organization (4)
Principles of computer-system design. Memoryless logic circuits, switching algebra, synthesis techniques, combinational hazards; sequential logic circuits, finite-state machines, synthesis techniques; control networks, synchronous and asynchronous operations, microprogramming; memory, sequential and random access. Three hours lecture. ***Prerequisites: APIS 161A-B-C, APIS 175A.*** (Not offered in 1974-75. Listed to help students plan for later years.) (F)

171B-171C. Digital System Organization (4-4)
Principles of computer operating systems. Batch systems,

multi-programming; procedure implementation; processes, parallelism, critical sections, deadlocks, communication, multiprocessing; multilevel memory management, binding, name management, file systems; protection; resource allocation, scheduling. Three hours lecture. ***Prerequisite: APIS 171A.*** (Not offered in 1974-75. Listed to help students plan for later years.) (W,S)

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.*** Staff (S)

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. ***Prerequisite: consent of instructor.*** Mr. Coles (F)

186. 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 151A or both APIS 13A and Math 160A.*** Mr. Savitch (F)

187. 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. ***Prerequisite: APIS 161C.*** Mr. Savitch (S)

195. Teaching (4-4-4)
Teaching and tutorial activities associated with sources and seminars. Not more than four units of APIS 195 may be used for satisfying graduation requirements. ***Prerequisite: permission of department chairman.*** (Pass/Not Pass grade permitted.) (F,W,S)

197. Field Study in Applied Physics and Information Science (4-8-12-16)
Directed study and research at laboratories and observatories away from the campus. ***Prerequisites: consent of instructor and approval of the department.*** (F,W,S)

198. Directed Group Study (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. Two hours recitation. ***Prerequisite: consent of the instructor.*** (F,W,S)

199. Independent Study for Undergraduates (4)
Independent reading or research by special arrangement with a faculty member. ***Prerequisite: consent of instructor.*** (F,W,S)

Graduate

203A-203B. 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. Three hours lecture. ***Prerequisite: consent of instructor.*** Mr. Dunthey (W,S)

204A. Advanced Acoustics I (3)
Boundary value problems in vibrating systems, wave propagation in strings, bars and plates. Fundamentals of acoustical transducers. ***Prerequisites: APIS 140A-140B-140C.*** (Concurrent registration in 204AL recommended.) Offered in alternate years only. Mr. Anderson (F)

204B. Advanced Acoustics II (3)
Theory of radiation, transmission and scattering of sound with special application to ocean acoustics. ***Prerequisite: APIS 204A or consent of instructor.*** (Concurrent registration in 204BL recommended.) Offered in alternate years only. Mr. Anderson (W)

204C. Advanced Acoustics III (3)
Signal processing in underwater acoustics. Theory and hardware embodiments. ***Prerequisite: 204B or consent of instructor.*** (Concurrent registration in 204CL recommended.) Offered in alternate years only. Mr. Anderson (S)

204AL-204BL-204CL. Advanced Acoustics Laboratory (2-2-2)
Experiments in acoustics complementing the APIS 204A-204B-204C lecture series. ***Prerequisites: concurrent registration in APIS 204A-204B-204C or consent of instructor.*** Offered in alternate years only. (F,W,S)

205A. Optics I (3)
Diffraction and interference, imaging and Fourier transforming with lenses, point-spread and transfer function concepts, space-bandwith product, partial coherence, image processing with coherent and incoherent lights, processing with feedback, nonlinear processing, real-time processing, optical computing and other applications. ***Prerequisite: APIS 140C or consent of instructor.*** Mr. Lee

205B. Optics II (3)
Lasers 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 holography, holographic microscopy, nondestructive testing with holography. ***Prerequisite: APIS 205A or consent of instructor.*** Mr. Lee

205C. Optics III (3)
Integrated optics, fiber optics, optical communication, optical computing. Image processing with computers, and other topics of current interest in optics. ***Prerequisite: APIS 205B or consent of instructor.*** Mr. Lee

206. Quantum Electronics (3)
Approximation methods for time-dependent problems. Absorption and emission of radiation. Application to masers and lasers. ***Prerequisite: Physic 212B or equivalent.*** (Not offered in 1974-75. Listed to help students plan for later years.)

207. Introduction to Plasma Dynamics (3)
Cold plasmas, magnetoionic theory. Two-fluid equations; CMA diagram. Motion of a particle in electromagnetic fields, adiabatic invariants. Vlasov equation, Landau damping. Term paper required. ***Prerequisites: APIS 101B and 105A.*** (Not offered in 1974-75. Listed to help students plan for later years.)

208. Electromagnetic Waves (3)
Waveguides, resonant, cavities. Scattering and diffraction of plane waves. Antennas. Wave propagation in nonuniform and dispersive media. Geometrical optics. ***Prerequisite: APIS 140C.*** Mr. Booker (F)

209. Magnetohydrodynamics (3)
Equations of motion for a conducting fluid. Dimensional analysis. Maxwell stresses. Magnetohydrostatics. Frozen field theorem. Waves. Helmholtz and Rayleigh-Taylor instabilities. One dimensional flow. Shock waves. Term paper required. ***Prerequisites: APIS 101B and 105A.*** (Not offered in 1974-75. Listed to help students plan for later years.)

212A. Advanced Plasma Physics I (3)
The Vlasov plasma; conductivity tensor, waves, instabilities. Fluctuations in and scattering of electromagnetic waves by a plasma. Derivation of the Balescu-Lenard equation. High frequency conductivity. Quasi-linear theory. Parametric instabilites. ***Prerequisite: consent of instructor.*** Mr. Fejer (W)

212B. Advanced Plasma Physics II (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.*** (Not offered in 1974-75. Listed to help students plan for later years.)

212C. Advanced Plasma Physics III (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.*** (Not offered in 1974-75. Listed to help students plan for later years.)

215. 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 208 or consent of instructor.*** (Not offered in 1974-1975. Listed to help students plan for later years.) (F)

224. 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' polarization parameters. Interferometric methods and synthesis of sky maps. Three hours lecture. ***Prerequisite: consent of instructor.*** Mr. Hankins (F)

225. Signal Processing (3)
Time-series analysis, sampling, spectral analysis, covariance and cross-covariance estimation. Digital filtering, optical filters, signal detection, parameter estimation. Measurement of random fields, angular spectra, detector arrays, synthetic apertures. (Not offered in 1974-75. Listed to help students plan for later years.) (W)

226. Wave Propagation Through Random Media (3)
Scattering of waves by a randomly varying medium. Applications to laser propagation in the atmosphere and to analysis of ground-based measurements of radio-wave scintillations to determine source size and structure, solar-wind characteristics and ionospheric drift. Three hours lecture. ***Prerequisite: consent of instructor.*** Mr. Rumsey (W)

227. Instrumentation (3)
Design, calibration, and testing of modern measurement systems. Electronic amplifiers, filters and detectors. Receivers. Microwave systems. Digital systems. Special devices; hybrid systems, noise generators, phaselock loops, etc. ***Prerequisite: consent of instructor.*** (Not offered in 1974-75. Listed to help students plan for later years.)

228. 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. Mr. Alfven (W)

230. 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. Three hours lecture. ***Prerequisite: consent of instructor.*** Mr. Arrhenius (W)

250. Second-Order Random Processes (3)
Treatment of second-order properties of random processes. Mean-square convergence, wide-sense stationarity, processes with orthogonal increments; spectral analysis, harmonizable processes, linear prediction and filtering. Random power series, Karthunen-Loeve expansion, autoregressive and moving average representations. ***Prerequisite: APIS 162C or consent of instructor.*** Mr. Lugannani (F)

251. Mathematical Models for Random Processes (3)
Study of random processes emphasizing their relationship to the models that generate them. Characterization of probability laws, filtering, estimation, limit theorems. Among the processes treated are: Brownian motion, shot noise, linear processes, Markoff processes and spherically invariant processes. ***Prerequisite: APIS 162C or equivalent or consent of instructor.*** Mr. Lugannani (W)

252. Theory of Queues (3)
Analysis of queueing systems. Relationship between waiting time, queue length, busy period and service time. Birth-and-death processes, renewal processes; bulk queues, tandem and series queues; queue discipline. Equilibrium solutions, limit theorems, approximations. ***Prerequisite: APIS 162C or equivalent or consent of instructor.*** Mr. Lugannani (S)

260A-260B-260C. Advanced Communication Theory (3-3-3)
Probability theory and its application to signal processing — an advanced treatment. Random variables, limit theorems. Random processes, correlation functions and power spectra, series representation, mean-square linear and nonlinear filtering and prediction, adaptive filtering, sampling and quantization. Markov processes. ***Prerequisites: APIS 162C and Mathematics 212C.*** Mr. Masry (F,W,S)

262A-262B-262C. Detection Theory (3-3-3)
Hypothesis testing; detection of signals in white and colored Gaussian noise; Karhunen-Loeve expansion; estimation of signal parameters; maximum-likelihood detection; resolutiion of signals; detection and estimation of stochastic signals; applications to radar, communications, and optics. ***Prerequisite: APIS 162C.*** Mr. Helstrom (F,W,S)

263. Information Theory (3)
Principles of optimum communication: analog and digital modulation, mutual information and entropy, channel capacity, error exponents and the coding theorem. ***Prerequisites; APIS 162C and APIS 163C.*** Mr. Lugannani (Not offered in 1974-75. Listed to help students plan for later years.) (S)

264A-264B-264C. 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. Three hours lecture. ***Prerequisite: APIS 161C or consent of instructor.*** Mr. Burkhard (F,W,S)

265A-265B-265C. Automata, Formal Languages, and Computational Complexity (3-3-3)
Regular sets and finite-state machines; context free languages and pushdown automata, ambiguous languages, deterministic languages, normal form theorems; Turing and register type machines, the halting problem, time and storage requirements; Blum axioms for computational complexity. ***Prerequisite: consent of instructor.*** Mr. Savitch (F,W,S)

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. (Satisfactory/Unsatisfactory grades permitted.) Mr. York (W)

287A-287B-287C. Special Studies In Information Science (1-3, 1-3, 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.*** (F,W,S)

288. Special Topics in Applied Physics (1-6, 1-6, 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.* (F,W,S)

289. Special Topics in Information Science (1-6, 1-6, 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.* (F,W,S)

290. Observatory Field Course (1-12, 1-12, 1-12, 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 results with a report. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S,Su)

291. Graduate Seminar in Applied Physics (1-1-1)
Weekly discussion of current research literature. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

292. Graduate Seminar in Solar-System and Space Physics (1-1-1)
Research topics in radio astronomy and solar-system physics. One hour seminar. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

293. Graduate Seminar in Information and Computer Science (1-1-1)
Research topics in information and computer science. One hour seminar. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

294. Graduate Seminar in Applied Solid-State Physics
Research topics and applied solid-state physics and quantum electronics. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

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 (Satisfactory/Unsatisfactory grades only.) (F)

296. Graduate Seminar in Optical Signal Processing (1)
Research topics of interest in holography. (Satisfactory/Unsatisfactory grades only.) (F,W)

297. Seminar in Applied Ocean Science (1-1-1)
Topics in applied ocean science. One hour seminar. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

298. Independent Study (1-12, 1-12, 1-12, 1-12)
Open to properly qualified graduate students who wish to pursue a problem through advanced study under the direction of a member of the staff. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S,Su)

299. Research (1-12, 1-12, 1-12, 1-12)
(Satisfactory/Unsatisfactory grades permitted.) (F,W,S,Su)

501. Teaching (1-4, 1-4, 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.* (Satisfactory/Unsatisfactory grades only.) (F,W,S)

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)*
Donald R. Helinski, Ph.D. *(Biology)*
John J. Holland, Ph.D. *(Biology)*
Harvey Itano, M.D., Ph.D. *(Pathology)*
Martin D. Kamen, Ph.D. *(Chemistry)*
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:

Marlene A. DeLuca, Ph.D. *(Chemistry) (In Residence)*
Robert Fahey, Ph.D. *(Chemistry)*
Nathan Gochman, Ph.D. *(Chemistry) (In Residence)*
Melvin H. Green, Ph.D. *(Biology)*
Elvin Harper, Ph.D. *(Chemistry)*
Masaki Hayashi, Ph.D. *(Biology)*
Oliver W. Jones, M.D. *(Medicine, Pediatrics)*
Percy J. Russell, Ph.D. *(Biology)*
Melvin I. Simon, Ph.D. *(Biology)*
Nguyen-Huu Xuong, Ph.D. *(Biology)*

Assistant Professors:

John Abelson, Ph.D. *(Chemistry)*
William Allison, Ph.D. *(Chemistry)*
Stuart Brody, Ph.D. *(Biology)*
Willie C. Brown, Ph.D. *(Biology)*
Maarten J. Chrispeels, Ph.D. *(Biology)*
Edward A. Dennis, Ph.D. *(Chemistry)*
John Elovson, Ph.D. *(Biology)*
D. John Faulkner, Ph.D. *(Marine Chemistry)*
Stephen H. Howell, Ph.D. *(Biology)*
William F. Loomis, Jr., Ph.D. *(Biology)*
Ramon Pinon, 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) (In Residence)*
Raymond C. Valentine, Ph.D. *(Chemistry) (In Residence)*

* * *

Lemuel Bowie, Ph.D., *Assistant Adjunct Professor of Chemistry*
Melvin Cohn, Ph.D., *Adjunct Professor of Biology*
Walter Eckhart, Ph.D., *Associate Adjunct Professor of Biology*
Robert Holley, Ph.D., *Adjunct Professor of Chemistry*
Yasuo Hotta, Ph.D., *Associate 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 Chemistry Department 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.

Major Program in Chemistry

For Premedical* and Biochemistry Concentrators

Recommended Schedule:

FALL	WINTER	SPRING
Junior Year		
(Org) Chem 141A	(Org) Chem 141B	(Org) Chem 141C
(Phy) Chem 130	(Phy) Chem 131	———
———	(Biochem) Chem 114	(Biochem) Chem 115
(Org Lab) Chem 143A	(Org Lab) Chem 143B	(Biochem Lab) Chem 112
	(Phy Lab) Chem 105A	———
Senior Year		
(Adv) Chem 118	(Enz) Chem 116	(Macro) Chem 113
(Inorg) Chem 120A	———	(Human) Chem 117••
(Mol Bio) Bio 111•	———	———
———	———	———

* Premedical students are advised to take (Genetics) Biology 101 in the fall of the junior year and either (Developmental Physiology) Biology 117 in the spring of the senior year or (Cell Biology) Biology 114 in the winter of the senior year.

• (Molecular Biology) Biology 110B may be taken instead of (Molecular Biology) Biology 111.

•• May be substituted by appropriate upper-division courses in Chemistry or Biology with approval of adviser.

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 department, but may, with permission of his departmental chairman, 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 is admitted; these are discussed separately by the Biology and Chemistry Departments. 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 Biol-

ogy and Chemistry Departments.

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, 92037. 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 Biology or Chemistry Departments.

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. *Prerequisites: Chemistry 141A-141B or 144A-144B.* (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 application of techniques including electrophoresis, peptide mapping and sequencing, amino-acid analysis, gas liquid chromatography, affinity chromatography, and enzyme kinetics and at least two quarters of upper-division physical chemistry to the study of the chemistry of protein structure and function and the chemistry of lipids, carbohydrates, and nucleic acids. *Prerequisites: Chem 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)

115A. Biochemistry Laboratory (4)
A laboratory course in the application of biochemical methods to biological problems: isolation and characterization of enzymes, nucleic acids, carbohydrates and lipids. Six hours laboratory. *Prerequiste: Biology 110A or 106.* (W)

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 Diseases (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)

199. Independent Study in Biochemistry (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.* (F,W,S)

Graduate

The integrated course offerings of the Biology/Chemistry Departments 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 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.* (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 Biological Macromolecules (3)
A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisite: physical chemistry.* (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: 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 which will deal 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 matter 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.

299. Research in Biochemistry (1-12, 1-12, 1-12)

Biology

OFFICE: 2130 Bonner Hall

Professors:
Warren L. Butler, Ph.D.
Richard W. Dutton, Ph.D.
Morris E. Friedkin, Ph.D.
E. Peter Geiduschek, Ph.D.
Clifford Grobstein, Ph.D. *(Vice Chancellor - University Relations)*
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. *(Chairman)*
Silvio S. Varon, M.D.

Associate Professors:
Stuart Brody, Ph.D.
Maarten J. Chrispeels, Ph.D.
Melvin H. Green, Ph.D.
Masaki Hayashi, Ph.D.
William F. Loomis, Jr., Ph.D.
Percy J. Russell, 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:
Willie C. Brown, Ph.D.
John Elovson, Ph.D.
Richard A. Firtel, Ph.D.
Hannah Friedman, Ph.D.
Michael E. Gilpin, Ph.D.
Daniel K. Hartline, Ph.D.
Stephen H. Howell, Ph.D.
Muriel Nesbitt, Ph.D.
Ramon Pinon, Ph.D.
Paul A. Price, Ph.D.
Milton H. Saier, Ph.D.
Immo E. Scheffler, Ph.D.
Allen I. Selverston, Ph.D.
Douglas W. Smith, Ph.D.
Nicholas Spitzer, Ph.D.

* * *

Yasuo Hotta, Ph.D., *Research Biologist*
Kiyoteru Tokuyasu, Ph.D., *Research Biologist*
Meredith G. Somero, Ph.D., *Assistant Research Biologist*
Melvin Cohn, Ph.D., *Adjunct Professor*
Walter Eckhart, Ph.D., *Associate Adjunct Professor*
Frank M. Huennekens, Ph.D., *Adjunct Professor*
Edwin Lennox, Ph.D., *Adjunct Professor*
John Spizizen, Ph.D., *Adjunct Professor*
William O. Weigle, Ph.D., *Adjunct Professor*

* * *

Major Programs

Several types of undergraduate programs leading to a Bachelor of Arts in biology are offered on the campus. The Biology major in each of the colleges has a core of its own. In addition, Muir, Third and Fourth Colleges offer, as an extension of the regular biology major, concentration areas in various fields of biology. Currently, these areas are: Cell Biology, Genetics, Human Biology, Physiology and Population Biology. Other areas such as Microbiology will be added in the near future. Each of these new programs forms a co-ordinated 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 consult the adviser for that area. 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 under *Biochemistry).*

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 is required for the biology major, regardless of College affiliation.

Majors who enroll in either a 198 or 199 course (see Catalog descriptions) may do so on a P/NP basis only, regardless of the department in which the particular course is given.

The Revelle biology major is intended for those who have a very strong interest in cellular and molecular biology. In order to ful-

fill 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 an excellent cellular and molecular basis for pursuing a variety of careers in biology.

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.

The Third College biology major is designed for students interested in medically related areas, including those who intend to pursue a medical career. In this program, the student is first given a thorough exposure to the basic sciences. Subjects essential to a study of medicine are then presented against this background of fundamental preparation. Students will receive much of their basic physics, chemistry and mathematics preparation in the lower division. In the upper division they will take the "core" sequence with an emphasis on physical chemistry, organic chemistry, biochemistry and genetics. A sequence of courses from either one of two concentration areas, Human Biology or Physiology, may be used to complete the major.

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.

Revelle College

Major Program in Biology (Recommended Schedule)

FALL	WINTER	SPRING
Junior Year		
Genetics 101	Pop. Bio. 173	Biochemistry 106
Organic Chem. 140A	Organic Chem. 140B	Physical Chem. 132
Org. Chem. Lab 143A (½ course)	Phys. Chem. 131	Biochem. Lab. 102
		Phys. Chem. Lab 105A* (½ course)
Senior Year		
Molecular Bio. 111	Cell Bio. 114	Developmental Bio. 117

Space in the Chemistry Laboratory courses 143A and 105A is not sufficient to accommodate all Biology majors in the quarters indicated. Chemistry 143A may also be taken in the Winter quarter and Chemistry 105A in the Fall quarter of the Senior year. The Biochemistry Laboratory 102 may also be taken in the Fall quarter of the Senior year. Physical Chemistry Lab 105A offered during the Spring Quarter of the Junior year: Biology 112, 115B, 119, 132, 141 and 143L may be used to substitute for this course.

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 2F and 2FL as electives and Natural Science 2D and 2DL. Mathematics 2D should be taken as an elective by students who have completed Mathematics 2C.

Biology majors are required to take the courses listed in the recommended schedule for the upper-division years. Chemistry 131, 132, and 105A can be taken in either the junior or senior year. In addition to the courses listed, a student is encouraged to elect other courses offered by the Biology and Chemistry Departments to broaden his knowledge in the natural sciences or pursue an area of special interest.

Noncontiguous Minor in 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

Major Program in Biology (Recommended Schedule)*

FALL	WINTER	SPRING
Junior Year		
Biology 110A	Biology 110B	Biology 110C
Biology 110X (Laboratory)	Biology 115A	
Senior Year		
Biology 110D		

* Prerequisites for the junior year biology course in Muir College are Science 3C, 140A-140B, Mathematics 2A-2B-2C or Mathematics 1A-1B-1C. All of these prerequisites should be taken in the first two years. (Science 4A-4B-4C is required but can be taken at any time before graduation.) Students are required to take one laboratory course in some area of biology. Biochemistry (Biology 115A) is recommended, but other courses can also satisfy the requirement (e.g. Biology 119, 115B and 112). 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 in the College (see below). In the senior year, Muir biology majors may choose any combination of upper-division courses appropriate to their educational and career goals.

Concentration Areas

CELL BIOLOGY: Advisor: Milton Saier
Muir Core Plus: at least four courses from among:

FALL	WINTER	SPRING
Biology 156	Biology 112	Biology 117
	Biology 176	Biology 125
	Biology 127	Biology 147
	Biology 151	Biology 142
	Biology 145	

GENETICS. Advisor: Dan L. Lindlsey
Muir Core Plus: Biology 172 or 173, plus five courses including one laboratory course chosen from the following list:

Fall	Winter	Spring
Biology 119*	Biology 125	Biology 142
Biology 133	Biology 127	
Biology 223	Biology 137	
	Biology 152*	
	Biology 171	
	Biology 222	
	Biology 224	

* Laboratory courses
Math 80A and 80B are also recommended.

PHYSIOLOGY: Advisor: Allen I. Selverston
Muir Core Plus:

FALL	WINTER	SPRING
Junior Year		
	Biology 129	Biology 144, 144L
		Biology 166
Senior Year		
Biology 149A (plus Lab)	Biology 149B	Biology 143
	And 3 Electives from among	
Biology 133	Biology 136	Biology 137
Biology 148	Biology 145	Biology 172
Biology 132	Biology 176	Biology 174
	Biology 173	Biology 146
	Biology 139	Biology 143L
	SIO 281	AMES 172
	SIO 275	
	Biology 141	
	Biology 121	
	AMES 173	

POPULATION BIOLOGY: Advisor: Christopher J. Wills
Muir Core Plus:

Junior Year		
APIS 10	Math 80A	Biology 122
	Biology 172	Math 80B
	Biology 173	
Senior Year		
Biology 133	Biology 136	Biology 174
In addition, at least one course from among:		
SIO 280 (P)	Biology 240 (P)	Psy. 149
Chem. 117	SIO 275C (P)	Biology 175

Third College

Major Program in Biology* (Recommended Schedule)*

* Core Sequence

FALL	WINTER	SPRING
Sophomore Year		
		Biology 21
Junior Year		
Biology 134A	Biology 144	Biology 132
Chem. 140A	Chem. 140B	Biology 144L
Chem. 143A		
Concentration Areas		
HUMAN BIOLOGY: Advisor: Juan Yguerabide		
Junior Year		
	Biology 152	
Senior Year		
Biology 149A	Biology 149B	Biology 146
Biology 149AL	Biology 149BL	
	Biology 141	

PHYSIOLOGY: Advisor: Allen I. Selverston

Junior Year		
Biology 129		Biology 134B
		Biology 166
Senior Year		
Biology 149A	Biology 149B	Biology 143
Biology 149AL	Biology 149BL	

* Prerequisites: Chemistry 12A, 12B, 12C; Physics 15A, 15B, 15C; Math 2A, 2B.

Fourth College

At the time of calendar preparation, the details of the core are still being determined. Further information will be available at the time of registration, but a prospective major should plan on the following during the first two years.

Mathematics, up to differential equations (e.g. Math 2A, B, C)

Two quarters of physics (e.g. Science 4A and 4B or C)

Two quarters of inorganic chemistry (e.g. Chem. 3A and 3A lab, 3B and 3B lab).

At least one introductory biology course (Natural Science 1C or 2E; Biology 10 or 11). Biology 12 is also recommended for prospective biology majors.

Organic Chemistry in the sophomore year

(140A, B and lab, 141A, B, C and one laboratory, or equivalent).

All concentration areas are open to Fourth College students.

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, imaginative and self-critical research and for teaching in the biological sciences.

There are no inflexible requirements for entrance to graduate study in the Department of Biology, but it is recommended that the student's undergraduate preparation include courses in calculus, organic chemistry, physical chemistry and biochemistry.

Formal course work and opportunities for dissertation research include most basic areas of biology with major emphasis in the general areas of biochemistry, genetics and developmental biology.

Doctor's Degree Program A program of 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. During the first year of graduate study, each student undertakes a small research project in the laboratories of each of five different faculty members; he is expected to spend a major portion of his academic time on this project. The selection of laboratories is designed by the Graduate Committee in consultation with the student to give him a broad view of the research interests of the department. 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. 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 choice, no later than the end of the first year. By the end of the second year, the student will be required to take a two-part oral examination in order to be admitted to candidacy for the Ph.D. degree. The purpose of these examinations is to have the student demonstrate competence in the field of his 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. (See ***Graduate Announcement: The Ph.D.***)

Close collaboration with members of the Departments of Chemistry, Physics 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 Developmental Biology The object of this program is to promote teaching and research in the field of developmental biology. Various disciplinary groups within the biomedical sciences are associated with the program. 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.

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 upper-division undergraduate biology majors and graduate students:

275A-275B	Marine Ecology
280	Marine Communities/ Environments
281	Environ. Physiology/ Biochemistry
289	Marine Plants

A description of the courses can be found under Scripps Institution of Oceanography listings. In all cases permission of the in-

structors should be secured prior to enrollment. Each of the courses can accommodate only a limited number of students.

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. (See *course listings: Natural Sciences* or *Science.)*

6. Principles of Modern Biology (4)
The essentials of cell biology, elementary cell chemistry, genetics and the biological basis of certain disease states will be emphasized. Not open to biology majors. (F)

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. (W)

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, three hours laboratory. *Prerequisites: Natural Science 1A, Science 3A, or equivalent.* (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. No prerequisites. Lecture one-and-one half hours per week. (S)

21. Introduction to Human Genetics (4)
Introduction to the principles of genetics, with special emphasis on genetic systems in higher organisms, especially man. *Prerequisites: Science and Technology 1A-1B-1C, or equivalent.* (S)

Upper Division

101. Genetics (4)
(Formerly Biology 101A)
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: Natural Science 1C or 2E.* (F)

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,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.* Three hours lecture, one hour discussion. *Prerequisites: Natural Science 1C or 2E, or permission of instructor.* (F)

106. Metabolism and Biochemistry (4)
(Formerly Biology 101C)
The metabolism of organisms with respect to energetics, biosynthesis and nutrition. Three hours lecture and one hour recitation. *Prerequisites: Chemistry 140A-140B, Chemistry 143A.* (S)

110A. Biochemistry (4)
General biochemistry. *Prerequisite: organic chemistry.* Three hours lecture. (F)

110B. Molecular Biology (4)
Study of biological macromolecules, their synthesis and function. Special emphasis on nucleic acids, proteins and regulatory phenomena. *Prerequisites: Biology 110A and 110X.* (W)

110C. Cell Biology (4)
The structure and function of cells. Cellular control mechanisms, cell division, cell differentiation and specialization. *Prerequisite: Biology 110B.* (S)

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)

110X. Genetics (4)
Introduction to genetics, covering transmission genetics, linkage and mapping, sex determination, haploid and microbial genetics and chromosome aberrations. Emphasis on certain aspects of human genetics and on the role of genetics in biology. *Prerequisites: Biology 10, 11 or equivalent.* (F)

111. Molecular Biology (4)
Molecular analyses of biological phenomena with special emphasis on genetics and metabolic regulation. Three hours lecture, two hours recitation. *Prerequisites: Biology 106, Chemistry 131 and 132.* (F)

112. Techniques in Cell Biology (4)
A laboratory-lecture course in methods of studying cell organization and behavior. Six hours laboratory, one hour lecture, one hour recitation. *Prerequisite: Biology 114 (may be taken concurrently).* (W)

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. Cell Biology (4)
The relation between the structure and function of cells, with particular emphasis on the role of the membrane and transport phenomena in cell and organelle physiology in selected cell type. Three hours lecture, two hours recitation. *Prerequisite: Biology 111.* (W)

115A. Biochemistry Laboratory (4)
A laboratory course in the application of biochemical methods to biological problems: Isolation and characterization of enzymes, nucleic acids, carbohydrates and lipids. Six hours laboratory. *Prerequisite: Biology 110A or 106.* (W)

115B. Molecular and Cell Biology Laboratory (4)
A laboratory course in the application of cellular techniques to biological problems. Six hours laboratory. *Prerequisite: Biology 110A or 106, 102 or 115A recommended.* (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)
(Formerly Biology 101B)
The development of organisms in relation to their functions and behavior, including the origins of multicellularity, cell-cell interactions, tissue interactions, fields and gradients, hormonal integration, neural integration and regeneration. Three hours lecture and four hours laboratory-recitation. ***Prerequisite: Biology 114.*** (S)

118. Advanced Biochemistry (4)
Advanced topics and recent advances in biochemistry for students already familiar with the subject matter of elementary courses. ***Prequisites: elementary physical chemistry, organic chemisy and biochemistry.*** (F)

119. 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 problems of transmission genetics. ***Prerequisites: Biology 101 or 110X.***

121. Neurobiology I (4)
Survey of anatomy and physiology of invertebrate and vertebrate nervous integration; methods of study and modern developments in the system aspects of neural function. Three hours lecture. ***Prequisite: general biology or general psychology.*** (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. ***Prerequisites: Calculus or equivalent.*** (S)

123. Analysis of Development (4)
A study of the fundamental problems in developmental biology. Three hours lecture. ***Prerequisite: Biology 114.*** (S)

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. ***Prerequisites: Biology 101 or Biology 110X.*** (S)

126. Special Topics in Mocrobiology (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. ***Prerequisites: Open to seniors with consent of instructor.*** (S)

127. Virology (4)
Molecular aspects of viral structure and development. Three hours lecture. ***Prerequisite: Biology 111.*** (W)

129. Structure and Function of Tissues (4)
A general survey will include examples of relationships between structure and function at the cell and tissue level. Emphasis will be placed on components of the vascular system and related structures such as endotheium, erythrocytes, leucocytes, cardiac, smooth and skeletal muscle, connective tissue, basement membranes and peripheral nerve cells. (F)

131. Marine Biology (4)
An introduction to life in the sea with emphasis on ecology and phylogenetic relationships. ***Prerequisite: Biology 11 or permission of instructor.*** (W)

132. Cytology (4)
A brief overview of gross anatomy and histology and introduction to cell biology. Three hours lecture and three hours laboratory. ***Prerequisite: Biology 11 or permission of instructor.*** (W)

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 FORTRAM 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 10 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: (or taken concurrently) Organic Chemistry.*** (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 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. ***Prerequisites: Natural Science 1C or 2E, or Biology 11.*** (W)

137. Human Genetics (4)
The structure of the human genome at the molecular and microscopic levels; human chromosome behavior; selected topics in human development, biochemical and population genetics. Three hours lecture, one hour discussion and ten hours outside preparation. ***Prerequisites: Biology 101 (or permission of instructor.)*** (S)

139. Comparative Physiology (4)
Structure and function of invertebrate and vertebrate physiological systems. Does not include nervous system. Three hours lecture. ***Prerequisite: general biology or consent of instructor.*** (W)

141. Human Development (4)
An analysis of reproductive physiology and embryology in humans at the cellular and organic levels. This analysis will be followed by the study of the developmental changes associated with postnatal life. This course is one of a series of core courses which is required for all Health Science majors. Three hours lecture and two hours laboratory. ***Prerequisites: Biology 21, Human Genetics.*** (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. Neurobiology II (4)
Biophysical basis of resting and action potential, synaptic transmission and properties of junctions. Neural coding, integration in sensory and motor systems. Three hours lecture. ***Prerequisites: Chemistry 131-132 or consent of instructor.*** (D)

143L. Laboratory in Neurobiology (4)
Current electrophysiological techniques used to study nervous systems will be taught through exercises and individual projects. One hour lecture, six hours laboratory. ***Students must be interviewed by instructors before register-***

ing in this course. Prerequisite: Chemistry 131-132. (S)

144. Biochemical Physiology (4)
An exploration of chemical mechanisms underlying the specific biological functions in cells and tissues. ***Prerequisites: Organic Chemistry, Biology 134 and Biology 138.*** (S)

144L. Biochemistry Laboratory (4)
Elementary principles in the laboratory of thermodynamics and chemical kinetics and their application to equilibrium, reaction mechanisms and other aspects of biological systems. ***Prerequisites: Biology 134 and Organic Chemistry.*** (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.*** (W)

146. Pathology (4)
Introduction to the principles of pathology and a survey of the cellular mechanism underlying disease. This course will consist of a series of lectures by members of the School of Medicine as well as other members of the Biology Department. ***Prerequisites: Biology 132, 138 and 141.*** (S)

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: Biology 106.***

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 electing a Human Biology major. ***Prerequisites: Biology 106, 110A or 144.*** (F)

151. Advanced Plant Biology (4)
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; senior standing.*** (W)

152. Cytology and Genetics Lab (4)
A laboratory-lecture course designed to help the student understand the experimental basis of the principles of cytology and genetics. One hour lecture, one hour discussion and 10 hours laboratory. ***Prerequisites: Biology 21 and 132 or their equivalent.*** (W)

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 nutrion and an evaluation of the relationship of the knowledge to nutrition in man. Three hour lecture. ***Prerequisite: Biochemistry.*** (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. ***Prerequisites: seniors with consent of instructor.*** (F)

157. General Microbiology I (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. ***Prerequisites: Introductory Biology and Organic Chemistry.*** (F)

158. General Microbiology II (4)
A discussion of the structure, growth and physiology of eucaryotic microorganisms with emphasis on the activities and environmental interaction 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. ***Prerequisites: Introductory Biology and Organic Chemistry.*** (W)

165. Immunochemistry (4)
Discussion of antibodies, antigens complement and their interactions. Three hours lecture. ***Prerequisite: Biology 110A.***

166. Membrane Physiology (4)
Biophysical and biochemical properties of membranes. Membrane structure, passive properties, membrane permeation, excitable membranes, artificial membranes. Three hours lecture. ***Prerequisites: Physical Chemistry; Organic Chemistry; Biochemistry (concurrently).*** (S)

171. Human and Animal Virology (4)
This course will cover all aspects of human and animal viruses and their activities. The biochemistry, cell biology, genetics and immunology of virus infection will be examined in lectures and in seminar-discussion format with student presentations. Two hours lecture, one hour seminar. ***Prerequisite: senior standing as biology major.*** (W)

172. Evolution (4)
Evolutionary processes are discussed in the genetic and ecological contexts. Emphasis on recent literature. Modern field and museum techniques are practiced. ***Prerequisite: Biology 101 or 110X.*** (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 four hours laboratory. ***Prerequisites: Biology 101 or 110X.*** (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. Optional field work. ***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. ***Prerequisites: 1) Genetics and 2) Development or Physiology; or consent of the instructor.*** (S)

176. Embryology (4)
A critical analysis of the mechanisms of development, concentrating on the problems of localization of cytoplasmic information, oogenesis, fertilizations, morphogenesis, tissue interactions and embryonic induction. Three hour lecture. ***Prerequisite: Biology 101.*** (W)

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. Registration for this course must take place at the beginning of the Winter Quarter. Please contact the Biology department. Ten hours lecture and 15 hours laboratory. ***Prerequisites: consent of instructors.*** (S)

190. Current Issues in Biology (4)
A special course of invited lectures by prominent biologists to familiarize students with some of the contemporary problems in biology. Two hours lecture. ***Prerequisites:***

senior standing in the major program and consent of instructor.

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. *Prerequisites: Biology 101, 102, 106, 111.* (F,W,S)

199. Independent Study for Undergraduates (4)
Independent reading or research on a problem by special arrangement with a faculty member. P/NP only. *Prerequisite: consent of instructor.* (F,W,S)

Graduate

203A-203B-203C. 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 (1)
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: elementary physical 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: Chemistry 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.) (F)

217. Human Biochemistry (2)
An advanced course in biochemistry, which will primarily deal with the molecular basis of human disorders. *Prerequisite: Chemistry 101C, 110A, 211, or its equivalent. Chemistry 211 may be taken concurrently.* (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 Biochemical 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; student initiation of topics is encouraged. Both faculty and 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)

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 differention, viral development, biorhythms, energy interconversions, solute transport, motility and taxis, metabolic regulation, microbial ecology.

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 presentation 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. *Prerequisite: Biology 123 or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (W)

233. Major Problems in Embryology (3)
A critical analysis of the mechanisms of development, concentrating on the problems of localization of cytoplasmic information, oogenesis, fertilizations, morphogenesis tissue interactions and embryonic induction. *Prerequisites: Biology 101, 117 or its equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (S)

240. Seminar in Population Biology (1)
Graduate students will report on controversial and pivotal issues in contemporary ecological and evolutionary biology. Critical analysis and synthesis of the literature will be emphasized. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (W,S)

242. Immunology (3)
The course will deal with antibody structures, antigens, antigen-antibody interractions, immune response, immunological unresponsiveness, *in vivo* and *in vitro* consequences of antigen-antibody interractions, delayed hypersensivity, control of the immune response and transplantation immunities. *Prerequisite: Biology 106.* (Satisfactory/Unsatisfactory grades permitted.)

243. Neurobiology (3)
Biophysical basis of resting and action potential; synaptic transmission and properties of junctions. Neural coding; integration in sensory and motor systems. *Prerequisites: Chemistry 130, 131 or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (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, six hours laboratory.

Prerequisite: Chemistry 130, 131, and consent of instructor. (Limited to 15 students). (Satisfactory/Unsatisfactory grades permitted.) (S)

244. Ethology (3)
The biological basis of animal behavior, invertebrate and vertebrate, 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, three hours lab or field work. *Prerequisites: lower-division biology, physics and chemistry; Biology 121 desirable.* (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 responses 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)
Graduate students will explore 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; and viruses. *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 under graduate 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. *Prerequisites: consent of instructors.* (Satisfactory/Unsatisfactory grades only.) (S)

257. Cellular Immunology (3)
The course will cover the cellular events and interactions of humoral and cellular responses to antigen. The course will be a graduate course not open to undergraduates. *Prerequisites: none.* (Satisfactory/Unsatisfactory grades only.) (S)

290. Special Topics in Biology (3)
A course to be given at the discretion of the faculty, in which integrative or interdisciplinary topics of biological interest will be presented by visiting or resident faculty members. (F,W,S)

299. Research in Biology (1-12)
(F,W,S)

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 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. A total of 12 units is required for graduation. Normally, a student would take 4 units of this course (equivalent of 0.5 of an assistantship per quarter) in each of three successive years, beginning with his second year of graduate study. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

Biophysics

OFFICE: 3426 Mayer Hall

This is an undergraduate program within the Department of Physics, which prepares the student 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 receive at present their degree 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 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 preparation required:

Natural Science 2A-2B-2C, or Physics 3A-3B-3C,-3D, Natural Science 2D-2DL-2E-2F-2FL; or Science 3A-3AL-3B-3BL, 4A-4B-4C-4D-4E, and Natural Science 2E.

Mathematics 2A-2B-2C-2D-2E.

(b) Upper division:

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	

* Mathematics 120 is recommended.

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 defiency 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 preparation required:

Natural Science 2A-2B-2C, or Physics 3A-3B-3C-3D, Natural Science 2D-2DL-2E-2F-2FL; or Science 3A-3AL-3B-3BL, 4A-4B-4C-4D-4E, and Natural Science 2E.

Mathematics 2A-2B-2C-2D-2E.

(b) Upper division:

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	

* Mathematics 120 is recommended.

Chemistry

OFFICE: 2112 Urey Hall
Student Information: 4426 Mayer Hall

Professors:
James R. Arnold, Ph.D.
Russell F. Doolittle, Ph.D.
Murray Goodman, Ph.D.
Martin D. Kamen, Ph.D.
Nathan O. Kaplan, 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. *(Acting Chairman of the Department, 1974-75)*
Harold C. Urey, Ph.D. *(University Professor, Emeritus)*
Bruno H. Zimm, Ph.D.

Associate Professors:
John Abelson, Ph.D.
William S. Allison, Ph.D.
F. Thomas Bond, Ph.D.
Leigh B. Clark, Ph.D.
Marlene A. DeLuca, Ph.D. *(In Residence)*
Robert C. Fahey, Ph.D.
Nathan Gochman, Ph.D. *(In Residence)*
Elvin Harper, Ph.D.
Robert G. Linck, Ph.D.
Trevor C. McMorris, Ph.D.
Charles L. Perrin, Ph.D.

Joseph W. Watson, Ph.D. *(Provost of Third College)*
Kent R. Wilson, Ph.D.
Nguyen Huu Xuong, Ph.D.

Assistant Professors:
Edward C. Alexander, Ph.D.
Edward A. Dennis, Ph.D.
Arthur F. Diaz, Ph.D.
Katja Lindenberg, Ph.D.
Kurt Marti, Ph.D.
Hans Oesterreicher, Ph.D.
Susan S. Taylor, Ph.D. *(In Residence)*
Raymond C. Valentine, Ph.D. *(In Residence)*
Robert L. Vold, Ph.D.
John H. Weare, Ph.D.
John C. Wheeler, Ph.D.

* * *

Robert W. Holley, Ph.D., *Adjunct Professor*
G. David Novelli, Ph.D., *Adjunct Professor*
Leslie E. Orgel, Ph.D., *Adjunct Professor*
Lemuel Bowie, Ph.D., *Asst. Adjunct Professor*
Stuart Levison, Ph.D., *Assistant 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.

The student who is considering a chemistry major is advised to take the Natural Science 2 sequence. In any case Natural Science 2D, 2DL, 2F and 2FL are essential. The department strongly recommends that all chemistry majors take Mathematics 2D.

Transfer students should note that in the first two years of the Revelle College curriculum students take calculus and physics, and that the sophomore chemistry course is concerned with thermodynamics and quantum theory; organic chemistry is deferred until the junior year. Transfer students should have had a laboratory course equivalent to Natural Science 2DL and 2FL, usually approximated by quantitative analysis.

The departmental course requirements for the Bachelor of Arts degree in Chemistry are: Chemistry 130, 131, 132; 120A, 120B; 141A, 141B, 141C; at least four of the following five laboratory half-courses, Chemistry 105A, 105B, 143A, 143B, 143C; five additional upper-division or graduate courses in chemistry or related fields, including at least a half-course of upper-division laboratory. The minimum passing grade in these courses is D and a minimum of a C average in the major is required for the degree. Departmental requirements may not be taken on a "Pass/Not Pass" basis by Chemistry majors. Opportunities for independent work and for research are available to qualified students through enrollment in Chemistry 199. Students should arrange a schedule for completing required courses in consultation with their faculty advisers at the start of the junior year. Muir College students may take Science 140A, 140B, and a third quarter of organic chemistry in lieu of 141A, 141B, 141C, but must take the three-quarter physical chemistry sequence. They should consult a faculty adviser Spring Quarter of their sophomore year.

Exceptions to these requirements may be made for students who wish to pursue more specialized programs such as biochemistry, geochemistry, or chemical physics.

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:

Major Program in Chemistry
For Premedical* and Biochemistry Concentrators
(Recommended Schedule)

FALL	WINTER	SPRING
Junior Year		
Chemistry 141A	Chemistry 141B	Chemistry 141C
Chemistry 130	Chemistry 131	—
—	Chemistry 114	Chemistry 115
Chemistry 143A	Chemistry 143B	
	Chemistry 105A	Chemistry 143C**
Senior Year		
Chemistry 118	Chemistry 116	Chemistry 113

Chemistry 120A	—	Chemistry 117••
Biology 111•,	—	—

* Premedical students are advised to take Biology 101 Fall of the junior year and either Biology 117 in the Spring of the senior year or Biology 114 Winter of the senior year.

** or Chemistry 112, Biology 115A, or Biology 102.

• or Biology 110B.

•• May be substituted by appropriate upper-division courses in Chemistry or Biology with approval of adviser.

Chemical Physics Prerequisites for this curriculum include Natural Science 2D and Mathematics 2E (may be taken in the junior year). Chemistry 141C and 143B or 143C are not required; instead, the upper-division electives include Chemistry 133, Physics 110A, 110B and Mathematics 110A, plus any two of the following courses: Chemistry 102A, 102B, 190, 199, any graduate course in physical chemistry; Physics 100A, 100B, 100C, 130A, 130B, 130C, 131A; Mathematics 102A, 102B, 110B, 120, or the equivalent AMES or APIS courses.

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.

Third College

Major Program in Chemistry

FALL	WINTER	SPRING
Sophomore Year		
Chemistry 12A	Chemistry 12B Chemistry 12AL	Chemistry 12C
Physics 15A	Physics 15B	Physics 15C Biology 22 (Genetics*)
Junior Year		
Chemistry 140A	Chemistry 140B	Chemistry 140C
Chemistry 143A	Chemistry 143B	
Computational Chemistry	Chemistry 131	Chemistry 132
	Chemistry 105A	Chemistry 105B
Cytology*	Cytogenetics*	
Senior Year		
Biochemistry 1	Biochemistry 2	Biochemistry 3
Material Science 1	Material Science 2	Material Science 3
	Natural Products*	Clinical Chemistry*

(*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.

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 material sciences. In addition, there will be elective courses in natural products chemistry, clinical chemistry, environmental chemistry, teaching of chemistry, Chemistry 199, electronics, patent chemistry, and technical writing. The last three are two-unit 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 he may participate effectively in this program, the entering graduate student will be required to have a mastery of the subjects usually presented in an undergraduate chemistry curriculum: physical, organic, and descriptive inorganic chemistry. So that the student may be properly advised, his mastery of these undergraduate subjects will be tested by written examination on his arrival. Deficiencies in under-

graduate 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. He may also take upper-division undergradaute courses and be assigned 3 units of credit per course. Depending on his special interests, he may also take courses in other departments. The student will normally select his thesis adviser by the end of the first year of study and begin his thesis research. In the second year he 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 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. He 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 chairman of the doctoral committee.

Successful passing of the qualifying examination advances the student to candidacy for the Ph.D. He then devotes most of his time to his 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.

Teaching experience is required of all chemistry graduate students. Every graduate student is required to perform half-time teaching for one quarter of every three quarters of residence. 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 Chemistry Department offers a major program in biochemistry in cooperation with the Department of Biology. Please refer to the Biochemistry listing in this catalogue for details.

Joint Doctoral Program with California State University, San Diego The Department of Chemistry at UCSD cooperates with the Department of Chemistry in the Division of the Physical Sciences, California State University, San Diego, in offering a joint program of graduate study leading to the Ph.D. degree in chemistry.

An applicant for admission to the joint doctoral program must first be admitted to regular graduate standing at the University of California, San Diego, and to classified graduate standing in the Graduate Division of California State University, San Diego. 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 California State University, San Diego, where the program is more fully described.

Courses

Lower Division

The Department of Chemistry cooperates in the teaching and administration of the Natural Sciences sequences for Revelle College students, the Science sequence for Muir College students and the Science and Technology sequence for Third College

students. (See course listings: *Natural Sciences, Science,* and *Science and Technology.*)

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. (F)

103. Molecular Spectroscopy (4)
The interaction of electromagnetic radiation with molecules will be treated both theoretically and experimentally. Topics to be covered include rotational, vibrational, and electronic spectroscopy, electron spin resonance, nuclear magnetic resonance, and structural determination by x-ray diffraction. *Prerequisites: Chemistry 130, 131, 132.*

105A. Physical Chemistry Laboratory (2)
Laboratory course in experimental physical chemistry. *Prerequsites: Chemistry 130 or 131 (may be taken concurrently).* (F, W, S)

105B. Physical Chemistry Laboratory (2)
Laboratory course in experimental physical chemistry. Students who have taken Chemistry 105A will do more advanced projects. *Prerequisites: Chemistry 105A, 131; 132 (may be taken concurrently).* (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-141B.* (S)

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 chromatagraphy, 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 141A, 141B, 141C, 130, 131, 143A, 143B, 105, 114, and 115. (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 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. *Prerequisites: 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. *Prerequiste: 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)

120A-120B. 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 properties of compounds are treated. Other topics include: solids, ions in solution, complex ions, solution structure, organometallic compounds. Three lectures, one recitation. (F, W)

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)

140A-140B. Organic Chemistry (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)

141A-141B-141C. 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. *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 and B or 141A, B and 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)

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 (2)
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. *Prerequisite: Chemistry 131, 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. *Prerequisites: Chemistry 141C or consent of instructor.* (F)

149A. Chemistry of the Environment (4)
Sources, components, chemistry, dynamics, and medical effects of air pollution. The role of energy. The decision-making process — the role of the citizen, government, industry. *Prerequisites: Three quarters of mathematics; five courses in physical and biological sciences.* (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.* (W)

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.* (S)

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 are advised to register on a P/NP basis. *Prerequisite: permission of instructor and department.* (F, W, S)

Graduate

200A-200B. 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 prepration for Chemistry 204A, as well as prerequisite to Chemistry 202B. *Prerequisite: Chemistry 132 or equivalent.* (F)

203. Molecular Spectroscopy (4)
The interaction of electromagnetic radiation with molecules will be treated both theoretically and experimentally. Topics to be covered include rotational, vibrational, and electronic spectroscopy, electron spin resonance, nuclear magnetic resonance, and structural determination by x-ray diffraction. *Prerequistes: Chemistry 130, 131, 132.* (S)

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, gases, 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 eesonance. Same as Physics 206. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (W)

207. Natural and Synthetic Macromolecules (3)
The physical chemistry of high polymers, proteins, and nucleic acids with emphasis on structure, characterization and properties. *Prerequisites: 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)

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)
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)

233. Elementary Statistical Thermodynamics (3)
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)

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: 148/248.*** (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 energy relationships; product studies, stereochemistry; reactive intermediates; rapid reactions. (S)

247. Mechanisms of Organic Reactions (4)
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)

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)

298. Special Study in Chemistry (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. (Satisfactory/Unsatisfactory grades permitted.) (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)
A doctoral student in Chemistry is required to teach a four-unit course (50 per cent teaching assistantship) 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 is participating. ***Prerequisites: graduate standing and consent of instructor.*** (Satisfactory/Unsatisfactory grades only.) (F, W, S)

Chicano Studies

OFFICE: 2302 Humanities & Social Sciences Building, Muir

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 UCSD department. The disciplinary emphasis will be the foundation 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) 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 132. The 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.*

For descriptions of the courses listed below, refer to that department's section of the Catalog.

History 107A-107B. The Expansion of Europe (4-4)

History 137A-137B. Latin America: Colonial Design and Modern Reality (4-4)

History 139. Social History of Early Colonial Spanish America (4)

History 140. Early Latin American Economic History (4)

History 144. Independence in Latin America (4)

History 146A-146B. A History of Mexico (4-4)

Literature/Spanish 9. Reading and Interpretations: Spanish for Native Speakers (4)

Literature/Spanish 125. Spanish-American Literature (4)

Literature/Spanish 130. Spanish-American Fiction (4)

Literature/Spanish 131. Spanish-American Poetry (4)

Literature/Spanish 141. Phonetics (4)

Literature/Spanish 142. Spanish Syntax and Morphology (4)

Literature/Spanish 143. Spanish Language in America: Spanish Dialects in USA (4)

Literature/Spanish 153. Introduction to Chicano Literature (4)

Sociology 115. The Mexican-American Family (4)

Sociology 119. Sociology of Poverty (4)

Sociology 120. Urban Social Problems (4)

Sociology 135. Comparative Race and Ethnic Relations (4)

Sociology 136. The Chicano Community (4)

Chinese Studies

OFFICE: Building 410, Matthews Campus

Associate Professors:

David K. Jordan, Ph.D. *(Anthropology) (Program Chairman)*
Wai-Lim Yip, Ph.D. *(Chinese, Comparative Literature)*

Assistant Professors:

Matthew Y.-Ch.Chen, Ph.D. *(Linguistics)*
Thomas A. Metzger, Ph.D. *(History)*
Benjamin K. T'sou, Ph.D. *(Linguistics)*

* * *

Chinese Studies is an interdisciplinary program. Four 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; and fourth, a senior project of study integrating the main features of the student's training.

This program is unusual in that it allows for training in a variety of 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 14 to 17 courses. No more than two of these may be at a lower-division level. 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 Focus — 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) Seminar or Independent Study — Two courses of seminar, 198 or 199 on any aspect of Chinese studies. Except for (4) all courses may be chosen from those listed under ***Courses.*** At present seven disciplines/areas are available to the student.

Major Programs Course Requirements

Major Program in Chinese Studies
Course Requirement

No. of courses / Discipline focus	Anthro	History (Modern)	History (pre mod)	Ling.	Lit	Socio	Third World Studies
Chinese Studies Requirements							
Language *							
Modern	3	3	3	3	3	3	3
Classical	0	0	3	0	3	0	0
Chinese Focus	3	4	4	2	3	3	2
Chinese Spectrum	3	2	2	4	2	3	4
Discipline Focus	3	3	3	4	3	3	3
Seminar 199	2	2	2	2	2	2	2
Total number of upper division courses	14	14	17	15	16	14	14
Lower division Chinese language prerequisite	3	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 context of these courses will determine whether the Chinese Studies minor is classified as humanities or social science.

Courses

Language — Lower Division

Lang/Ch 51 — Elementary Cantonese
Lang/Ch 52 — Elementary Cantonese
Lang/Ch 53 — Elementary Cantonese
Lang/Ch 61 — Elementary Mandarin
Lang/Ch 62 — Elemenatry Mandarin
Lang/Ch 63 — Elementary Mandarin

Language — Upper Division

Chinese Studies 154 — Intermediate Cantonese
Chinese Studies 159 — Intermediate Cantonese
Chinese Studies 164 — Intermediate Mandarin
Chinese Studies 175 — Readings in Contemporary Chinese I
Chinese Studies 176 — Readings in Contemporary Chinese II
Chinese Studies 181A-181B — Introduction to Classical Chinese
Chinese Studies 183 — Readings in Classical Chinese

Chinese Focus/Chinese Spectrum

Anthropology 12 — Chinese Society and Culture
Anthropology 103 — Problems in Chinese Ethnology
Chinese Studies 116 — Scientific Development in Traditional China (Not offered 1974-75)
Chinese Studies 163 — Introduction to Chinese Linguistics
Chinese Studies 198 — Directed Group Study in Chinese Studies
Chinese Studies 199 — Independent Study in Chinese Studies
History 180A-180B-180C — 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 187 — Intellectual History of Modern China
History 280 — 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
Sociology 190 — Senior Seminar
Visual Art 114B — Introduction to Chinese Art

Courses

Upper Division*

M116. Scientific Development in Traditional China (4)
An integrated series of lectures and readings covering vari-

ous aspects of scientific development in traditional China. Topics will include developments in mathematics, astronomy, chemistry, medicine, applied science and technology, logic, the role of language in scientific inquiry interplay between technology and social organization and social change. *Prerequisites: junior standing, completion of basic-science requirement at Revelle, Muir, or Third College (or equivalent) or consent of instructor.*

154. Intermediate Cantonese (4)
Grammar, conversation in Cantonese and reading and writing in Cantonese and Modern Standard Chinese. Continuation of Lang/Chinese 53. (This course or equivalent will fulfill the language requirement) *Prerequisite: Lang/Chinese 53 or equivalent.*

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: Chinese Studies 154 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.

164. Intermediate Mandarin (4)
Grammar, conversation, reading and writing in Mandarin. Continuation of Lang/Chinese 63. (This course or equivalent will fulfill the language requirement.) *Prerequisite: Lang/Chinese 63 or equivalent.*

175. Readings in Contemporary Chinese I (4)
Reading and translation in contemporary Chinese literature. The emphasis will be on the further development of reading, writing and comprehension ability. The course includes grammar reviews, lectures and class discussions. *Prerequisites: Chinese Studies 164 or 159.*

176. Readings in Contemporary Chinese II (4)
Continuation of Chinese Studies 175. Introduction to simplified characters used in the Republic of China. *Prerequisite: Chinese Studies 175.*

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: Chinese Studies 176 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 topics in Chinese Studies not covered in regular course work. Under the direction of a faculty member in Chinese Studies. *Prerequisite: consent of instructor.*

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 in Chinese Studies. *Prerequisite: consent of instructor.*

* For a description of lower-division language courses, see Language.

Classical Studies

OFFICE: Humanities and Social Sciences Building, Muir College
(Provost, Muir College)

Associate Professors:
Edward N. Lee, Ph.D. *(Philosophy) (Chairman)*
David K. Crowne, Ph.D. *(English, Comparative Literature)*

Assistant Professors:
Georgios H. Anagnostopoulos, Ph.D. *(Philosophy)*
Page Ann duBois, Ph.D. *(Classical and Comparative Literature)*
Alden A. Mosshammer, Ph.D. *(History)*

Lecturer:
Lawrence Waddy, M.A. *(Classical Languages, Literature)*

* * *

This program offers undergraduates an opportunity to study the cultures of Greece and Rome through the coordinated resources of the History, Literature, and Philosophy Departments. Included besides training in the Greek and Latin languages are courses in the history, literature, and philosophy of Greece and Rome, utilizing 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 at least two courses from each of the participating departments.

The Minor Program A minor in Classical Studies consists of six courses from those approved for the Program and listed below. A knowledge of Greek or Latin is not required. The minor will include Classical Studies 109: The Greco-Roman World, and three other courses, one from each of the participating departments.

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

Humanities 2. Jews and Greeks (4)

Classical Studies 109A-109B-109C. The Greco-Roman World (4-4-4)
An intensive study of the intellectual life of the Greco-Roman World with special emphasis on the development of the unique features of Greco-Roman literature, philosophy, historiography and art. A primary purpose will be to understand the relationships between the intellectural activity and the social and political environment in which it took place. *Prerequisite: sophomore standing. Not to be offered 1974-75*

History 100. The Ancient Near East and Israel (4)

History 101A-101B. Greece in the Classical Age (4)
(Not to be offered 1974-75.)

History 101Q. Special Topics in Ancient History (4)
A study in depth of selected problems and periods in ancient history. Topics will vary from year to year and students may repeat the course for credit with permission of instructor. *Prerequisite: one upper-division course in ancient history.* Topic for Fall, 1974: Greece before Solon.

History 102A-102B. The Roman Republic and Empire (4-4)

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/La. 100. Introduction to Latin Literature (4)
Prerequisite: Lit/La. 2 or equivalent.

Lit. 100. The Classical Tradition (4)
Greek and Roman literature in translation. Topics in Roman and Greek literature, read in translation. Topics will vary and students may repeat the course for credit with permission of instructor. Topic for 1974-75: Women in Antiquity.

Lit 199. Special Studies in Greek and Roman Literature (4)

Philosophy 101. History of Philosophy (4)
Greek philosophy to Aristotle.

Philosophy 102. History of Philosophy (4)
Greek and Roman philosophy after Aristotle.

Philosophy 103. Mythology and Philosophy (4)
Comparative study of ancient Near-Eastern mythologies and the earliest Greek philosophers.

Philosophy 199. Independent Study (4)

Graduate

History 204. The Literature of Greek History (4)

History 205. The Literature of Roman History (4)

History 205A-205B. Research in Greek History (4-4)

History 207A-207B. Research in Roman History (4-4)

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/Cl 297. Directed Studies in Greek or Latin Literature (1-12)

Lit/Cl 298. Special Projects in Greek or Roman Literature (4)

Philosophy 201. Topics in the History of Philosophy: Greek Philosophy (4)

Philosophy 202. Topics in the History of Philosophy: Hellenistic and Roman Philosophy (4)

Philosophy 290. Directed Independent Study (1-4)

Philosophy 295 Research Topics (1-2)

Communications

OFFICE: Building 411, Matthews Campus

Professor:
Herbert I. Schiller, Ph.D.

Assistant Professors:
Michael R. Real, Ph.D.
Benjamin K. T'sou, Ph.D. *Assistant Professor of Linguistics*
John Waterhouse, Ph.D. *(Coordinator of Communications), Assistant Professor of Literature*
Will H. Wright, Ph.D., *Assistant Professor of Sociology*

* * *

Claudio Fenner-Lopez, *Lecturer*
Susan U. Philips, *Lecturer*

* * *

The Communications Program at UCSD offers a campus-wide undergraduate major in communications. Most Communications courses are available also as electives for any advanced-standing student at UCSD.

Students in the Communications Program are concerned with human beings as message-and-symbol-using animals with the social contexts which shape these messages and symbols. In the most powerful way, communications systems may both reflect the values of a society and determine those values. Thus a central analytical ques-

tion 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 may be altered by the messages and symbols the mass media convey. In social contexts face-to-face interactions, similar analytical questions need to be asked: how are messages, responses, and counter-messages shaped by context, role, and by the medium itself, verbal or non-verbal.

The Communications segment of the Third College General Education 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.

Option B: Communications 20.

The Major Program To receive a major in Communications, the student must take 15 upper-division courses, at least six of which must be specifically in the Communications Program. The additional nine courses may be selected, with the approval of the Communications faculty, from campus-wide offerings in related disciplines. Of the Communications courses, at least one must be from each of the three sub-fields: Macro-communications, Micro-communications, and Media. Sample course offerings in each of the areas are listed below.

Macro-Communications Courses: Political Economy of Mass Communications, Films and Society, Communications Analysis and Research.

Micro-Communications Courses: Non-Verbal Communications, Language and Society, Audio-Visual Resources for Micro-Communications Research.

Media Courses: Television Documentaries, 16mm Film Workshop, Research Writing.

Many of the communications-related upper-division courses in related disciplines have required prerequisites. For that reason, Communications majors are urged to pick one or several departments and pursue a sequence of the courses listed below and, if necessary, others from that department to create a "sub-specialization" as part of their Communications major with the approval of a Communications faculty adviser. These courses have departmental range that includes: APIS, Anthropology, Drama, Economics, History, Linguistics, Literature, Music, Philosophy, Psychology, Sociology, Urban and Rural Studies, and Visual Arts. For a list of approved courses in these areas see the Communications Program office.

Courses

Lower Division

10. Composition (4)
Course attempts to zero in on the basic language problems particular to minority students and to deal with them on an independent basis. The curriculum will aim at four primary problematic areas in composition — differences between oral and written presentation, spelling and punctuation, grammatical differences; analysis and synthesis; and exposition. May be repeated for credit.

11. Composition (4)
Intensive course in reading and rhetoric limited to students recommended by the Provost.

12. Writing and Stylistic Analysis (4)
Emphasis on student writing and analysis of student writing within a framework of structured progression from stream-of-consciousness and interior monologue to objective writing about ideas, facts and concrete objects. This is done against a background of continuing analysis of non-fictional modes of prose writing by professional writers. ***Prerequisites: completion of another lower-division writing course.***

20. Communications (4)
An introductory communications perspective designed to create an awareness of the social institutions and processes that shape individual and group interaction. It will familiarize the student with the process of communications in the social context. Message transmission in its many forms will be analyzed, always relating to the social environment.

23. Introduction to Media Systems (4)
Introduction to principles, techniques and resources used in media. Application and development of communications theory through the use of materials, equipment, in the allied fields of film, television and radio.

60. Beginning Camera Techniques (4)
A fundamental course emphasizing the main problem of how to get the desired image onto the film. It will examine camera techniques and the kind of translation of vision a camera requires. Students will shoot and develop film and produce slides to examine the individual image or image sequences. There will be a brief introduction to printing.

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: basic communications sequence and consent of instructor.*** (F)

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.*** (W)

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)
A general introductory overview of the process of communication, both verbal and non-verbal and across social contexts. The course will focus on micro-communicative situations, intrapersonal and interactional, and will compare these with macro-communicative process as found in mass-media communications systems.

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, crtitical anmd descriptive theories.

108. Cable Television (4)
This survey/research course will explore the alternatives to traditional broadcast media. It will entail a survey of the economic and social impact of developments in communications technology. It will be concerned specifically with the design, finance and regulation of CATV, ½-inch videotape, cassettes, microwave and master-antenna systems, and will be supported by field research into systems planned and operating in San Diego County. ***Prerequisites: upper-division standing and consent of instructor.*** (Not offered 1974-75.)

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 and completion of a lower-division writing course.***

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. The Writing of Dramatic Materials for Television Production (4)
Course will consist of the writing of scripts and scenarios with an eye to their use in television production. The first four weeks of the course will deal with dramatic fabulation, the second four weeks with documentary narration. The last two weeks will involve the preparation and presentation, on videotape, of each student's project in either dramatic or documentary form, or a combination thereof. ***Prerequisite: consent of instructor.*** (Not offered 1974-75.)

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.

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. (Not offered 1974-75.)

153. American Journalism of Dissent (4)
An examination of American journalism from Tom Paine to the present day: its forms, relationship to established media, and impact on social change. ***Prerequisites: upper-division standing.***

154. Non-Verbal Communications (4)
The role of various forms of non-verbal communication, including gesture, dress, body alignment and socio-spatial arrangement in face-to-face interaction. Topics include the relationship between verbal and non-verbal forms of communications, and the relevance of animal communications studies to the analysis of human communications. ***Prerequisites: upper-division standing or consent of instructor.***

M155. Sociology of the West (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. ***Prerequisite: consent of instructor.***

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. ***Prerequisite: upper-division standing.***

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.

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. (Not offered 1974-75.)

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)
Introduction to finding and analyzing information about the mass-communications functions of private, public, and mixed structures and institutions on the loca, national, and international levels. Techniques for observing, collecting, processing, and implementing data. (S)

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 21, 22, 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. 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.***

194. Senior Seminar (4)
A research seminar on special topics of interest to participating staff. Provides communications majors with a context for research in close cooperation with faculty. ***Prerequisites: Communications majors with senior standing.***

195. Undergraduate Teching (4)
This course is offered to students with senior standing who wish to receive course credit for undergraduate instructional assistance. ***Prerequisite: senior standing.***

198. Independent Group Study (4)
Research seminars and research under the direction of a member of the staff. May be repeated for credit. ***Prerequisites: upper-division standing and consent of instructor.***

199. Independent Study (4)
Tutorial: individual guided reading and study in an area not covered by the present limited offerings. ***Prerequisites: upper-division standing and consent of the instructor.***

Comparative Studies In Language, Society, and Culture

OFFICE: 8016 Humanities and Social Sciences Building
Muir Campus

Doctoral Candidates in the Humanities, Social Sciences and Arts are, in this program, given the opportunity to design strongly interdisciplinary curricula on the basis of which they write their dissertations. The program requires of the student that he be admitted and fundamentally trained in one discipline and that "fundamentally trained" should be interpreted as fulfilling all of the Ph.D. requirements of the department into which he or she was originally admitted as a graduate student. In addition, he must complete M.A.-level work in a related discipline or culture area. From the point that he enters the program, the student's work is under the supervision of an interdisciplinary committee, which must approve his study and research plans and his 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. The chairman of the committee supervising the program is Melford Spiro, Department of Anthropology, to whom inquiries should be directed at the earliest during the student's first year of residency at UCSD.

Contemporary Issues

OFFICE: 2105 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 UCSD 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. The Wilderness (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 UCSD 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

100. The Origins and Results of the U.S. Space Program (4)
The political, technological, and strategic origins of the U.S. Space Program from its early beginnings will be presented, with special emphasis on the period from the end of World War II to Kennedy's decision to go to the Moon. The results of the program will be presented by the lecturer with an occasional help of guest speakers. Results to be discussed will include practical applications (e.g., communications, and monitoring arms control agreements) as well as scientific information. Mr. York (F)

190. Culture/Personality and the Education Process (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 topic for further check on reading materials and course of discussion. ***Prerequisite: Contemporary Issues 196, and consent of Director of Interdisciplinary Sequences.*** (F,W,S)

196. Contemporary Issues Workshop (2)
A workshop for potential discussion leaders in the Contemporary Issues Program. Students will investigate both possible topics for discussion and methods of presentation and instruction. Participation in the workshop does not guarantee that a student will be selected as a discussion leader. ***Prerequisite: consent of the director of Contemporary Issues Program.*** (F)

198. Directed Group Studies in Contemporary 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.

199. Special Studies in Contemporary Issues (2-4)
Individual reading and projects in the areas of contemporary concern. Term paper and/or completed project required. This class is given under special circumstances, e.g. student abroad. ***Prerequisites: permission of Muir Provost and Director of Interdisciplinary Sequences*** (F,W,S)

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: 2105 Humanities and Social Sciences Building
Lola Romanucci-Ross, Ph.D., *Director*

* * *

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-1B-1C, 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 CT sequence but provides him 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: UCSD Theatre, Building 203, Matthews Campus

Professors:
Eric Christmas, R.A.D.A.
Arthur Wagner, Ph.D. *(Chairman)*

Associate Professors:
Michael Addison, Ph.D.
Floyd Gaffney, Ph.D.

Assistant Professors:
Frantisek Deak, Ph.D.
Daniel Dryden, M.F.A.

* * *

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) elective courses for the general student desiring experiences in the dramatic arts; 3) a sequence of courses to fulfill the fine arts and humanities requirements in Revelle, Muir and Third Colleges; and 4) a series of courses fulfilling Revelle and Fourth College minor requirements.

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 and 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
Drama 150	Basic Design

Plus three upper-division courses in literature/history/criticism to be taken from offerings in the Literature or Drama Departments.

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.

Courses

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 (4)
Lectures and laboratories dealing with the technical aspects of theatre production: scenery, lights, costumes, the designer, the director, the stage manager, etc.

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.***

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.

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.

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.***

125. Movement for the Actor (2-4)
Intensive exploration of the physical range and capabilities of the actor, development of techniques and skills that

enable the actor to employ his body as an expressive instrument at the service of the dramatic text and theatrical event. Theatrical theories of Brook, Grotowski, Spolin, Chaikin, and Artaud. *Prerequisite: Premission 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 instructor.*

140A-140B. History of the Theatre (4-4)
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. A — Greeks through Elizabethans, B — Renaissance through Modern. *Prerequisite: Upper-division standing or consent of the instructor.*

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.*

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.*

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. Discussion of various techniques in painting and renderings. Exercises and practical experience in scenic design, model making, elevations, and scene painting for productions. *Prerequisite: 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.*

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.*

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 his junior year, a student will select his courses in consultation with the Earth Sciences advisers in the Geological Sciences Group in the Scripps Institution of Oceanography and his own department. In most instances he may be able to substitute 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. *No prerequisites.*

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. (S)

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, reconstitution, 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, occasional field trips. Mr. J. Hawkins and Mr. W. Berger (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. (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. (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. *Prerequisites: Earth Sciences 102 or concurrent registration.* 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: 3412 Humanities-Library Building

Professors:
Richard Attiyeh, Ph.D. *(Chairman)*
Clive W. J. Granger, Ph.D.
John W. Hooper, Ph.D. *(Director of Undergraduate Studies)*
Daniel Orr, Ph.D.

Associate Professors:
Donald V. T. Bear, Ph.D. *(Director of Graduate Studies)*
John Conlisk, Ph.D.
Ramachandra Ramanathan, Ph.D.

Assistant Professors:
Richard Emmerson, Ph.D.
Wolfhard Ramm, Ph.D.
Richard Schmalensee, Ph.D.
Dennis Smallwood, Ph.D.

Lecturer:
Donald W. Katzner, Ph.D.

* * *

The 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-1B-1C, or 2A-2B-2C. At least 12 upper-division courses in economics must be taken, including Economics 100A, 100B, 110A, 110B, and either 120A-120B or 129, or Mathematics 181A-181B. These courses introduce the major to basic tools and concepts which have applicability to a wide variety of real-world problems. History 158A-158B 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.

It is recommended that majors take Mathematics 1A-1B-1C or the equivalent before beginning upper-division course work in economics as they are prerequisites for some required upper-division economics courses.

The economics major is encouraged to discuss his elective courses and choice of minor with the Director of Undergraduate Studies. 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 his upper-division program, the prospective economics major should consult with the Director of Undergraduate Studies during the year in which he or she takes the Economics 1 or 2 sequence. It is often convenient to commence with the 100 or 110 sequences or both.

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, 1B, 1C or 2A, 2B, 2C:

1. if either sequence is used to satisfy the Revelle College social-science requirement, the economics minor must include six upper-division courses;
2. otherwise, the minor must include either elementary sequence, plus any three upper-division courses.

The Department of Economics is also willing to cooperate with other departments in the formulation of an integrated project minor for which the work is done in two or more related disciplines. (See ***Revelle College: Noncontiguous Minor.)***

Students who wish to pursue a noncontiguous minor involving the Department of Economics should consult with the Director of Undergraduate Studies (minor adviser) as early as possible.

The Graduate Program There is a Ph.D. degree program, but no master's degree program. However, a master's degree program is currently being planned by the Department. To receive a Ph.D., a student must pass qualifying examinations 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 courses 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 Graduate Adviser in Economics, care of the Department of Economics. Residence and other campus-wide regulations are described in the Graduate Division section of this catalog.

Courses

Lower Division

1A-1B-1C. 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-2B-2C. Introduction to Economics Analysis (4-4-4)
The content of this course approximates that of the 1 sequence, but analytical methods are stressed. Open only to students with Mathematics 1A-1B-1C or the equivalent, and intended principally for mathematics, engineering, physics or economics majors Either 1A-1B-1C or 2A-2B-2C or the equivalent is required of all majors and minors in economics.

3. Mathematical Methods for Economists (4)
Elementary mathematical methods useful in economics. Designed for students without calculus-level mathematics desiring to do upper-division work in economics. Closed to students with Mathematics 1B or the equivalent. ***Prerequisite: consent of instructor.*** (Not to be offered 1974/75)

10. Principles of Economics (4)
A relatively intensive though, for the most part, nonmathematical introduction to economic theory, designed to prepare students having taken Economics 14 for upper-division work. Closed to students without Economics 14. ***Prerequisite: Economics 14.*** (Not to be offered 1974/75)

14. Economics of Housing (4)
An introduction to economic principles and analysis through the study of the economic aspects of housing. Supply, demand, employment impact, and welfare considerations will be emphasized. (Not to be offered 1974/75)

Upper Division

100A-100B. Mircroeconomics (4-4)
Household and firm behavior as the foundations of demand and supply. Market structure and performance, income distribution, and welfare economics. ***Preprequisites: Economics 1A-1B-1C or 2A-2B-2C, and Mathematics 1A-1B-1C or Economics 3 or the equivalent.***

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 1A-1B-1C or 2A-2B-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 100A-100B.***

107.Invention, Innovation and Technical Change (4)
Research and development activity; market structure and technical change; the role of technical change in economic development; appropriate government policies to foster technical change in the private sector. ***Prerequisites: Economics 100A-100B.*** (Not to be offered 1974/75)

110A-110B. 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 1A-1B-1C or 2A-2B-2C and Mathematics 1A-1B-1C or Economics 3 or the equivalent.***

111A-111B. Financial Institutions and Monetary Policy (4-4)
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 110A-110B.***

113. Mathematical Economics (4)
Mathematical concepts and techniques used in advanced economic analysis; applications to selected aspects of economic theory. ***Prerequisites: Economics 100A-100B, and Mathematics 2A-2B-2C or their equivalents.***

115A-115B. 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 problems of the times. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-2C.*** (Not to be offered 1974/75)

116A-116B. Economic Development (4-4)
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 1A-1B-1C or 2A-2B-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 1A and Mathematics 1C or equivalent, or consent of instructor.***

118. Law and Economics (4-4)
Economic analysis of the rationale for and actual effects of the legal system as it relates to economic activity. Legal foundations of the U.S. economy, attempts to control business practices through legislation, and direct regulation of particular industries will be studied. ***Prerequisites:***

Economics 1A-1B-1C or 2A-2B-2C.

120A-120B-120C. 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 1A-1B-1C or 2A-2B-2C and Mathematics 1A-1B-1C.***

129. Research Methods in Economics (4)
An introduction to statistical methods useful in applications of economics. Stress will be on concepts and applications, not on mathematical rigor. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-2C, and Mathematics 1A-1B-1C or Economics 3.***

130A-130B-130C. 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: 1A-1B-1C or 2A-2B-2C.***

135. Urban and Regional Economics (4)
The economics of location: transport demand in relation to the layout of the city; the determinanants of interregional economic specialization; central-place theory; industrial complex analysis. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-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 1A-1B-1C or 2A-2B-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 1A-1B-1C or 2A-2B-2C.***

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 1A-1B-1C or 2A-2B-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. ***Prerequisitess: Economics 1A-1B-1C or 2A-2B-2C.***

140A. Economic History (4)
Surveys the economic history of Europe from the fall of the Roman Empire to the onset of the Industrial Revolution, with emphasis on the critical analysis of the relationships among the main social institutions, land settlement, and economic growth. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-2C.*** (Not to be offered 1974/75)

140B. Economic History (4)
Concentrates on American economic history from 1790, with emphasis on the role of economic policy and on the quantification of economic change. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-2C.*** (Not to be offered 1974/75)

150. Public Finance (4)
An analysis of the effects of government tax and expenditure policies on resource allocation and the distribution of income, the public debt; economic and political determinants of optimal public expenditure policies. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-2C.***

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 1A-1B-1C or 2A-2B-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 1A-1B-1C or 2A-2B-2C.***

161. Comparative Economic Systems (4)
Capitalism and socialism, studied as ideal models and in actual performance. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-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 1A-1B-1C or 2A-2B-2C.***

166. Marxist and Radical Economics (4)
Theories and ideologies in relation to practice in various economies; analysis of the views of economic thinkers in the Marxist and radical traditions. ***Prerequisites: Economics 1A-1B-1C or 2A-2B-2C.*** (Not to be offered 1974/75)

167. Problems in the Social Sciences (4)
Concerned with approaches taken by economists and other social scientists in analyzing problems that lie on the boundaries of traditional disciplines. Some mathematics concepts will be developed in the course. ***Prerequisite: upper-division standing.***

170. 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. ***Prerequisites: Economics 1A-B-C or 2A-B-C.***

171. 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 100A.***

172. 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 100A.***

173. 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. ***Prerequisites: Economics 100A, 170.***

175. Management Science: Decision-Making under Uncertainty (4)
Develops the principles, with applications to economics and business, which explain and underlie rational decision-making under uncertainty. Includes an introduction to statistical concepts as they relate to such decision-making. The course involves quantitative concepts, but calculus will not be employed. ***Prerequisites: Economics 1A-B-C or 2A-B-C.***

176. Management Science: Linear Programming and Games (4)
An introduction to linear programming, the most commonly employed managerial optimization technique. Methods of solving linear programs and interpreting solutions will be stressed, along with business applications. This analytical structure is applied to the theory of games. *Prerequisite: Economics 100A.*

177. Management Science: Dynamic Optimization (4)
Introduces certain quantitative planning techniques and applies them to problems of managing current and fixed (capital) assets, including privately and publicly owned natural resources. Queueing and inventory models will be discussed as they arise in applications. *Prerequisites: Mathematics 1C or equivalent, Economics 175-176, or consent of instructor.*

190A-190B-190C. 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. *Prerequisite: consent of instructor.*

195A-195B-195C. 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 B average in upper-division economics work. *Prerequisites: consent of department chairman and course instructor.*

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-200B-200C-200D-200E. Microeconomics. (4-4-4-4-4)
Background mathematical techniques, consumer theory, theory of the firm, theory of markets, general equilibrium and welfare theory.

201A-201B. International Trade (4-4)
Theory of international trade, finance, and monetary relations. Growth, disturbances, and balance of payments adjustment. International economic policy and welfare.

205A-205B. Industrial Structure and Performance (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: consent of instructor.*

210A-210B-210C-210D. Macroeconomics (4-4-4-4)
Classical and Keynesian theories of employment, income, interest rate, price level, and other aggregate variables. Macroeconomic policy. Growth theory.

211A-211B. Monetary Theory and Policy (4-4)
Macroeconomic models of the monetary sector. Microeconomic foundations of aggregate asset supply and demand. Regulation of financial institutions. Interaction of monetary and fiscal policy. Monetary behavior in open and closed economies.

213A-213B. Advanced Economic Theory (4-4)
An intensive examination of the literature on selected topics of current importance in economic theory. *Prerequisites: 200 and 210, or consent of instructor.*

216A-216B. Economic Development and National Planning (4-4)
Analysis of conditions necessary for increasing income, employment, and capital formation in "underdeveloped" areas. Techniques useful in planning, e.g., input-output analysis and programming. *Prerequisites: Economics 200C and 210C, or consent of instructor.*

220A-220B-220C-220D-220E-220F. Econometrics (4-4-4-4-4-4)
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-221B. Advanced Econometrics (4)
Errors in variables. BLUS procedure. Forecasting. Formulation and interpretation of econometric models. Probit, logit, and Tobit analysis. Bayesian analysis. Principal components. Canonical correlation. Discriminant analysis. *Prerequisite: consent of instructor.*

237A-237B. Income Distribution (4-4)
Facts and measurement. Probability models. Factoral distribution. Wealth, human capital, and the size distribution. Discrimination. Distributive impacts of unions. Redistributive policy. *Prerequisite: consent of instructor.*

250A-250B. Public Economics (4-4)
Analysis of the impact of the government budget upon resource allocation and income distribution; social choice and political processes; tax and transfer policies and intertemporal income distribution; the problem of public goods in a private market economy.

251A-251B. Public Expenditure Analysis (4-4)
Applications of public economics to the evaluation of government activities. Benefits and costs, methods of quantification. Allowance for time, uncertainty, market imperfections, and distributional impacts. *Prerequisite: 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.)

290A-290B-290C. 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.)

297. Independent Study (1-6)
(Satisfactory/Unsatisfactory grades permitted.)

299. Research in Economics for Dissertation (1-12)
(Satisfactory/Unsatisfactory grades permitted.)

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)*

Abraham I. Braude, M.D., Ph.D. *(Medicine and Pathology)*

Russell F. Doolittle, Ph.D. *(Chemistry)*

Richard W. Dutton, Ph.D. *(Biology)*
Morris E. Friedkin, Ph.D. *(Biology)*
John J. Holland, Ph.D. *(Biology)*
Cecil Hougie, M.B. *(Pathology)*
Harvey A. Itano, M.D., Ph.D. *(Pathology, Chairman of Group)*
Oliver W. Jones, M.D. *(Medicine)*
Nathan O. Kaplan, Ph.D. *(Chemistry)*
Peter W. Lampert, M.D. *(Pathology)*
Averill A. Liebow, M.D. *(Pathology)*
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)*
Alfred Zettner, M.D. *(Pathology)*

Associate Professors:
Colin M. Bloor, M.D. *(Pathology)*
Charles D. Davis, M.D. *(Pathology, in residence)*
Sidney L. Saltzstein, M.D. *(Pathology, in residence)*
Melvin I. Simon, Ph.D. *(Biology)*
Charles J. York, D.V.M., Ph.D. *(Pathology)*

Assistant Professors:
Katsumi Miyai, M.D., Ph.D. *(Pathology)*
James A. Robb, M.D. *(Pathology)*
Harley D. Sybers, M.D., Ph.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, Medicine, Pathology, 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 faculty advisor. 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.

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. (S)

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, cities as organisms. To find solutions to social and environmental problems it is first necessary to analyze these problems. (S)

113. Frontiers of Modern Medicine (4)
An integrated series of lectures and readings covering the modern frontiers of medical research. Lectures to be given by members of the faculty of the School of Medicine to acquaint the student with on-going problems in modern health research.

119. Energy Production and Utilization (4)
Resource estimates for fossil-fuel, nuclear, hydro-electric and other energy sources. Application technologies of energy sources. Development of new technologies (e.g., fast-breeder reactors, fusion power, solar-energy utilization, wind power, coal gasification, etc.). Past, current and estimated future utilization trends. Impact of environmen-

tal and economic considerations on energy use. Global, national and regional energy policies.

120. Frontiers of Science: History, Science & Technology in Marine Archaeology (4)
History, prehistory, geological and marine science and technology in marine archaeology. Sub-marine search, technologies, ocean currents, marine weather, chemistry, glaciation, dating techniques, etc. are interrelated with history and prehistory of marine peoples and with discoveries in, and the future of, marine archaeology.

121. Physics and Power (4)
This course is concerned with the contribution that physics can make to solving the power problems of our society. A survey of present energy sources and a discussion of their limitations will be followed by a study of novel potential energy sources, such as tides, geothermal energy, thermonuclear fusion and solar power.

History

OFFICE: Room 5024, Humanities and Social Sciences Building

Professors:
Guillermo Cespedes, Ph.D.
* Gabriel Jackson, Ph.D.
Allan Mitchell, Ph.D.
Armin Rappaport, Ph.D.
Ramon Eduardo Ruiz, Ph.D.
(Chairman)
Harry N. Scheiber, Ph.D.

Associate Professors:
Stanley Chodorow, Ph.D.
Michael Parrish, Ph.D.
Edward Reynolds, Ph.D.
Barbara Shapiro, Ph.D.

Assistant Professors
• Robert Edelman, Ph.D.
Cissie Fairchilds, Ph.D.
++ Susan Kleinberg, Ph.D.
David Luft, Ph.D.
Roberta T. Manning, Ph.D. (Visiting)
Thomas A. Metzger, Ph.D.
Michael P. Monteon, Ph.D.
Alden Mosshammer, Ph.D.
Paul Pickowicz, Ph.D.
Robert C. Ritchie, Ph.D.
Emory Tolbert, Ph.D.

Acting Assistant Professors
Richard Romo, M.A.

Senior Lecturer
Trevor Colbourn, Ph.D. (Visiting)

* Leave of Absence, 1974-75
• Leave of Absence, Winter and Spring Quarters, 1974
++ Leave of Absence, Spring Quarter, 1974

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 4A-4B-4C (The West and the Third World in Modern Times)

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 an honors program for outstanding history majors. The Department chooses honors candidates at the end of the Winter Quarter from among juniors in history who have taken at least four upper-division courses in the Department. Students with a 3.5 GPA in history (3.0 overall) are eligible. Students who apply for admission to the program are accepted on the basis of their grades and the recommendation of professors with whom they have worked.

The honors program consists of a seminar in historiography for all honors students given in the Spring Quarter of their junior year. In their senior year, honors candidates choose a field adviser in the Department,

with the approval of the honors committee and write a thesis under his/her direction. Thesis work receives double course credit and must be completed by the end of the Winter Quarter of the senior year. In the final quarter of the program, all honors candidates participate in an Honors Colloquium devoted to the oral presentation of the theses and to study for general honors examinations held at the end of the Spring Quarter of the senior year.

Honors in history are granted to a student whose thesis is approved by the Department acting in conjunction with the thesis adviser and whose performance on the general examinations is satisfactory. The Department reserves the right to drop a student from the honors program if his/her GPA in history falls below 3.0 or if work in the historiography seminar is unsatisfactory.

Students who enter the honors program will organize their work in the following way:

1. four quarter courses in one of the fields offered by the Department;
2. two quarter courses in a field other than the primary one;
3. a seminar in historiography taken in the Spring Quarter of the junior year;
4. four quarter course credits for thesis work undertaken in the Fall and Winter Quarters of the senior year;
5. an honors colloquium taken in the Spring Quarter of the senior year.

The Graduate Program

Master's Degree Program

The Department offers programs in the social/ethnic history of the United States and the history of Third World countries leading to the M.A. degree under the comprehensive examination plan. A student is required to complete 36 units of work in consultation with an adviser, and to pass an oral comprehensive examination administered by the Department. Students must pass a language proficiency examination for the program in Third World history but not in social/ethnic history of the United States.

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 first day of February.

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:

I. European History
A. Major Fields
   1. Modern Europe with a specialty in Spain, France, Germany, social history, or intellectual history
   2. Early Modern Europe with a specialty in expansion of Europe
   3. Medieval Europe with a specialty in political theory, canon law, or the polities 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 discipline

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 Europe or Hispanic World 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.
3. Students concentrating in United States history must pass one foreign language examination, usually in French, German or Spanish. Additional languages may be required for dissertation research. In addition to passing one foreign language examination, students must also complete two courses in a discipline other than history. Students may in some instances be permitted to substitute a second foreign language for this extra-disciplinary requirement.
4. Students must pass at least one foreign language examination by the end of the first year of study. Failure to meet this requirement may be grounds for dismissal from the program. No student can be permitted to take the Preliminary Examination before the completion of one language requirement, nor the Qualifying Examination before the completion of all language and extra-disciplinary 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 History

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 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 UCSD 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 examintion 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.

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 UCSD, there may be appropriate adjustments in the course work. Nevertheless, all 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-1B-1C. 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-3B-3C. 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.

4A-4B-4C. The West and the Third World in Modern Times. (4-4-4)
A lecture-discussion course on the impact of Europe and America on traditional Third World societies and their modern responses. In 1974/75 the course will deal with Africa, China and the United States.

7A-7B-7C. 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-30B-30C. 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. Topics are introduced by a series of lectures designed to establish the necessary context, but the emphasis is on the problems

themselves. Each of these is studied in small class groups, with special attention given to written work.

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.).

101A-101B. 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 1974-75.)

101Q. Special Topics in Ancient History (4)
See *Colloquia*, below.

102A-102B. 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.

104A-104B. 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-105B. 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.

106A-106B. Early Modern European History. (4-4)
A lecture-discussion course on Europe in the seventeenth and eighteenth centuries, examining the social and political institutions of the ancien regime and the emergence of rationalism and the modern state. ***Prerequisite: upper-division standing or permission of the instructor.***

107A-107B. 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.

108A-108B. Europe: 1750-1870 (4-4)
The impact of industrialization and the entry of new classes into politics. Effects of political, social, and economic change on both the domestic and the international order of the European states. 108A covers 1750-1814; 108B covers 1815-1870. ***Prerequisite: Humanities sequence or equivalent.***

109A-109B. 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 The Soviet Union in the 1920's (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. 123A covers 1470-1603, 123B 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.

114. 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 include Sorel, Weber, Freud, and Mann. ***Prerequisite: upper-division standing or permission of the instructor.***

114Q. Special Topics in Modern European Intellectual History (4)
See *Colloquia*, below.

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.

116. The Era of the French Revolution (4)
France and Europe from the late Old Regime to the advent of Bonaparte. Emphasis falls upon intellectual and social forces. ***Prerequisite: upper-division standing or permission of the instructor.***

118. The Austrian Empire: 1809-1918 (4)
A course on the political, social, and cultural history of the Hapsburg Empire in the nineteenth century, with special emphasis on the distinctive achievements of the multinational state after 1867. ***Prerequisite: upper-division standing or permission of the instructor.***

119. Modern German Intellectual History (4)
The course will examine major figures such as Hegel, Marx, Nietzsche, and Weber within the broader context of German institutional, social, and cultural history. ***Prerequisite: upper-division standing or permission of the instructor.***

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.***

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.

123. Social and Political Thought on the European Continent: 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.***

125A-125B. Tradition and Modernity in Europe and China (4-4)
Dealing comparatively with Europe and China from late medieval times to the present, this course focuses on the traditional patterns of intellectual, economic, and political life in these two civilizations and on the transformation of these patterns in modern times. ***Prerequisite: upper-division standing or permission of the instructor.***

125Q. Colloquium on the Spanish Civil War (4)
See *Colloquia*, below.

129Q. History of Law in Philosophical Perspective (4)
See *Colloquia*, below.

134. 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.***

134Q. Colloquium on Medieval and Renaissance Spain (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.***

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: 135 or permission of the instructor.***

136Q. Colloquium on Spain since 1790 (4)
See *Colloquia*, below.

137A-137B. 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. Agrarian Societies of Latin America, 1825-1930 (4)
The evolution of rural areas in Latin America after Independence: the expansion of agricultural exports, the subjugation of Indians and peasants, the persistence and final abolition of slavery, and the origins of the movements for land reform. ***Prerequisite: upper-division standing or permission of the instructor.***

145Q. Violence and Instability in South America (4)
See *Colloquia*, below.

146A-146B. 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.***

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.

147Q. Topics in Spanish American History, since 1910 (4)
See *Colloquia*, below.

148. The City in South America, 1880-1970 (4)
The evolution of several of the largest South American cities; the lectures will examine the impact of these cities on their country's social and economic progress. Students will be encouraged to do research on a particular South American city. ***Prerequisite: upper-division standing or permission of the instructor.***

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. ***Prerequisite: upper-division standing or permission of the instructor.***

151Q. Colloquium in Nineteenth Century United States History (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-156B. 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-157B. 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-158B. 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-159B. 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.***

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-164B. American Intellectual History, to 1860 (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 religous 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.***

165. American Intellectual History, from 1860 (4)
American thought in post-Civil War period, and some major trends in social, economic, political, and religious thought of the twentieth century. Developments in American philosophy, the social sciences, and literature. ***Prerequisite: Humanities sequence or its equivalent.***

167A-167B. 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.

169A-169B. 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.***

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.

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.***

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.***

180. History of Early Imperial China. (4)
The course deals with the genesis of Chinese thought and institutions in Shang and Chou times, Han political structure and thought, and the rise of Buddhism.

180Q. Topics in the History of Imperial China. (4)
See *Colloquia*, below.

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 ideol-

ogy, the tension between city and countryside, Maoism, the Great Leap Forward, and the Cultural Revolution. *Prerequisite: upper-division standing or permission of the instructor.*

185A. Institutional and Economic History of Early Imperial China. (4)
Covering the period 1000 B.C.-1000 A.D., this course deals with the technology of economic production, the organization of peasant agriculture, the relations between patterns of land tenure, taxation, and commerce; the economic role of the state; the question of capitalism; and other social and political aspects. *Prerequisite: History 180.*

185B. Institutional and Economic History of Late Imperial China. (4)
Covering the period 1000 A.D.-1850, this course deals with the same topics as History 185A. *Prerequisite: History 180.*

186. China's Intellectual History in Late Imperial Times (4)
This course focuses on the development of Confucian thought in Sung times, the metaphysical and political issues discussed in Ming and Ch'ing times, and the first attempts to deal with Western ideas. *Prerequisite: History 180A or permission of the instructor.*

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.*

189Q. Special Topics in Modern Chinese History (4)
See *Colloquia*, below.

190A-190B-190C. 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.*

196A. History Junior Honors Seminar (4)
The four-quarter sequence constitutes the course requirement for the undergraduate honors program in the Department of History. During the first quarter (Spring Quarter of the Junior Year) honors candidates participate in a seminar devoted to the critical analysis of classic historical works and to the study of the techniques of research and writing in history. *Prerequisite: permission of the instructor.*

196B. Thesis Direction (8)
The second quarter of the undergraduate honors program in the Department of History. This quarter is devoted to the preparation of an honors thesis based on the candidate's own investigation of an historical problem. *Prerequisite: permission of the instructor, 196A.*

196C. Thesis Direction (8)
The third quarter of the undergraduate honors program in the Department of History. This quarter is devoted to the completion of an honors thesis based on the candidate's own investigation of an historical problem. *Prerequisite: permission of the instructor, History 196A, 196B.*

196D. History Senior Honors Colloquium (4)
The fourth and final quarter of the undergraduate honors program in the Department of History. The colloquium of the final quarter provides the candidate a forum for presenting and defending the paper before fellow students and members of the faculty. *Prerequisite: permission of the instructor, History 196A, 196B, 196C.*

197. History and Historians (4)
The nature and uses of history will be explored through the study of the historian's craft, and the critical analysis of historical sources and historical literature relating to selected topics in European, American, and non-Western history. The course will be taught by different faculty members each year in various fields.

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 Ancient History (4)
A study in-depth of selected problems and periods in ancient history. Topics will vary from year to year and students may therefore repeat the course for credit with the permission of the instructor. Topic for fall 1974: Greece before Solon. *Prerequisite: upper-division or graduate standing.*

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.*

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.*

110Q. The Soviet Union in the 1920's (4)
Was the degeneration of the Revolution necessary? The fate of cultural and social experimentation in view of the realities and necessities facing the Soviet Union after the Civil War (1921). *Prerequisite: upper-division or graduate standing.*

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.*

114Q. Special Topics in Modern European Intellectual History (4)
Topics vary. *Prerequisite: upper-division or graduate standing.*

120Q. Colloquium in Nineteenth-Century Europe (4)
This course alternates with History 121Q, and the topics of these will vary from time to time. Topic for 1974-75: France in Tocqueville's 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.*

125Q. 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: fluent reading knowledge of Spanish or French, 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.*

134Q. 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. *Prerequisite: fluent reading knowledge of Spanish or French; upper-division or graduate standing.*

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.*

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.*

145Q. Violence and Instability in South America (4)
Will explore the interrelationships between violence — civil turmoil as well as institutional wars — and the social and political instability of South America. *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.*

147Q. Topics in Spanish American History, since 1910 (4)
Topic will vary from year to year. *Prerequisite: upper-division or graduate standing.*

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.*

151Q. Colloquium in Ninteenth-Century United States History (4)
Readings in selected topics in American history in the national period to 1877. *Prerequisite: upper-division or graduate standing.*

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.*

167Q. Colloquium in Twentieth-Century American History (4)
Leading works on Progessivism, New Deal, Depression and American foreign policy will be considered and discussed. The emphasis will be on historiography. *Prerequisite: 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.*

180Q. Topics in the History of Imperial China. (4)
Readings in intellectual, institutional, and economic history. *Prerequisite: 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.*

Graduate

204A-204B. 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. *Prerequisite: graduate standing; reading knowledge of French, German, Italian or Latin.*

207QA-207B. 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.*

220A-220B. Topics in Modern European History (4-4)
Prerequisite: graduate standing or permission of the instructor.

234A-234B. Readings in Spanish History Since 1790 (4-4)
Study of major Spanish historians of the nineteenth and twentieth centuries. *Prerequisite: graduate standing; reading knowledge of Spanish essential.*

235A-235B. Research Seminar on the Spanish Civil War (4-4)
Detailed study of the historiography of the Civil War followed by preparation of a research paper on a topic agreed upon by the instructor and each individual student. The Southworth Collection will be used extensively. *Prerequisite: graduate standing; fluent reading knowledge of Spanish required, German or French desirable.*

237A-237B. Seminar in Colonial Latin America (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-246B. 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. *Prerequisite: graduate standing.*

250A-250B-250C. 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-258B. 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-261B. United States, Colonial Period (4-4)
Prerequisite: graduate standing.

266A-266B. 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-267B. 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. *Prerequisite: graduate standing.*

268A-268B. America in the Twentieth Century (4-4)
A two-quarter research seminar focusing upon the political, constitutional, and social history of the United States in the twentieth century. Students will receive training in the archival sources and research techniques relevant to the study of selected aspects of the progressive movement and the New Deal. The second quarter will be devoted to writing of individual research papers. *Prerequisite: graduate standing.*

269A-269B. 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-277B. 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 theses. *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. Supervised teaching in sections of the undergraduate Humanities 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 grading of examinations and other written exercises, and student relations.

Humanities

OFFICE: 1512 Humanities-Library Building

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This sequence of courses is to be used by Revelle College students in fulfilling the humanities requirement of the college. It is offered jointly by the Departments of Literature, Philosophy and History, and has the purpose of introducing the student to his cultural heritage. He will learn to interpret major literary, historical and philosphical documents through lectures and discussions, as well as through the writing of themes.

One aim of the course is to develop the student's ability to write clear and well-ordered expository prose. In each quarter, students read approximately 1,500 to 2,000 pages and write three themes of approximately 1,000 words each plus a final examination. The reading assignments are divided equally among the fields of literature, philosophy and history. No fewer than five or more than 10 different authors are read per quarter.

Beginning Fall 1974 there will be other options available for meeting the Humanities requirement with Literature, History, Philosophy, Drama, Music, Visual

Arts course sequences. (See the Humanities Department or the Office of the Provost, Revelle for course listings applicable to the requirement.)

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

2. Jews and Greeks
Readings from the Bible, Homer and the Greek dramatists, historians and philosophers. Two lectures, one discussion, regular assignments in expository writing. (F)

3. Rome and the Middle Ages
Documents in the literature, philosophy and history of Rome and Medieval Europe. Two lectures, one discussion, regular assignments in expository writing. (W)

4. The Renaissance
Documents in the literature, philosophy, and history of the Renaissance. Two lectures, one discussion, regular assignments in expository writing. (S)

5. Classicism and Enlightenment
Documents in literature, philosophy and history of the seventeenth and eighteenth centuries. Two lectures, one discussion, regular assignments in expository writing. (F)

6. The West after the French Revolution
Documents in the literature, philosophy and history of the nineteenth century. Two lectures, one discussion, regular assignments in expository writing. (W)

7. The Present Age
Analysis of some major twentieth-century books and cultural trends. Two lectures, one discussion, regular assignments in expository writing. (S)

Interdisciplinary

OFFICE: Provost, Revelle College

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Courses

(Also see *Earth Sciences* and *Frontiers of Science)*

45. Introduction to Religious Studies
Course is designed to introduce the student to the scholarly study of religion in a variety of contexts; historical, social, scientific, philosophical, literary, and artistic. (F,W)

196. Tutoring, Teaching and Academic Learning
The intellectual and relational aspects of teaching will be surveyed. Emphasis will be placed on learning theory and information organization. The theoretical material from the course will be applied to tutor-student relationships. Participation in the tutorial program is required for class membership. (Course may be repeated but not for credit.) (F,W,S)

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 UCSD should enroll in Language 1. A student who has studied a language previously must take a placement test given by the UCSD Testing Office if he wishes to continue his study of that language at UCSD. His placement within the Language course sequence or in Literature 10 or 11 will be determined by the results of that examination.

Placement into langage or literature courses will be as follows:

COURSE	PREREQUISITES PLACEMENT SCORE
Lang 1	0-400
Lang 2	410-500
Lang 4*	500-550
Lit 10	550-650
Lit 11	650 plus

**** Students who have achieved 500 on the CEEBS examination in Russian should take Literature/Russian 9.***

Courses numbered Language 11 are intended for students whose only concern is to learn to read a language, and graduate students preparing to fulfill their graduate reading examination requirements.

The language laboratory and language library at UCSD 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 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 51. Elementary Cantonese (4)
Basic grammar and usage with initial emphasis on the spoken language. The written language will be progressively incorporated.

Lang/Ch 52. Elementary Cantonese (4)
Continuation of Lang/Ch 51. *Prerequisite: Lang/Ch 51 or equivalent.*

Lang/Ch 53. Elementary Cantonese (4)
Continuation of Lang/Ch 52. *Prerequisite: Lang/Ch 52 or equivalent.*

Lang/Ch 71. Intermediate Cantonese (4)
Usage and grammar with equal emphasis on the written language and spoken language. *Prerequisite: Lang/Ch 53 or equivalent.*

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.*

See also:
Chinese Studies/154. Intermediate Cantonese (4)
Chinese Studies/159. Mandarin for Cantonese Speakers (4)
Chinese Studies/164. Intermediate Mandarin (4)
Chinese Studies/175. Readings in Contemporary Chinese I (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. Introduction to 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 UCSD language requirements.)

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 (4)
A course designed to prepare students for graduate reading 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 (4)
A course designed to prepare students for graduate reading 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 also:
Department of Literature
Lit/Gr. 1. Beginning Greek (4)
Lit/Gr. 2. Intermediate Greek (4)

Hebrew

Lang/He E1-E2-E3 Hebrew (4-4-4)
Lang/He E4 Intermediate Hebrew (4)

See also:
Department of Literature
Lit/He 10. Readings and Interpretations (4)

Italian

See also:
Department of Literature
Lit/It. 1, 2 Beginning Italian (4-4)
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

Lang/Ru Elementary Russian Reading (4)
A course designed to prepare students for graduate reading examinations. (F,W,S)

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) 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, Panjabi, 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:
Edward Klima, Ph.D. *(Chairman)*
Leonard Newmark, Ph.D.

Associate Professors:
Sige-Yuki Kuroda, Ph.D.
Ronald W. Langacker, Ph.D.
Margaret H. Langdon, Ph.D.
Sanford Schane, Ph.D.

Assistant Professors:
Paul Chapin, Ph.D.
Matthew Y-Ch Chen, Ph.D.
Timothy S. Smith, Ph.D.
Benjamin K. T'sou, Ph.D.

* * *

Broadly speaking, linguistics is simply 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 a student the background that will best prepare him 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 relatively few 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 1A-1B; 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 through achieving a score of 550 or more on the CEEBS reading proficiency examination administered by the UCSD Testing Office as well as passing an oral interview administered by the UCSD Basic Language Program. He must also pass the ETS Graduate School Foreign Language Test in the same language during his last year of undergraduate study. Passing performance on this examination is defined as a score of 500 or better.

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 additional upper-division courses related to the study of language. These six additional 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 for each student on the basis of his specific program. The classification of his 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 1A-1B (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 Major Program

(1) Language Requirements I and II.(not including Linguistics 100).

(2) Six upper-division courses in linguistics (not including Linguistics 100).

(3) Six additional 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 Major

Formal Linguistics Area:
Phil 110; Math 80, 111, 160, 161, 180, APIS 119, 161, 165, 167; Anthro 112; Psych 148.

Psycholinguistic Area:
Psych 10, 11, 107, 147, 138.

Sociolinguistic Area:
Anthro 105, 106, 118, 121; Soc 103, 106, 107, 116.

General Semiotic Area:
Lit 191; Phil 104, 112, 130; Commun 152, 183, 190; Vis Arts 131; Hist 190; 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:
Hist 137, 146, 179, 182.

Applied and Non-experimental Social Science Area:
Literature 195, Anthro 105, 106, 118, 121, Soc 103, 106, 107, 116.

Psychology of Language and Quantitative Analysis Area:
Psych 10, 11, 107, 147, 138, 148; Math 80, 160, 161, 180,

181; Anthro 112; APIS 119, 161, 165, 167; Phil 110.

General Semiotic Area:
Lit 191; Lit/Sp 141, 142, 143; Commun 152, 183, 190; Phil 104, 112, 130; Vis Arts, 131; Hist 190; 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, *(b)* a broad knowledge of the major achievements of descriptive and historical linguistics, and *(c)* 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, but since few institutions offer serious linguistics courses for undergraduates, the student may begin his graduate program here with no previous course work in linguistics proper. 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) upon completion of the basic graduate requirements. In the student's first two years of graduate study, his basic courses will stress linguistic theory and the structure of English, particularly from the point of view of generative grammar and language analysis. For his advanced work, he will choose, subject to the approval of the Department's Graduate Committee, an area of specialization based on his individual interests: for example, linguistic theory, Romance linguistics, English linguistics, psycholinguistics, language acquisition, or anthropolgical linguistics.

Language Requirements A candidate for the M.A. degree must demonstrate (1) his ability to read French, German, or Russian by achieving a scaled score of at least 500 on the Social Science option of the Graduate School Foreign Language Test given by the Educational Testing Service of Princeton, New Jersey, and (2) his knowledge of the structure of an Indo-European language and of a non-Indo-European language, either through his 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 he has not used it in fulfilling the M.A. requirements, otherwise German or Russian — and (4) oral fluency in some language other than his native one. The language chosen for oral fluency may be one of those in which he 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 the student's knowledge in his 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 his preparation for a future academic career, every linguistics student at UCSD is given special opportunities to participate in

one of the Department's teaching and research programs under the supervision of a professor. Depending on his qualifications, the student may conduct conversation classes or analysis conferences in the Basic Language Program administered by the Department, or he may be asked to assist a professor in the teaching of a graduate or undergraduate linguistics course, or he may do research in linguistics under the supervision of his doctoral committee chairman. Such apprentice training, equivalent to a half-time assistantship for three quarters, is an integral part of the linguistics graduate program at UCSD 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 his doctoral committee. He will be recommended for the Doctor of Philosophy degree after he has made a successful oral defense of his dissertation before the doctoral committee.

Courses

Lower Division

1A-1B-1C, Linguistics (4-4-4-)
Language as object, language as system, language as communication. A general introduction to language; English dialects; phonetics and language change; structural linguistics and formal models; language acquisition and biological foundations of language; structural poetics; human language and animal communication. Linguistics 1A may be taken independently.

Upper Division

100. General Linguistics (4)
An introduction to the study of language. The analytical and descriptive methods and devices of general linguistics. Phonological, morphological and syntactic systems. Comparative and historical linguistics, psycholinguistics, anthropological linguistics, and their relationships to general linguistics. *Prerequisite: consent of instructor.*

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 1A-1B-1C, or Linguistics 100; 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. *Prerequisites: Linguistics 1A-1B-1C, or Linguistics 100; 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.*

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.*

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.*

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 1A-1B-1C or Linguistics 100 or equivalent.*

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 1A-1B-1C or Linguistics 100 or equivalent; or Psychology 110 or 105 or equivalent.*

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 Under-graduate 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.*

201C. Linguistic Theory (3)
Introduction to the theory of generative grammar, transformational rules and other rule schemata. Models for syntactic description; formalization of grammars. Advanced problems in syntactic theory; deep and surface grammar; semantic considerations in syntax.

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 (3)
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-211B. 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-224B. 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-231B. 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-231B 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.

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. Other Romance languages and Latin will be considered, according to student interest.

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.

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.

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.

281. Psycholinguistics (3)
The study of models of language and of language acquisition from the point of view of modern linguistics and psychology.

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 admitted to candidacy for the Ph.D. degree. *Prerequisite: admission to candidacy.* (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching in 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)*
Michel Benamou, Doctorat-es-lettres *(French Literature, Chairman)*
* Ronald Berman, Ph.D. *(English Literature)*
• Carlos Blanco Aguinaga, Ph.D. *(Spanish Literature)*
Diego Catalan, Ph.D. *(Spanish Literature)*
Robert C. Elliott, Ph.D. *(English Literature)*
• Edwin Fussell, Ph.D. *(American Literature)*
Claudio Gullen, Ph.D. *(Spanish and Comparative Literature)*
Fredric Jameson, Ph.D. *(French and Comparative Literature)*
Reinhard Lettau, Ph.D. *(German Literature)*
James K. Lyon, Ph.D. *(German Literature)*
* Louis Marin, Doctorat-es-lettres *(French Literature)*
Roy Harvey Pearce, Ph.D. *(American Literature, Dean of Graduate Studies)*
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 German Philology)*
\+ Andrew Wright, Ph.D., F.R.S.L. *(English Literature)*
Bernhard Blume, Ph.D. *(German Literature, Emeritus)*
Joaquin Casaldero, Ph.D. *(Spanish Literature, Emeritus)*

Associate Professors:

Jack Behar, Ph.D. *(American 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)*
* Wai-Lim Yip, Ph.D. *(Chinese and Comparative Literature)*

Assistant Professors:

Jeffrey Barnouw, Ph.D. *(English and Comparative Literature)*
* Nathalie Babel Brown, Ph.D. *(French and Comparative Literature)*
Alain J. J. Cohen, Ph.D. *(French Literature)*
\+ Page Ann duBois, Ph.D. *(Classics)*
Jerome Katsell, Ph.D. *(Russian and Comparative Literature)*
\+ + Susan Kirkpatrick, Ph.D. *(Spanish and Comparative Literature)*
* Keith D. Lowe, Ph.D. *(English Literature)*
Louis A. Montrose, Ph.D. *(English Literature)*
Fred V. Randel, Ph.D. *(English Literature)*
* George H. Szanto, Ph.D. *(Dramatic and Comparative Literature)*
\+ Cynthia Walk, Ph.D. *(German Literature)*
John Waterhouse, Ph.D. *(English Literature and Language Acquisition)*
Anthony G. Wilden, Ph.D. *(French Literature)*
Sherley Anne Williams, M.A. *(Black U.S. Literature)*

Acting Assistant Professors:

Raymond Fleming, M.A. *(Italian and Comparative Literature)*
Juan Rodriguez, M.A. *(Latin American Studies)*

* On leave 1974-75

+ On leave Fall 1974
+ + On leave Fall and Winter 1974-75
• On leave Spring 1975

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All literature courses at UCSD are offered by a single Department of Literature. The Department brings together teacher-scholars add 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 or 11 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 Six programs are open to those majoring in literature: English-American, French, German, Russian, Spanish, and General Literature. In each case, whatever his primary field of concentration, a student is expected to study a second literature. The range of second literatures includes Chinese, Classical Greek, Italian, and Latin, and also the previously mentioned French, German, Russian, Spanish, and (for those concentrating in a foreign 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, at least one of which must be upper-division, in a second literature (Literature 10 may not be counted as part of this requirement);
3. enough other upper-division courses to make a total of 14 upper-division courses in the Literature Department.

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 him each quarter.

Students who plan on teaching careers and graduate school are strongly advised to take Literature 191 in the Winter Quarter of their senior year, to be followed in the Spring Quarter by Literature 199 in the literature of their specialization. In this case, Literature 199 will center on writing a long paper, planning for which will begin in Literature 191.

The Noncontiguous Minor in Revelle College 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 signature on their proposed program.

The Department also offers the opportunity of interdepartmental majors under the Muir College Special Projects and under the

"Literature and Society" concentration in Third College.

The Graduate Program

Doctor's 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, to be tested during the first quarter of residence.

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 is specializing. The prorram 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.

Teaching The Department requires for the completion of the Ph.D. degree that each graduate student do apprentice teaching as an integral part of his 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 participates.

Language Requirements Each graduate student is required to develop (or demonstrate that he already possesses) a working knowledge of one language other than that of the literature in which he primarily specializes. That is, the student should be able to read literary and secondary texts and to follow seminar discussions or lectures in that language. Speaking fluency is not required. In consultation with a faculty member in the appropriate section, each student is to prepare a project of study involving this second language. The project must include regular enrollment in at least one seminar in the literature of the second language, or in suitable upper-division courses.

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 (his comparatist project) in a non-Romance literature relevant to his field of specialization.

The Ph.D. program in German Literature requires that a student who concentrates his 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.

The Qualifying Examination The Qualifying Examination, to be taken normally at the end of the third year, concentrates on areas and topics defined by the student's interests. It is designed to meet demands of scope, variety and methodological awareness. The examination in English and American literature, for example, requires three questions concerning 1) a literary genre, 2) a period, generation or movement, and 3) a major writer, with minimal overlap of content. One of these three topics is dealt with in a paper of at least thirty pages, the other two in written examination essays. All three are reviewed in a two-hour oral examination. Ideally the paper should provide the germ of a dissertation, so that the Qualifying Examination will not only help the student organize his preliminary study (instead of trying to 'cover' a comprehensive field for a general examination), but also will provide a transition to actual work on the Ph.D. thesis.

The Dissertation A suitable dissertation is required for the Ph.D. degree. The student concentrates on the dissertation after he has passed 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-1B-1C. 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. Saville (F)

1B Man and Nature Mr. Katsell (W)

1C Man and Society Ms. Widmer (S)

Lit/Gen 3A-3B-3C. 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 Netherlands Mr. Dijkstra (F)

3B France Mr. Jameson (W)

3C Germany Ms. Walk (S)

Lit/Gen 17. Introduction to Criticism and Writing (4)
Emphasis on craft of literary analysis and critical thinking, writing about literature and consideration of a given culture's influence upon the literature which grows out of it. Ms. Williams (F)

Lit/Gen 41. Latin American Literature in Translation (4)
Reading of representative works of literature with a view to literary analysis (form, theme, meaning), the developmental processes of literature, and the many contexts: historical, social, cultural. Staff (W)

Lit/Gen 51. The Theater of Change (4)
Plays by authors mainly of the twentieth century, including Brecht, Ionesco, Eliot, Beckett, and others. Staff (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, McCullers, and Mailer. Mr. Wright, Mr. Waterhouse (S)

Lit/Gen 61. Conflict and Resolution in Modern Literature of the Americas (4)
Recent literature of all the Americas, North and South. Mr. Blanco (F)

Lit/Gen 62. Literature of the New World (4)
Representative figures of nineteenth-century North American literature, such as Emerson, Thoreau, Whitman, Hawthorne, and Melville. Mr. Behar (W)

Lit/Gen 63. Literature of the New World (4)
An introduction to Latin-American and Chicano literature in English. Mr. Sommers (S)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Gen 109A-109B-109C. The Greco-Roman World (4-4-4)
(Not to be offered 1974-75.)

Lit/Gen 111,112,113,114. Writing Workshop (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 hours seminar.

111 Fiction Mr. Lettau (F)

111 Fiction Mr. Waterhouse (S)

112 Expository Writing
(Not to be offered 1974-75.)

113 Drama
(Not to be offered 1974-75.)

114 Verse
(Not to be offered 1974-75.)

Lit/Gen 115. Writing Workshop: The Short Story (4)
Discusses the fundamentals of short-story writing. Student's works will be read and discussed in the class along with the works of some of the best contemporary short-story writers. The course aims at helping the student to get started as well as offering constructive criticism to those who have already done some short-story writing. Ms. Widmer (W)

Lit/Gen 116. Writing Workshop: The Long Narrative (4)
(Not to be offered 1974-75.)

Lit/Gen 120. The Classical Tradition (4)
Greek and Roman literature in translation.

Women in classical antiquity, their place in literature, society and myth. Ms. duBois (W)

Lit/Gen 124. Studies in European Romanticism (4)
In translation. 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. May be repeated as topics vary.

German Romanticism and Idealism. Mr. Barnouw (W)

Lit/Gen 126. Epic Poetry (4)
(Not to be offered 1974-75.)

Lit/Gen 127. The Novel (4)
(Not to be offered 1974-75.)

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. Staff (F)

Lit/Gen 129. Lyric Poetry (4)
(Not to be offered 1974-75.)

Lit/Gen 130. Introduction to Criticism (4)
(Not to be offered 1974-75.)

Lit/Gen 147. Romantic Poetry (4)
This course will concentrate upon selected poems of such authors as Keats, Wordsworth, Holderlin, Leopardi, De-Vigny and others. All continental authors will be read in translation. Mr. Fleming (S)

Lit/Gen 148. Italian Literature in Translation (4)
One or more periods or authors in Italian Literature. *Petrarch and Boccaccio.* May be repeated for credit as topics vary. *Mr. Fleming (F)*

Lit/Gen 149. German Literature in Translation (4)
(Not to be offered 1974-75.)

Lit/Gen 150. Masterpieces of Chinese Literature in Translation (4)
(Not to be offered 1974-75.)

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.

Hegel, Nietzsche and Sartre: Themes of existentialism Mr. Jameson (F)

Ecology and Ideology Mr. Wilden (F)

The Astonished Look: Kafka

Kafka's early prose and some later works, with special emphasis on the technical aspects of his writing. Mr. Lettau (W)

Brecht Staff (W)

Freud on Art and Literature Mr. Cohen (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. Staff (W)

Lit/Gen 171. Pushkin (4)
(Not to be offered 1974-75.)

Lt/Gen 172. Short Masterpieces of Russian Fiction (4)
(Not to be offered 1974-75.)

Lit/Gen 173. Chekhov (4)
(Not to be offered 1974-75.)

Lit/Gen 174. Solzhenitsyn (4)
(Not to be offered 1974-75.)

Lit/Gen 175. Nineteenth Century Prose (4)
A survey of important works of fiction in the nineteenth century, in the context of Russian history. All readings will be in English. May be repeated once with consent of instructor. Mr. Saville (F)

Lit/Gen 176. Russian Drama (4)
(Not to be offered 1974-75.)

Lit/Gen 177. Russian Drama (4)
A continuation of Lit/Gen 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. Mr. Katsell (S)

Lit/Gen 178. Russian Poetry (4)
(Not to be offered 1974-75.)

Lit/Gen 179. Tolstoy (4)
A study of some to Tolstoy's major novels, novellas, and short stories. All readings will be in English. Mr. Katsell (W)

Lit/Gen 180. Dostoevsky (4)
(Not to be offered 1974-75.)

Lit/Gen 181. Twentieth Century Prose (4)
A survey of important works of fiction in the twentieth century, in the context of pre-revolutionary and Soviet history. All readings will be in English. May be repeated once with consent of instructor. Mr. Saville (W)

Lit/Gen 182. Russian Autobiography (4)
(Not to be offered 1974-75.)

Lit/Gen 183. Russian Literature from the Beginnings through the Eighteenth Century (4)
(Not to be offered 1974-75.)

Lit/Gen 190. Seminars (4)
(Not to be offered 1974-75.)

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,S,)

Lit/Gen 195. Apprentice Teaching of Writing (4)
Emphasis on practical aspect of teaching, but students will also conduct a seminar on the principles of teaching in these areas, focusing on techniques of teaching reading skills, 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. 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 (4-4)
Consideration of pedagogical methods appropriate to the teaching of literary texts at the undergraduate level. Pedagogical aids for the teaching of composition. Supervised teaching in undergraduate literature courses. *Prerequisite: student must be a Teaching Assistant.* (Satisfactory/Unsatisfactory grades only.) 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 un-

dergraduate 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)

Chinese Literature

Upper Division

Prerequisites: upper-division 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 1974-75.)

Lit/Ch 198. Directed Group Study (4)
(Not to be offered 1974-75.)

Lit/Ch 199. Special Studies (4)
(Not to be offered 1974-75.

Comparative Literature

Graduate

Lit/CO 210. Classical Studies (4)
(Not to be offered 1974-75.)

Lit/CO 215. Medieval Studies (4)
(Not to be offered 1974-75.)

Lit/CO 211. Renaissance Studies (4)
(Not to be offered 1974-75.)

5Lit⅛CO 224. Seventeenth Century Studies (4)
(Not to be offered 1974-75.)

Lit/CO 241. Romanticism (4)
(Not to be offered 1974-75.)

Lit/CO 242. Ninteenth Century Studies (4)
French-Russian literary influences. A study of the mutual influences among nineteenth-century novelists — Balzac, Hugo, Dostoevesky, Turgenev.

Theory of Naturalism. Mr. Jameson (S)

Lit/CO 243. Symbolism (4)
(Not to be offered 1974-75.)

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.

Modern Theater. Staff (S)

Lit/CO 253. The New Literature (4)
(Not to be offered 1974-75.)

Lit/CO 261. Comparative Literature: History and Theory (4)
(Not to be offered 1974-75.)

Lit/CO 262. Comparative Prosody (4)
(Not to be offered 1974-75.)

Lit/CO 263. Theory and Practice of Translation (4)
(Not to be offered 1974-75.)

Lit/CO 271. Critical Theory (4)
Problems of literary anlysis; competing schools and major figures in litery criticism.

Literature and Freudo-Marxian Model Mr. Cohen (F)

Systems and Structure Mr. Wilden (F)

Walter Benjamin Mr. Barnouw (W)

Communications and Literature Mr. Wilden (W)

Lit/CO 272. Literature and Social History (4)
(Not to be offered 1974-75.)

Lit/CO 273. Art and Literature (4)
An investigation into themes and styles common to literature and the visual arts. 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.

Theory of Comedy Staff (F)

Introduction to the Problems of Genre Mr. Guillen (W)

Lit/CO 275. Literature and Music
A study of selected topics in the interrelationship of poetry, drama and music. Undergraduates may enroll with permission of instructor. ***Prerequisite: ability to read music.***

The literature of opera; the art song Mr. Saville (W)

5Lit+CO 276. The Modern Theatre (4)
(Not to be offered 1974-75.)

Lit/CO 279. Literary Studies and Linguisitcs (4)
(Not to be offered 1974-75.)

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 permitted.) Staff (F,W,S)

Lit/CO 299. Thesis (1-12)
Research 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. Dunseath (F)

21R Mr. Montrose (F)

22 Neoclassicism and Romanticism Mr. Eliott (W)

22R Mr. Steier (W)

23 The Rise of Modernism Mr. Randel (S)

23R Mr. Barnouw (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. Montrose (F)

Lit/En 90. Freshman Seminar (0)
Freshman seminars organized around the research interests of various faculty members. P/NP grading only.

Poetry Newer and Newest Mr. Pearce (F)

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 from Addison and Steele to Orwell. Mr. Randel (W)

Lit/En 102. English Dramatic Literature (4)
The development of the drama in English. May be repeated for credit as topics vary.

Elizabethan and Jacobean Drama Mr. Steier (F)

Restoration Drama Mr. Steier (W)

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.

Chaucer Mr. Crowne (S)

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.

Milton Mr. Dunseath (F)

Lit/En 123. The Eighteenth Century (4)
Major literary works of the eighteenth century. May be repeated for credit as topcs vary.

18C Novel: Defoe, Fielding, Smollett, Sterne Mr. Elliott (W)

18C Major Authors: Pope, Swift, Johnson, Boswell, Gray Mr. Elliott (S)

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, Shelley and the Romantic Imagination. Mr. Randel (F)

Victorian Poets: Tennyson, Browning, the Pre-Raphaelites. Mr. Wesling (F)

Victorian Prose: Carlyle, Mill, Ruskin, Arnold. Mr. Wesling (W)

19C Novel: Bronte, Dickens, Thackeray, Hardy. Mr. Wright (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.

American Renaissance: Emerson, Thoreau, Hawthorne, Melville, and Whitman. Mr. Fussell (F,W)

American Renaissance: 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.

Modern Poetry: Yeats, Eliot, Frost, Stevens, Dylan Thomas. Mr. Behar (F)

Modern American Novel: Edith Wharton, F. Scott Fitzgerald, John dos Passos, Norman Mailer, Ralph Ellison. Ms. Widmer (W)

Modern American Fiction Mr. Behar (S)

Lit/En 140. The 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 (F)

Lit/En 141. Literary Images of Black Woman (4)
(Not offered 1974-75.)

Lit/En 142. Contemporary Black Literature (4)
An examination of major developments in Black literature from 1940 to the present. Ms. Williams (S)

Lit/En 150. Shakespeare: Comedies and Histories (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. Dunseath (W) Mr. Montrose (W)

Lit/En 151. Shakespeare: Tragedies and Romances (4)
A survey of the plays of Shakespeare's late period. Recommended for majors in literature whose primary literature is English. Mr. Dunseath (S) 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 deparment.***

Dr. Johnson. Mr. Barnouw (F)

Henry James. Mr. Fussell (F)

Black Mountain Poets. Mr. Wesling (F)

Melville. Mr. Behar (W)

Hogarth and Fielding. Mr. Dijkstra (W)

Whitman. Mr. Fussell (W)

Black Prose. Ms. Williams (W)

Jane Austen. Mr. Wright (W)

Blake. Mr. Barnouw (S)

American Literature at the Turn of the Century. Mr. Dijkstra (S)

John Donne. Mr. Steier (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 (2 or 4)
Tutorial; individual guided reading in an area not normally covered in courses. May be repeated for credit three times. ***Prerequisite: special permission of the department and upper-division standing.*** Staff (F,W,S)

Graduate

Lit/En 211A-211B. Old English Literature (4-4)
(Not to be offered 1974-75.)

Lit/En 214. Middle English Literature (4)
Consideration of one or more major figures, texts, or trends in Middle English Literature.

Mid Scots Poetry. Mr. Crowne (W)

Lit/En 221. Sixteenth Century English Literature (4)
(Not to be offered 1974-75.)

Lit/En 224. Seventeenth Century English Literature (4)
Consideration of one or more major figures, texts, or trends in seventeenth-century English literature, including the

metaphysical poets and Jacobean Drama. Topic varies from year to year.

John Donne. Mr. Steier (S)

Lit/En 226. Shakespeare (4)
(Not to offered 1974-75.)

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)

Lit/En 241. English Literature of the Romantic Period (4)
A study of the major poetry and related prose of early nineteenth-century literature.

Keats and Shelley. Mr. Randel (W)

Jane Austen. Mr. Wright (W)

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 and the Romance/Novel Problem. Mr. Pearce (F)

Lit/En 246. Victorian Literature (4)
(Not to be offered 1974-75.)

Lit/En 251. Twentieth Century English Literature (4)
(Not to be offered 1974-75.)

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.

Baldwin. Ms. Williams (W)

American Poetry since 1945. Mr. Westling (S)

Lit/En 271. Genres in English (4)
(Not to be offered 1974-75.)

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 permitted.) Staff (F,W,S)

Lit/En 299. Thesis (1-12)
Research for the dissertation. Offered the 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. ***Prerequisites: Score of 550 or higher on CEEB test or satisfactorily completed Language 6.*** 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.*** Mr. Benamou (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.*** Staff (F,WS)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Fr 130A-130B-130C. 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.

130A. Dieu et l'homme 17e siecle Staff (F)
130B. Idees sociales et politiques de la Revolution a la Commune Mr. Cohen (W)
130C. L'Avenement du moderne Mr. Jameson (S)

Lit/Fr 140. Composition and Stylistics (4)
Analysis of classical and modern French literary tests to increase the student's sensitivity to style and improve his ability to write and speak French. Required of French majors. ***Prerequisite: Lit/Fr 25.*** Staff (F)

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. May be repeated for credit three times.

Flaubert Mr. Jameson (W)

Diderot Mr. Cohen (S)

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 the single quarter. ***Prerequisite: upper-division standing and permission of department.***

Saussure et le structuralisme Mr. Wilden (W)

Lit/Fr 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: 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. May be repeated for credit three times. ***Prerequisite: 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 1974-75.)

Lit/Fr 221. Sixteenth Century French Literature (4)
Critical study of one or more major figures, texts, or literary trends of the French Renaissance.

Topics and Methods. Staff (F,W)

Lit/Fr 224. Seventeenth Century French Literature (4)
Consideration of one or more major figures, texts, or trends in the seventeenth-century French literature. Staff (F)

Lit/Fr 231. Eighteenth Century French Literature (4)
(Not to be offered 1974-75.)

Lit/Fr 241. Nineteenth Century French Literature (4)
Consideration of one or more major figures, texts, or trends in nineteenth-century French literature.

Baudelaire, poetry and prose Mr. Benamou (W)

Lit/Fr 251. Twentieth Century French Literature (4)
Selected topics in modern French literature and thought.

Mr. Cohen (F)

L'ecriture textologie Staff (S)

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.) (F,W,S)

Lit/Fr 298. Special Projects (4)
Treatment of a special topic in French literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades permitted.) 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. ***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 language proficiency test conducted by the Department of Linguistics.*** Successful completion of Literature 10 satisfies the requirement for language proficiency in Revelle College Staff (F,W,S)

Lit/Ge 11. Readings in German Literature and Culture (4)
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 calls for an ability to read extensive texts in German. ***Prerequisite: proficiency in a foreign language.***

Middle Ages and Renaissance Mr. Wierschin (F)

Baroque and Enlightenment Staff (W)

The Twentieth Century Mr. Lettau (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.*** Staff (F). Ms. Walk (W)

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 German "Volksmaerchen"

Typological analyses of archaic types of folktale under the aspects of literature, religion, myth and "Tiefenpsychologie." Mr. Wierschin (F)

The German "Entwicklungsroman"

A reading of representative novels of this genre, e.g. Grimmelshausen, Goethe, Th. Mann, Hesse. Mr. Lettau (W)

Lit/Ge 102. German Dramatic Literature (4)
The devlopment of the drama in German.

German Drama 1880-1925;

Naturalism through Expressionism. Ms. Walk (S)

Lit/Ge 103. German Poetry (4)
(Not to be offered 1974-75.)

Lit/Ge 123. Eighteenth Century German Literature (4)
(Not to be offered 1974-75.)

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 ability to write and speak German. Required of German Majors.

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/Ger 149. German Literature (4)
(Not to be offered 1974-75.)

Lit/Ge 151. Goethe (4)
(Not to be offered 1974-75.)

Lit/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

A careful reading of Kafka's early "open" prose and some later works, with special emphasis on the technical aspects of his writing. Mr. Lettau (W)

Lit/Ge 190. Seminars (4)
(Not to be offered 1974-75.)

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. ***Prerequisite: upper-division standing and permission of department.*** Staff (F,W,S)

Graduate

Lit/Ge 203. Cultural History of the German Language (4)
A philological study of the growth process of German with particular attention to historical, cultural and social interrelations. Mr. Wierschin (S)

Lit/Ge 210A-210B. Middle High German (4-4)
(Not offered 1974-75.)

Lit/Ge 221. Middle High German Classicism (4)
(Not to be offered 1974-75.)

Lit/Ge 231. Eighteenth Century German Literature (4)
(Not to be offered 1974-75.)

Lit/Ge 238. Goethe (4)
A close study of a few significant major works from Goethe's prose, lyric poetry, dramas and essays. Staff (F)

Lit/Ge 241. German Romantic Prose (4)
(Not to be offered 1974-75.)

Lit/Ge 242. Nineteenth Century German Literature (4)
(Not to be offered 1974-75.)

Lit/Ge 251. The Twentieth Century (4)
A study of the structural, philosophical and social aspects of twentieth-century German literature.

Lyric Poetry from Trakl to the Present
An examination of poetry by six representative lyric poets of this century (Trakl, Benn, Rilke, Brecht, Bobrowski, Celan), with emphasis on their relationship to the language of their age. Staff (W)

The Twentieth-Century Novel
A careful investigation of several major German-language novels in the twentieth century from Thomas Mann to Gunter Grass. Staff (S)

Lit/Ge 252. Major German Authors (4)
A study in depth of the work of one major German author.
Georg Buechner
Close reading and discussion of the major research problems. Mr. Lettau (F)

Lit/Ge 271. Theory of Genres (4)
(Not to be offered 1974-75.)

Lit/Ge 272. Genres, Trends and Forms (4)
Seminars on literary genres, trends, movements, schools and on aspects of literary forms and structures in any given era or over a certain period of time.
Literature of Decadence
Decadence at the turn of the century; its symptoms, forms, problems and solutions. Ms. Walk (W)

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 permitted.) 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. Ms. duBois (W)

Lit/Gr 2. Intermediate Greek (4)
Continuing instruction in Greek grammar, with reading of single texts. ***Prerequisite: Lit/Gr. 1 or equivalent.***
Ms. duBois (S)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Gr. 100. Introduction to Greek Literature (4)
(Not to be offered 1974-75.)

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.*** Staff (F,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. ***Prerequisite: upper-division standing and permission of Department.***

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 permitted.) Staff (F,W,S)

Hebrew Literature

Lower Division

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 (F,W,S)

Upper Division

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

Lit/It 1. Beginning Italian (4)
Fundamentals of Italian grammar, exercises in vocabulary, accidence and in reading. Mr. Fleming (F)

Lit/It 2. Intermediate Italian (4)
Continuing instruction in Italian grammar, with reading of simple texts. ***Prerequisite: Lit/It 1 or equivalent.*** Mr. Fleming (W)

Lit/It 10. Readings and Interpretations (4)
(Not to be offered 1974-75.)

Lit/It 11. Readings in Italian Literature and Culture (4)
(Not to be offered 1974-75.)

Upper Division

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.*** Mr. Fleming (S)

Lit/It 147. Romantic Poetry (4)
Works of Foscolo, Manzoni, and Leopardi. Mr. Fleming (S)

Lit/It 148. Italian Literature (4)
One or more periods or authors in Italian Literature. May be repeated for credit as topics vary.

Petrarch and Boccaccio Mr. Fleming (F)

Lit/It 198. 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.*** Mr. Fleming (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.* Mr. Fleming (F,W,S)

Graduate

Lit/It 215. Dante (4)
(Not to be offered 1974-75.)

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.) Mr. Fleming (F,W,S)

Lit/It 298. Special Projects (4)
Treatment of a special topic in Italian literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades permitted.) Mr. Fleming (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 (S)

Lit/La 198. 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.* Mr. Katsell (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. Saville (W)

Lit/Ru 11. Readings in Russian Literature (4)
An introduction to Russian literature, with continuing instruction in grammar, conversation and composition. *Prerequisites: 1. satisfactory completion of Lit/Ru 10, as indicated by written recommendation from the instructor of that course or consent of the instructor.* Mr. Saville (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 1974-75)

Lit/Ru 124. Advanced Language and Literature (4)
(Not to be offered 1974-75)

Lit/Ru 126. Advanced Language and Literature (4)
(Not to be offered 1974-75)

Lit/Ru 128. Advanced Language and Literature (4)
(Not to be offered 1974-75)

Lit/Ru 171. Pushkin (4)
(Not to be offered 1974-75)

Lit/Ru 172. Short Masterpieces of Russian Fiction (4)
(Not to be offered 1974-75)

Lit/Ru 173. Chekhov (4)
(Not to be offered 1974-75)

Lit/Ru 174. Solzhenitsyn (4)
(Not to be offered 1974-75)

Lit/Ru 175. Nineteeth Century Prose
Consists of the lectures of Lit/Gen 175, with readings and papers in the original and additional meetings to be arranged with the instructor. Mr. Saville (F)

Lit/Ru 177. Russian Drama (4)
Masterpieces of Russian drama from the eighteenth to the twenitieth century. The reading list varies from year to year, so that the course may be repeated for credit with the consent of the instructor. Mr. Katsell (S)

Lit/Ru 179. Tolstoy (4)
Lectures and discussion on some of the chief novels, novellas, and short stories of Tolstoy, with due attention to the historical and biographical context. Mr. Katsell (W)

Lit/Ru 181. Twentieth Century Russian Prose (4)
A study of important literary works, in all genres, from the pre-Revolutionary and Soviet periods. May be taken for repeated credit. Mr. Saville (W)

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 re-

peated for credit three times. *Prerequisite: upper-division standing and permission of department.* Staff (F,W,S)

Spanish Literature

Lower Division

Lit/Sp 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, compssitions and readings from Chicano and Latin American authors. Equivalent to Lit/Sp 10. *Prerequisite: consent of instructor.* Ms. Sanchez (F)

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. *Prerequisites: score of 550 or higher on CEEB test or satisfactory completion of Language 6.* 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 1974-75)

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)

Upper Division

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Sp 101. Spanish Literary Prose (4)
The development of major forms and modes of Spanish literary prose, including the novel, the essay, biography, and other genres. May be repeated for credit as topics vary. Mr. Catalan (S)

Lit/Sp 102. Spanish Dramatic Literature (4)
(Not to be offered 1974-75.)

Lit/Sp 103. Spanish Poetry (4)
(Not to be offered 1974-75.)

Lit/Sp 104. History of Spanish Language (4)
(Not to be offered 1974-75.)

Lit/Sp 105. Dialectology (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. Ms. Sanchez (S)

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. Mr. Catalan (W)

Lit/Sp 122. Renaissance and Baroque (4)
Studies in selected topics in sixteenth- and seventeenth-century Spanish literature. May be repeated for credit as topics vary. Mr. Guillen (S)

Lit/Sp 124. The Nineteenth Century (4)
(Not to be offered 1974-75.)

Lit/Sp 125. Spanish-American Literature (4)
Studies in selected topics in Spanish-American literature. May be repeated for credit as topics vary.

Major Works. Staff (S)

Lit/Sp 126. The Modern Period (4)
Selected topics in modern Spanish literature. May be repeated for credit as topics vary.

The Generation of '98. Ms. Kirkpatrick (S)

Lit/Sp 130. Spanish American Fiction (4)
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.

Peruvian Novel. Mr. Sommers (F)

Lit/Sp 131. Spanish American Poetry (4)
(Not to be offered 1974-75.)

Lit/Sp 132. Spanish American Essay (4)
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. Mr. Sommers (W)

Lit/Sp 140. Composition and Stylistics (4)
Analysis of classical and modern Spanish literary texts to increase the students' sensitivity to style and improve his ability to write and speak Spanish. Strongly recommended for students who take Spanish as their primary literature. Ms. Sanchez (F)

Lit/Sp 141. Phonetics (4)
A comparative study of the English and Spanish phonetic systems. The course will include a study of the organs of articulation, manner of articulation, stress and intonation patterns, as well as dialectal variations in Spanish. Ms. Sanchez (W)

Lit/Sp 143. Spanish Language in America: Spanish Dialects in USA
(Not to be offered 1974-75.)

Lit/Sp 142. Spanish Syntax and Morphology (4)
(Not to be offered 1974-75.)

Lit/Sp 151. Cervantes (4)
A critical reading of the "Quijote." Required of literature majors whose primary literature is Spanish. Mr. Guillen (W)

Lit/Sp 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. Staff (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.

La Celestina Mr. Catalan (F)
Methods of Criticism Mr. Blanco (W)

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. *Prerequisite: 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. ***Prerequisite: 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 1974-75.)

Lit/Sp 202. Spanish Language in America (4)
(Not to be offered 1974-75.)

Lit/Sp 203. History of the Spanish Language (4)
Readings and discussions in the monographic literature of a selected topic. Mr. Catalan (S)

Lit/Sp 208. Textural Criticism in Spanish (4)
(Not to be offered 1974-75.)

Lit/Sp 214. Studies in Medieval Literature (4)
Consideration of one or more major figures, texts, trends, or problems in medieval Spanish literature.

Mio Cid Mr. Catalan (F)

Lit/Sp 216. Fifteenth Century Spanish Literature and Culture (4)
(Not to be offered 1974-75.)

Lit/Sp 224. Golden Age Studies
Consideration of one or more major figures, texts, trends or problems in Spanish Golden Age studies. Mr. Guillen (F)

Lit/Sp 226. Cervantes (4)
(Not to be offered 1974-75.)

Lit/Sp 231. Eighteenth-Century Spanish Literature (4)
(Not to be offered 1974-75.)

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.

Historical Novel Ms. Kirkpatrick (S)

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. Staff (F)

Lit/Sp 254. Modern Spanish Poetry (4)
(Not to be offered 1974-75.)

Lit/Sp 255. The Modern Spanish Novel (4)
(Not to be offered 1974-75.)

Lit/Sp 258. Spanish-American Prose (4)
Consideration of one or more major figures, texts, trends or problems in Spanish-American prose.

Staff (W)
Vargas-Llosa Mr. Sommers (S)

Lit/Sp 259. Spanish-American Poetry (4)
Consideration of one or more major figures, texts, trends, or problems in Spanish-American poetry. Staff (W)

Lit/Sp 271. Literary Theory (4)
(Not to be offered 1974-75.)

Lit/Sp 272. Literature and Society Studies (4)
Special topics in practical criticism involving social and economic historical perspectives. Mr. Blanco and Mr. Sommers (F,W)

Lit/Sp 280. Field Work
(Not to be offered 1974-75.)

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. (Satisfactory/Unsatisfactory grades permitted.) 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)

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.
Hubert Halkin, Ph.D.
Jacob Korevaar, Ph.D.
Burton Rodin, Ph.D.
Helmut Rohrl, Ph.D.
Murray Rosenblatt, Ph.D.
Stefan E. Warshawski, Ph.D. (Emeritus)

Associate Professors:
Jay P. Filmore, Ph.D.
Carl H. FitzGerald, Ph.D.
William B. Gragg, Jr. Ph.D.
Alfred B. Manaster, Ph.D.
Michael J. Sharpe, Ph.D.
* Norman A. Shenk, Ph.D.
Lance W. Small, Ph.D.
Donald R. Smith, Ph.D.
Stanley G. Williamson, Ph.D.

Assistant Professors:
Allen B. Altman, Ph.D.
L. Andrew Campbell, Ph.D.
David Golber, Ph.D.
Leonard R. Haff, Ph.D.
Patrick J. Ledden, Ph.D.
Roy H. Ogawa, Ph.D.
Richard R. Patterson, Ph.D.
John A. Rice, Ph.D.
Audrey A. Terras, Ph.D.
Adrian R. Wadsworth, Ph.D.
John J. Wavrik, Ph.D.
James E. White, Ph.D
Daniel E. Wulbert, Ph.D.
Einar Hile, Ph.D. *Research Mathematician*
Arthur Sard, Ph.D. *Research Associate in Mathematics*
Frank B. Thiess, Ph.D. *Lecturer in Mathematics*
* On leave Winter, Spring 1975

* * *

The Undergraduate Program 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 and Third College. Foreign languages recommended for mathematics majors are French, German and Russian.

All students majoring in mathematics will complete the basic sequence 2A-2B-2C-2D-2E and at least 12 one-quarter courses in the upper-division offerings of the department. Two of the 12 courses must be Mathematics 140A-140B. All mathematics majors except those whose main interest is computational mathematics must also include Mathematics 100A-100B (or 101A-101B). As with all departmental course 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-103B and APIS 161B-161C. (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 sequences. 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-140B or 100A-100B (103A-103B) should be taken during the junior year.

The mathematics major in John Muir College is required to take Science 4A-4B-4C or the equivalent.

With the approval of his 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.

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 18 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 Mathematics Department.

A reading knowledge of one foreign language: French, German, or Russian, is required. (In exceptional cases other lan-

guages 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 A proposal for a program of graduate studies in applied mathematics is presently under consideration. Students interested in enrolling in this program for 1974-75 should inquire with the Department of Mathematics.

Doctor's 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. Normal progress in the early part of a doctoral student's graduate program includes passing examinations in at least two areas by the end of his first year, at least three by the end of his second year, and all four by the end of this third year. The department requires the satisfactory completion of two area examinations by the beginning of a student's third year, three by the end of his third year, and four by the beginning of his fourth year. Examinations may be repeated but no more than eight attempts are allowed to pass the examination in four areas. A detailed list of depth requirements in each area, with literature references and approved courses, is available in the office of the Mathematics Department.

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). The foreign language examinations, which consist of the translation of selected passages in mathematics, are administered by the Department.

After a student has met the area and language requirements and has decided upon a direction 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 area of the proposed research and the project itself. A student must pass this examination by the end of his fifth year. Successful completion of this requirement advances the student to candidacy. The student then devotes himself to study and research for his doctoral dissertation. After completion of his research and dissertation, the student takes a final oral examination on his dissertation.

Courses

A beginning student in Revelle College normally takes the Mathematics 2 or 1 sequence; a student in Muir College may take the Mathematics 1, 2 or 5 sequence; and a student in Third College normally starts with the Mathematics 1, 2 or 4 sequence. Where there is substantial overlap among courses in different sequences, full credit is given only once.

Certain transfers from one sequence to another are possible, but such transfers should be carefully discussed with the student's adviser. Good students, who begin the Mathematics 1 sequence, and who wish to transfer to the faster paced Mathematics 2 sequence, should normally follow Mathematics 1A with 2A. Transfers at a later stage are discouraged and may result in loss of credit.

Lower Division

1A. Elements of Mathematical Analysis (4)
Differentiation and integration of algebraic functions. Fundamental theorem of calculus. Applications. Three lectures, two recitations. ***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 equations. Complex numbers. ***Prerequisites: Mathematics 1A.*** (W,S)

1C. Elements of Mathematical Analysis (4)
Vector geometry, velocity and acceleration vectors. Partial derivatives, multiple integrals. Exact differentials. ***Prerequisites: Mathematics 1B.*** (F,W)

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 logarith-

mic, 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 (Credit is not given for both Mathematics 1B and Mathematics 2B.)*** (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, (Credit is not given for both Mathematics 1C and Mathematics 2C.)*** (F,W,S)

2AS-2BS-2CS. Calculus Supplement (2-2-2)
This course is intended for students who want to obtain a broader view of the material presented in Mathematics 2. Advanced topics which clarify that material and applications which give it greater meaning will be studied. ***Prerequisite: concurrent enrollment in the corresponding quarter of Mathematics 2A-2B-2C.*** (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. (Credit is not given for both Mathematics 1C and Mathematics 2D.)*** (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)

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.*** (F,W,S)

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-guided 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. (W)***

4C. Introductory Calculus (4)
Limits, continuity, differentiation and integration of algebraic and trigonometric functions. Applications. ***Prerequisites: Mathematics 4A and 4B.*** (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)

80A-80B. 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-100B-100C. Introduction to Algebra (4-4-4)
An introduction to the methods and basic sturctures of higher albegra: 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)

101A-101B-101C. Honors Algebra (4-4-4)
An intensive course in groups, rings, ideals, modules, fields and field extensions, linear algebra, inner product spaces and canonical forms. The instructor may develop certain of these structures in the process of investigating some major problem of algebra. Three lectures, one recitation. ***Prerequisite: consent of instructor.*** (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-Penrose 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-103B 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)

109. Undergraduate Seminar (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. Three periods. ***Prerequisite: permission of department.*** (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, 2D, 2E 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-111B Mathematical Model Building (4)
This course is intended to acquaint students with mathematical model building in fields such as natural sci-

ence, 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, 2D, 2E or consent of instructor.*** (F,W)

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, 2D.*** (F,W,S)

130A-130B. 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. ***Prerequisites: Mathematics 2C, 2D, 2E.*** (F,W)

131. Elements of Calculus of Variations (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, 2E or consent of instructor.***

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, ***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-140B-140C. Foundations of Analysis (4-4-4)
Axioms, the real number system, topology of the real line, metric spaces, continuous functions, sequences of functions, differentiation, Riegmann-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, 2D.*** (F,W,S)

150A-150B-150C. 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-160B. 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 100AB or 103AB*** (F)

170A. 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. ***Prerequisite: Programming experience and Mathematics 2E.*** (F)

170B. 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. ***Prerequisite: Mathematis 170A.*** (W)

170C. Numerical Linear Algebra (4)
Analysis 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. ***Prerequisite: Programming experience and Mathematics 2E.*** (S)

171A-171B. 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, 2D, and 2E.*** (F,W)

180A. Introduction to Probability (4)
Probability spaces, independence, conditional probability, random variables, distributions, expectations, joint distributions, central-limit theorem. ***Prerequisite: Mathematics 2C and 2D.***

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.***

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.***

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; Poly's theory of counting; Hall's theorem; assignment problem; backtrack technique; error-correcting codes; combinatorial optimization problems. Three lectures, one recitation. *Prerequisite: Programming experience.* (S)

190A-190B. 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-140B.* (F-W)

195. Undergraduate Apprentice Teaching (4)
Highly qualified senior mathematics majors who are interested in obtaining experience in undergraduate teaching will act as section head in one section of Math 1, 2, or similar courses. *Prerequisites: Mathematics 100A, 100B, 100C, Mathematics 140A, 140B, 140C and consent of instructor.*

199. Independent Study for Undergraduates (2 or 4)
Indpendent reading in advanced mathematics by individual students. Three periods. *Prerequisite: permission of department.* (F,W,S)

Graduate

200A-200B-200C. 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-100B-100C or consent of instructor.*

202A-202B. 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, 103B or Mathematics 100A, 100B.*

203A-203B-203C. 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-200B-200C.*

207A-207B-207C. Topics in Algebra (3-3-3-)
In recent years, topics have included number theory, commutative algebra, non-commutative 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-2E 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 partial differential equations. Uniqueness theorems, maximum principles. Spherical harmonics. Wave propagation. *Prerequisites: Mathematics 210B or consent of instructor.* (S)

211A-211B. 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, Mathematics 2E, Mathematics 180A.*

215A-215B-215C. 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, 241B, 241C, or consent of instructor.*

217A-217B-217C. 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-200B-220C. 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-140B, or consent of instructor.*

221A-221B-221C. 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, 220B, 220B-220C, or consent of instructor.*

227A-227B-227C. 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-230B-230C. 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: Math 130A, B and Math 220A, B or consent of instructor.*

231A-231B-231C. 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-132B, or consent of instructor.*

232A-232B-232C. 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. Caratheodory's approach to calculus of variations. *Prerequisites: Mathematics 240A-240B-240C, or Math 210A, 210B, 210C.*

237A-237B-237C. 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-240B-240C. Real Analysis (3-3-3)
Lebesgue integral and Lebesgue measure; Fubini theorems; functions of bonded variation; Stieltjes integral, derivatives and indefinite integrals; the spaces L and C; equi-continuous families; continuous linear functionals; general measures and integrations. *Prerequisites: Mathematics 190A-190B or consent of instructor.*

241A-241B-241C. 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-240B-240C, or consent of instructor.*

247A-247B-247C. 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-250B-250C. 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-100B-100C.*

251A-251B-251C. 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-257B-257C. 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-260B-260C. Mathematics 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-100B-100C or consent of instructor.*

261. Discrete Computation (4)
Premutations and combinations and their orderly generation. Backtracking algorithms and orderly searching of finite sets. Sorting. Trees and other basic concepts and applications of graph theory. Emphasis will be on constructive methods. *Prerequisites: Mathematics 2D, Mathematics 2E, programming experience.*

262. Topics in Combinatorial Mathematics (3)
Development of a topic in combinatorial 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-100B-100C.*

267A-267B-267C. 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.*

268. Seminar in Logic (1 to 3)
Prerequisite: consent of instructor. (Satisfactory/Unsatisfactory grades permitted.

270A-270B-270C. 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 hermitean matrices; eigenvalue problem for general matrices; iterative methods of linear equations. *Prerequisites: Mathematics 2D, 2E, and programming experience.*

271A-271B. Complexity of Computational Algorithms (3-3)
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 102A. Some familiarity with Computer Science or Numerical Analysis desirable but not required.*

277A-277B-277C. 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-280B-280C. 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-281B-281C. 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-282B-282C. Data Analysis (4-4-4)
Sequence in applied statistics. General linear models with applications to regression analysis; analysis of variance and

covariance. Topics in experimental design, analysis of counted data, order statistics. Emphasis throughout is on the analysis of actual data. ***Prerequisites: Mathematics 180A or equivalent.***

283. Quantitative Methods in Clinical Medicine and Research (2)
An elementary survey of the uses of modern statistical and data-analytic techniques in clinical medicine and research. Lectures provide an introduction to computer diagnosis and planning of therapy, clinical trials, normal ranges, automated discovery of syndromes and prediction of therapeutic response. Discussions emphasize critical evaluation of the role of these methods in medicine. ***Prerequisites: Second-year medical-student status or consent of instructor.***

287A-287B-287C. 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-290B-290C. 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: Math 100A, 100B, 100C, Math 140A, 140B, 140C.***

297A-297B-297C. 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). ***Prerequisiste: consent of adviser.*** (Satisfactory/Unsatisfactory grades only.)

Muir

OFFICE: Provost, Muir College

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Courses

199. Special College 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

OFFICE: Room 111, Mandeville Center

Professors:
Rafael Druian, Dip.Mus.
Robert Erickson, M.A.
Peter Farrell, M.M.
Kenneth Gaburo, D.M.A.
Thomas Nee, M.A.
Wilbur Ogdon, Ph.D.
Roger Reynolds, M.M.
* John Silber, Ph.D.

Associate Professors:
Keith Humble, Dip.Mus.
Pauline Oliveros, B.A.
Bertram J. Turetzky, M.A.

Assistant Professors:
James L. Campbell, M.S.

* On Leave 1974-75

* * *

The music department 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 his 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 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.

All graduate students are required to approve their course schedule with their adviser prior to registering for classes. Any significant change in their schedule should be reviewed with the adviser.

One year of 201A-201B-201C, 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.

The department requires reading ability in one or more foreign languages if the research area calls for such profiency.

Master's Degree Program The M.A. degree in music is awarded according to Plan I: 36 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; a three-unit candidate's tutorial, taken during the first year of graduate study; the departmental seminar; and, when the student is functioning as a teaching assistant, the experimental instruction course.

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, Compositional Linguistics, Time Perception, 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, Tuning and Temperament, Instrumentation, etc.

VI. *Music Literature, Special Studies.* Special studies focussing 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, etc.).

Doctor's 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, UCSD, (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 oral examination.

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 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. He will also undertake independent studies, supervised by an appropriate member of the faculty and prepare himself 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 student's 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. 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 1A, 2A, 10A and 11A.

The following courses are available after the student has demonstrated performing proficiency through auditions (held the week prior to classes and at the beginning of the new quarter): Music 130, 135, 136, 140 and 141.

The following courses are offered to satisfy lower-division college requirements: Music 1A-B-C (Muir), 10-A-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/100A-B-C; 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, as tested the week before Fall Quarter classes) 100A-B-C/103A-B-C or 100A-B-C/101A-B-C.

The Major Program in Music

Lower-division course requirements and prerequisites:

1. Music 1A-B-C.
2. Demonstration of pitch, rhythmic and performance abilities through testing and audition (administered the week prior to the beginning of classes).
   a. preparation for musicianship proficiency testing through Music 2A-B-C.
   b. preparation for performance proficiency audition through Music 30 or by means of certified private instruction.

Upper-division requirements:

1. The three-year music theory and practice sequence: Music 100A-B-C, Music 101A-B-C, Music 102A-B-C.
2. The one-year laboratory sequence surveying music literature: Music 110A-B-C.
3. The two-year laboratory sequence in chamber music performance: Music 130.
4. One of the two-year laboratory sequences in directed ensemble performance: Music 135, 136, 140, 141.
5. An approved collection of six electives in one of the following areas: composition, communications, performance, or literature.
6. Continued enrollment in the departmental seminar, Contemporary Issues in Music: Music 143.

Courses

Lower Division

1A-1B-1C. 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. Basic Musicianship I (4)
The learning of standard music notation and the practice of fundamental music skills through reading, writing, singing and hearing pitch and time relationships.

2B. Basic Musicianship II (4)
The continuing practice of reading, writing, singing and hearing pitch-time relationships, as well as music manu-

script editing and the writing of performance parts, problems in arranging. *Prerequisite: 2A or consent of department.*

2C. Basic Musicianship III (4)
The continuing development of music skills as well as experimental projects in basic music theory using electronic instrumentation. Instruction in the operation of music recording equipment. Note: this series of courses serves as preparation for the major for those students unable to demonstrate the level of musicianship expected of beginning music majors. *Prerequisite: 2B or consent of department.*

10A-B. Projects and Studies in Music (4-4)
A study of the nature of music, how it is made, how to listen to it. Projects include improvising in groups, tape music composition and invention of music notation. Old, new and newest music will be listened to and studied. This course may be used in satisfying the Revelle College fine arts and humanities requirements. (F,W)

11A-11B-11C. Issues in Western Art Music (4-4-4)
A three-quarter study of music repertory through lecture, recorded and live performance. Two to four hours of assigned music listening/discussion weekly and one two-hour performance lab. Occasional papers or reports. Not open to music majors. Will satisfy Muir College fine arts requirements and Revelle College humanities requirement. *Prequisites: 11A for 11B, 11B for 11C.* (F,W,S)

13A-13B-13C. Studies in Jazz (4-4-4)
A study of the literature, history, aesthetics and theory of jazz. Includes a weekly two-hour listening/discussion lab. For non-music majors only.

30A-30B-30C. Seminar in Chamber Music Performance (2-2-2)
Class instruction in instrumental/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

100A-100B-100C. Applied Creative Musicianship (4-4-4)
An integrated approach to the study of music through hearing, writing, analyzing, conducting and performance. Emphasis on intervallic structures, instrumentation and on divisive additive principles of musical time measurement. *Prerequisite: proficiency by examination.* (F,W,S)

101A-101B-101C. Music Theory and Practice II (4-4-4)
An integrated study of the materials and processes of music, emphasizing harmonic structures and textures, along with their corollary time and timbral relationships. *Prerequisites: 100C for 101A or proficiency by examination.* (F,W,S)

102A-102B-102C. Music Theory and Practice III (4-4-4)
Advanced study of the materials and processes of music, emphasizing polyphonic structures and textures, along with corollary rhythmic and timbral relationships. *Prerequisites: 101C for 102A or proficiency by examination.* (F,W,S)

103A-103B-103C. Seminar in Composition (4-4-4)
Individual projects in composition critically reviewed in seminar with fellow student and faculty composers. *Prerequisites: Music 100A-100B-100C, or consent of instructor.* (F,W,S)

104A. Principles of Electroacoustic Transmission of Music Information (4)
A study, involving electroacoustic principles, of the transmission of musical information. Operational techniques of microphones, amplifiers, magnetic tape recorders, loudspeakers and broadcast and recording facilities will be discussed. *Prerequisites: Music 2A-2B-2C and consent of instructor.*

104B. Projects in Electroacoustic Transmission of Music Information (4)
An investigation into the 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.*

105A. Electronics in Music (4)
Exercises in electronic sound generation and processing with emphasis on voltage-controlled systems. *Prerequisite: consent of instructor.*

105B. Projects Seminar in Electronics in Music Performance (4)
Prerequisite: consent of instructor.

110A-110B-110C. Laboratory Survey of Music Literature (2-2-2)
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. *Prerequisites: restricted to declared music majors, with department approval.*

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 projects seminar session. *Prerequisites: Music 11A-11B-11C for non-music majors, Music 110A-110B-110C 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-11B-11C for non-music majors, Music 110A-110B-110C for music majors, or consent of instructor.*

114. Music of the Twentieth 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-11B-11C for non-music majors, Music 110A-110B-110C 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. *Prerequisites: Music 11A-11B-11C for non-music majors, Music 110A-110B-110C 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-11B-11C for non-music majors, Music 110A-110B-110C 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-11B-11C for non-music majors, Music 110A-110B-110C for music majors, or consent of instructor.*

120A-120B. Audio Circuitry for Musicians (2-2)
AC and DC circuit analysis, soldering and assembly techniques; projects.

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 additional projects seminar session. *Prerequisites: Music 11A-11B-11C for non-music majors, Music 110A-110B-110C 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-11B-11C for non-music majors, Music 110A-110B-110C for music majors, or consent of instructor.*

125. Introduction to Black Music (4)
An examination of Black music from an historical and sociological perspective, beginning with its African roots and continuing to the present. This course will be an extensive investigation of the music of Black Americans including the link to racial oppression and will place this music within its proper perspectives. *Prerequisites: at least sophomore standing.*

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-130B-130C. Seminar in Chamber Music Performance (2-2-2)
Performance of representative 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. (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. Seminars may be repeated for credit. *Prerequisites: consent of instructor through audition. Limited to music majors.*

133A-133B-133C. Perspectives of Jazz (4-4-4)
A study of the music from a theoretical, historical and applied manner, i.e., theory, harmony, ear-training, listening, styles, aesthetics, history (reading/discussion), listening, performance training. *Prerequisite: consent of instructor through audition.*

135. Concert Orchestra (2)
Study and performance of orchestral literature. May be repeated for credit. *Prerequisite: consent of instructor through audition.*

136. Chamber Orchestra (2)
Study of standard orchestral literature in coached rehearsal sessions. May be repeated for credit. *Prerequisite: consent of instructor through audition.*

140. Concert Chorus (2)
Study and performance of choral literature. May be repeated for credit. *Prerequisite: consent of instructor through audition.*

141. Chamber Chorus (2)
Study and performance of literature for small choral ensemble. May be repeated for credit. *Prerequisite: consent of instructor through audition.*

143. Contemporary Issues in Music (2)
Bi-weekly seminars on contemporary issues in music. Required of all music majors for the entire year.

195. Instructional Assistance (2)
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. *Prerequisites: consent of instructor and departmental approval.*

Graduate

201A-201B-201C. Advanced Problems and Projects in Conducting and Performance (1 or 3)
(Performance, Technology)

202. Problems and Projects in the Specialized Use of Electronics in Performance (3)
(Performance, Technology) (Satisfactory/Unsatisfactory grades permitted.)

203A-203B-203C. Advanced Projects in Composition (3-3-3)
(Composition) (Satisfactory/Unsatisfactory grades permitted.

204. Projects Seminar in Electroacoustic Transmission of Music Information (3)
(Technology) *Prerequisites: Music 104A and consent of instructor.*

205. Advanced Use of Electronics in Music (3)
(Technology) Seminar in advanced theoretical and applied research in the generation and processing of electronic sound for composition and performance. *Prerequisite: consent of instructor.*

206A-206B-206C. Experimental Studies Seminar (3-3-3)
(Experimental Studies) Seminars offered by faculty within areas of present research interests, such as: timbre, compositional linguistics, time perception in aesthetic situations, psychoacoustics, socio-musical studies, time and motion.

207A-207B-207C. 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, tuning and temperament, instrumentation. *Prerequisite: consent of instructor.*

208A-208B. 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. Should be taken in sequence or may be taken separately with instructor's consent.

209A-209B. Advanced Music Theory and Practice (3-3)
(Theoretical Studies)

211. Non-Western Music (3)
(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 Twentieth 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 thirteenth, fourteenth and fifteenth 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.

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, Sepcial 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 through coached rehearsal and seminar studies. Course may be repeated for credit since the literature studied varies from quarter to quarter.

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, Technology) 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.***

240. Experimental Instruction (1)
A graduate teaching seminar in experimental approaches to music learning. Required of all graduate students the first year. May be repeated for credit.

243. Seminar on Contemporary Issues in Music (1)
Bi-weekly seminars on contemporary issues in music. Required of all graduate students during residence. (Satisfactory/Unsatisfactory grades only.)

297. Candidates Tutorial (1)
(Literature, Special Studies) A course requirement for all prospective M.A. and Ph.D. candidates, the tutorial is taken with the student's graduate adviser and provides for supervised independent remedial music studies and guided preparation for thesis research. Students are to enroll for three quarters for a total of three units. (Satisfactory/Unsatisfactory grades only.)

299. Advanced Research Projects and Independent Study (1-12)
(All Categories) (Satisfactory/Unsatisfactory grades permitted.)

500. Apprentice Teaching (1-4)
Participation in the undergraduate teaching program is required of all graduate students in the first year.

Natural Sciences

OFFICE: Provost, Revelle College

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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-1B-1C-1D-1E 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-2B-2C or have advanced standing will usually take the sequence Natural Science 2A-2B-2C-2D-2E. 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-3B-3C-3D instead of Natural Science 2A-2B-2C. The Physics 3 sequence provides a solid foundation in physics; it is particularly recommended for students majoring in physical science or engineering. The sequence eegins a quarter earlier than the regular Natural Science 2 sequence but merges with it at the beginning of Natural Science 2D (chemistry). The course descriptions for Physics 3 are in the 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 col-***

lege 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, 1B, 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. Three hours lecture, two hours recitation. ***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 technology, such as energy resources, and to biology. The lecture portion of the course is identical with Natural Science 1D. Three hours lecture; two hours recitation; 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. Three hours lecture; two hours recitation. ***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, three hours lecture, two hours recitation; 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. Three hours lecture, two hours recitation, or six hours of self-paced study. (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. Three hours lecture, two hours recitation, or six hours of self-paced study. (S)

2C. Natural Science: Physical Chemistry (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. Three hours lecture, two hours recitation, three hours laboratory or six hours of self-paced study and three hours laboratory. (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 must be accompanied by registration in either 2DL or 2DS. ***Prerequisites: Natural Sciences 2A, 2B, 2C recommended.*** (W)

2DL. Natural Science: Chemistry (2)
A laboratory course that introduces the student to analytical procedures and physical measurements on chemical systems. Emphasis is on accuracy and theoretical knowledge. Two hours laboratory lecture, two three-hour laboratories. Registration must be concurrent with registration in 2D. (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. (S)

2FL. Natural Science: Chemistry (2)
A laboratory course that will include further analytical work, along with other physical measurements, including the study of kinetics. Emphasis will be on precision and accuracy as well as on the theoretical basis of experimental design. Two hours laboratory lecture, one hour recitation, two three-hour laboratory sessions. (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.
John W. Evans, M.D., Ph.D. *(Mathematics)*
Robert Galambos, M.D., Ph.D.
Robert B. Livingston, M.D.
Arnold J. Mandell, M.D. *(Psychiatry)*
John S. O'Brien, M.D. *(Chairman of the Group)*
George S. Reynolds, Ph.D *(Psychology)*
Robert Tschirgi, M.D., Ph.D
Silvio Varon, M.D. *(Biology)*
Wigbert C. Wiederholt, M.D.

Associate Professors:

Youssef Hatefi, Ph.D. *(Adjunct, Neurochemistry)*
James R. Nelson, M.D. *(Adjunct)*
Charles E. Spooner, Ph.D.
Juan Yguerabide, Ph.D. *(Biology)*

Assistant Professors:

Hannah Friedman, Ph.D. *(Biology)*
Daniel K. Hartline, M.D. *(Biology)*
Steven A. Hillyard, Ph.D. *(In Residence)*
Ronald T. Kuczenski, Ph.D. *(Psychiatry)*
G. David Lange, Ph.D
Allen I. Selverston, Ph.D. *(Biology)*

David S. Segal, Ph.D. *(Psychiatry)*
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.

Doctor's 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 interests and goals so as to provide a good grounding in several disciplines of preclinical neurosciences. The student's program will include formal courses selected from the UCSD *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. He 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, neuronal 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 opportunity also exist since 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)
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 digital logic design. Two hours of lecture; four hours of laboratory. ***Prerequisites: consent of instructor; minimal knowledge of computer applications.*** (Satisfactory/Unsatisfactory grades permitted.) (W)

222. Selected Topics in the Neurosciences (1)
Lectures, group discussions, and demonstrations covering recent advances and current research problems in selected disciplines of the neurosciences. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

223. Quantitative Theories of Nervous-system Function (2)
Detailed analysis of selected models of nerve-membrane

function, simple neuron interactions and sensory data processing. The application of linear algebra and transform techniques to input-output relations of nervous systems. ***Prerequisite: consent of instructor.*** (Satisfactory/Unsatisfactory grades only.) (W)

224. Biogenic Amines and Brain Function (2)
Lectures and discussions concerned with biogenic amines as synaptic transmitters in the brain and neuropharmacological agents whose effect on brain functions may possibly be mediated by modifying the actions of biogenic amines. ***Prerequisite: medical-student or graduate-student status in biology, marine biology, psychology or neurosciences, or consent of instructor.*** (Satisfactory/Unsatisfactory grades permitted.) (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 SM205, 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 Neurophysiology (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. Current Topics in the Neurosciences (1)
Seminars by campus and departmental faculty, postdoctoral fellows, and guest lecturers on topics of current research and teaching interest in the neurosciences. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

232. Basic Mechanisms in Clinical Neurology (1)
A basic science course covering all the major disciplines of the neurosciences. The emphasis will be on the correlation of clinical neurological disorders and the basic mechanisms involved in the production of patient symptoms and physical findings. ***Prerequisite: medical-student or graduate-student status or consent of instructor.*** (Satisfactory/Unsatisfactory grades only.) (Not to be offered 1974-75)

233. Comparative Neurology (4)
Survey of structure and function of nervous systems of invertebrates and vertebrates. Two hours lecture, 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.) (W)

237. Moral and Ethical Aspects of Medicine (1)
This course will investigate and discuss many of the issues of value judgement which are related to and affect medical practice, education, and research. These issues will be raised through visiting speakers, residents, faculty, staff, and student seminar presentations, reprints, films and tapes. Intended for medical students, residents and resident staff. (Satisfactory/Unsatisfactory grades only.) (F,W,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.)

239. The EEG: Its Nature and Quantitation (1)
Lectures and demonstrations of EEG recording and computer-processing techniques. Basic mechanisms of slow-wave generation, evoked potential techniques, depth recording, use of data-compression methods, illustrated from animal, normal human and patient material. ***Prerequisites: Basic Neurology or Biology 121 or 143 or Neurosciences 238 or equivalent.*** (Satisfactory/Unsatisfactory grades only.) (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.) (Not to be offered 1974-75.)

245. EEG Research Seminars (1)
Presentation 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,W,S)

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.) (S)

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.

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. Apprenticeship 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. ***Prerequisites: must be neurosciences graduate students.*** (Satisfactory/Unsatisfactory grades only.) (F,W,S)

Oceanography

(See Scripps Institution of Oceanography)

Philosophy

OFFICE: 3112 Humanities-Library Building

Professors:

Henry E. Allison, Ph.D.
Frederick A. Olafson, Ph.D. *(Chairman)*
Avrum Stroll, Ph.D. *(Acting Chairman, Fall Quarter)*

Honorar Professeur:

Herbert Marcuse, Ph.D.

Associate Professors:

Georgios H. Anagnostopoulos, Ph.D.
Edward N. Lee, Ph.D.

Assistant Professors:

Helen E. Longino, Ph.D.
Thomas C. Mark, Ph.D. *(Graduate Adviser)*
Ronald D. Scales, Ph.D. *(Undergraduate Adviser)*
Richard J. Arneson, M.A., *Acting Assistant Professor*
Barbara A. Sinclair, A.B., *Acting Assistant Professor*

The Undergraduate Program

Students who wish to major in philosophy must have satisfied the general lower-division requirements. These requirements must include either the Humanities sequence 1 through 6 (Revelle College) or Philosophy 13, 14, 15 (other colleges), or their equivalent.

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)
4. Three additional upper-division courses in Philosophy (may include courses listed in 3 which are not used in satisfaction of 3).
5. Two upper-division courses from one or more of the following fields: History, Linguistics, Literature, or, with the approval of the undergraduate adviser, from fields of study that are closely related to the individual student's major philosophical interest.

The total is fourteen courses — twelve in philosophy, two in related fields. 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 UCSD 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. Course (Sect. 4)	Additional Phil. Course (Sect. 4)
— —	* — —	* — —
— —	— —	— —
Senior Year		
Philosophy 104	Philosophy 105	Philosophy 106
Sequence Course (Sect. 3)	Sequence Course (Sect. 3)	Additional Phil. Course (Sect. 4)
or	or	or
Additional Phil. Course (Sect. 4)	Sequence Course (Sect. 3)	Sequence (Sect. 3)
— —	— —	— —
— —	— —	— —

* Upper-Division course in related fields.

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 philosphical traditions and to develop as a philosopher in his 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 36 quarter units; at least 14 units must be from graduate courses in philosophy; no more than 9 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.

Doctor's Degree Program From the time of his initial enrollment until advancement to candidacy, the student will be expcted 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 36 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 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 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.

Each student who attempts the examination will receive from the Graduate Adviser official and written evaluations of his performance. Those students who pass the examination will be informed as to whether they are encouraged or permitted to begin preparation for the Oral Qualifying Examination. Such encouragement can be given only if the student's work in the Department and performance on the exams is of such a quality that staff members indicate a willingness to assist the student in the preparation of his prospectus and, eventually, to serve on his doctoral committee.

After passing the written comprehensive examination, the student must submit a prospectus of his dissertation to his Doctoral Committee. This committee will then orally examine the student on the subject of his intended 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 his doctoral committee, each candidate will write a dissertation demonstrating a capacity to engage in original and independent research. The candidate will defend his thesis in an oral examination by the doctoral committee. (See *Graduate Division: the Ph.D.*)

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 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 1974-75.)

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.) (F)

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.) (W)

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.) (S)

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 courses. (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.) (F,W,S)

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 analyses 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 1974-75.)

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 1974-75.)

Upper Division

0101. History of Philosophy: Greek Philosophy (4)
Greek philosophy through Plato. Examination of original material in Greek philosophy, including those of the pre-Socratics and Plato. Two hours lecture, one-hour discussion. (F)

102. History of Philosophy: Hellenistic and Roman Philosophy (4)
Greek and Roman philosophy from Aristotle to Plotinus. Examination of original materials of Hellenistic philosophy, including those of the Socratic schools down through the Stoic, Epicurean, Sceptic and Neo-Platonic. Two hours lecture, one-hour discussion. ***Prerequisite: Philosophy 101.*** (W)

103. History of Philosophy: Medieval Philosophy (4)
Medieval and Renaissance Philosophy. Examination of materials in Medieval and Renaissance Philosophy, including those by Medieval Christian, Jewish and Moslem philosophers and representative figures of the later humanistic tradition. Two hours lecture, one-hour discussion. ***Prerequisite: Philosophy 102.*** (S)

104. History of Philosophy: Early Modern Philosophy (4)
16th and 17th century philosophy. Examination of original materials in early modern philosophy; 17om the late Renaissance and Reformation to Descartes, Leibniz and Spinoza. Two hours lecture, one-hour discussion. (F)

105. History of Philosophy: 18th Century Philosophy (4)
Examination of original materials of 18th century philosophy, including the work of Locke, Berkeley, Hume, Kant and French Enlightenment figures. Two hours lecture, one-hour discussion. ***Prerequisite: Philosophy 104.*** (W)

106. History of Philosophy: 19th Century Philosophy (4)
Examination of original materials of 19th century philosophy, including Kant and Hegel. Two hours lecture, one-hour discussion. ***Prerequisite: Philosophy 105.*** (S)

108. Mythology and Philosophy (4)
Study of various ancient Near Eastern mythologies in relation to early Greek philosophy. (Not to be offered in 1974-75.)

109A-109B-109C. The Greco-Roman World (4)
An intensive study of the intellectual life of the Greco-Roman World, with especial emphasis on the development of the unique features of Greco-Roman literature, philosophy, historiography and art. A primary purpose will be to understand the relationships between the intellectual activity and the social and political environment in which it took place. ***Prerequisite: upper-division standing.*** (Cross-listed as Literature 109A-109B-109C and History 109A-109B-109C.) (Not to be offered in 1974-75.)

110A. Symbolic Logic (4)
Introduction to mathematical logic; consistency and completeness results for propositional and predicate calculi and identity theory. (F)

110B. Symbolic Logic (4)
First order theories, recursive functions, arithmetic models, Godel results. (W)

112A. Philosophy of Science (4)
An introductory examination of the nature, import and procedures of science in the light of its historical development. (W)

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.*** (S)

120A. Political Philosophy (4)
An examination of problems and theories concerning the nature of the state, society and government. Two or three lecture-discussions. (W)

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.*** (S)

123A. Ethics (4)
An inquiry into the nature of human conduct. Three-hour lecture-discussion. (F)

123B. Ethics (4)
An advanced course dealing with current topics in Ethics, such as Action theory, freedom and responsibility. ***Prerequisite: Philosophy 123A.*** (W)

130A. Contemporary Anglo-American Philosophy (4)
The history of contemporary analytical philosophy from Mill to Austin, emphasizing the development of formalistic and ordinary language approaches to philosophical issues. (W)

130B. Contemporary Anglo-American Philosophy (4)
An examination of current problems, approaches and conceptions in the philosophical thought of the contemporary Anglo-American tradition. ***Prerequisite: Philosophy 130A*** (S)

140A. Contemporary European Philosophy (4)
An examination of the philosophy of the life of Nietzsche and others, their rejection of systematic philosophy and turn to psychology and history. Husserl's phenomenological critique of both naturalism and psychologism. (F)

140B. Contemporary European Philosophy (4)
A study of how existential themes and the phenomenological method meet in such contemporary figures as Heidegger, Sartre, Merleau-Ponty and others. Two or three lecture-discussions. ***Prerequisite: Philosophy 140A.*** (W)

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. (Not to be offered in 1974-75.)

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 1974-75.)

160. Philosophy of Religion (4)
An examination of the nature of religious experience, the nature of faith, and the role in religion. (S)

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.

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. (S)

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. (W)

180. Senior Colloquium (4)
A seminar dealing with the examination of specific philosophical problems and topics and designed for seniors of high standing who major in Philosophy. ***Prerequisites:***

senior status and permission of department. May be repeated for credit. (S)

199. Individual Study (4)
Prerequisite: permission of departmental adviser. (F,W,S)

Graduate

200. Topics in the History of Philosophy (4)
A course of studies designed to prepare students for advanced work in seminars.

201. Topics in the History of Philosophy: Greek Philosophy. (4)
A course of studies designed to prepare students for advanced work in seminars in pre-Socratic and Platonic philosophy.

202. Topics in the History of Philosophy: Hellenistic and Roman Philosophy (4)
An examination of typical problems and philosophic issues found in the study of Greek and Roman philosophers: e.g., the origin and development of Greek philosophical concepts; the philosophic schools from the beginnings of Stoicism, Epicureanism, Skepticism down through Neo-Platonism.

203. Topics in History of Philosophy: Medieval Philosophy (4)
The medieval development of the Western philosophical tradition. Representative writings of Greek Gnosticism and the rise of the Latin Western Christian tradition: Clement of Alexandria and others.

204. Topics in the History of Philosophy: Early Modern Philosophy (4)
Philosophical and intellectual currents of the Renaissance, with reference to the origins and delopment of classical humanism and medieval scholasticism and the emergence of a Renaissance philosophy of man.

205. Topics in the History of Philosophy: Seventeenth and Eighteenth Century Philosophy. (4)
An examination of the origins and development of early modern philosophy, together with its philosophical and intellectual foundations, including a study of Descartes, Malebranche, Spinoza, Leibniz, etc. (Satisfactory/Unsatisfactory grades permitted.) (F)

206. Topics in the History of Philosophy: Nineteenth Century Philosophy (4)
A study of representative philosophical movements of the nineteenth century, as found in the writings of Hegel, Schopenhauer, Comte, Mill, Nietzsche, etc.

210. Topics in 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. Seminar in 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.

220. Topics in Moral and Political Philosophy (4)
A course of studies designed to prepare students for advanced work in seminars.

223. Seminars in 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. (F)

224A-224B. Seminar in Social and Political Philosophy (4-4)
An analysis of social philosophies and ideologies as they emerge from basic types of social structure.

230. Seminar in Contemporary Analytic Philosophy (4)
An analysis of some important problems in recent and contemporary Anglo-American philosophy as illustrative of major movements of thought.

240. Seminar in Contemporary European Philosophy (4)
An analysis of some important problems in recent and contemporary continental philosophy as illustrative of major movements of thought.

250. Seminar in 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. Seminar in 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.

264. Seminar in Philosophy of History (4)
An examination of basic concepts, categories and presuppositions of historical experience in the context of representative philosophies of history.

270. Seminar in 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. Seminar in 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 a specific philosophical problem. (Satisfactory/Unsatisfactory grades permitted.)

290. Directed Independent Study (1-4)
Supervised study of individually selected philosophical topics. May be repeated for credit. ***Prerequisite: consent of instructor.*** (Satisfactory/Unsatisfactory grades optional.) (F,W,S)

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.) (F,W,S)

299. Thesis Research (1-12)
(Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

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.) (F,W,S)

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. (F,W,S)***

Physical Education

OFFICE: Gymnasium

Supervisors:
Theodore W. Forbes, Ed.D.
Howard F. Hunt, M.A.

Associate Supervisors:
Frank N. Vitale, M.A.
John H. Douglass, M.A.
James R. White, Ph.D.

Assistant Supervisors:
John W. Cates, M.A.
J. Barry Cunningham, M.A.
Bert N. Kobayashi, Ph.D.
J. Charles Millenbah, B.S.
Robert Moss, B.A.
Andrew Skief, Jr., B.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 intercollegiate 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 22 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 availbale to use gymnasium and pool facilities. Noontime and evening volleyball or basketball games are popular and the sauna is open from 8:00 a.m. to 10:00 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, 28 UCSD 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 two days of instruction each quarter. Consult the Schedule of Classes issued by the Registrar's Office 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 par-

ticipants with instruction to perfect techniques and sharpen competitive strategy.)

1A-1B-1C. Swimming (0)
Designed to permit students to gain or improve swimming strokes, techniques, and aquatic skills on an individual basis.

2. Synchronized Swimming for Women (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. *Prerequisites: Intermediate Swimming or consent of instructor.*

4. Water Safety Instruction (0)
Standard American Red Cross course designed 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-7D. 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-8D. 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.*

10A-10B. 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 UCSD beginning swimmer's certificate.*

11A-B-C-D. Sailing (0)
Course is designed to make sailing an easily understood sport. Special emphasis is placed on nautical terms, water and safety rules, demonstrations and practical exercises in rigging and boat handling.

14A-14B-14C-14D-14E. Tennis (0)
Instruction in the fundamentals of the serve, strokes, volley, rules, scoring, tactics and court strategy.

15A-15B-15C-15D-15E. 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-16B-16C-16D-16E Volleyball (0)
An emphasis on fundamental skills in serving, spiking, blocking, and teamwork techniques. Opportunity for team competition.

17A-17C. 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-18C-18D. Cycling (0)
Proper riding techniques, care, maintenance, safety considerations and trips within a 50-mile radius of campus.

19. Squash (0)
Introduction to the sport, including instruction in fundamental skills and techniques, individual and group practice, and opportunities for competion.

10. Handball (0)
Instruction in fundamentals of the serve, rally and court strategy. Opportunity for singles and doubles competiton.

21A-21C. Modern Dance (0)
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-22C. Jazz Dance (0)
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.

28. Table Tennis (0)
The course will stress an understanding of rules, strategy and good form.

29A-29C. 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 woman enrolled in the class through personal evaluation, diet, measurements and exercise.

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.

38A-38B-38C-38D-38E. 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-40B-40C-40D. Gymnastics, Women (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-46C-46E. Fencing, Epee (Electric) (½)
Classical French style, brief history, electrical equipment and safety, protocol and basic technique. Attacks, both simple and compound; defences, simple and compound; strategy and directing of bouts using French terminology.

47A-47C-47D. 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-48D. 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-50B-50C-50D-50E. 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.

54A-54D. 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.

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

87. Psychology of Officiating (0)
Techniques and analysis of basketball officiating, stressing mechanics and practical application of rules leading to official's rating for student 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)*
George Feher, Ph.D.
William R. Frazer, Ph.D.
Walter Kohn, Ph.D.
Norman M. Kroll, Ph.D.
Leonard N. Liebermann, Ph.D.
Ralph H. Lovberg, 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.
Laurence E. Peterson, Ph.D.
Oreste Piccioni, Ph.D.
Sheldon Schultz, Ph.D.
Harry Suhl, Ph.D. *(Chairman)*
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:

Joseph C. Y. Chen, Ph.D.
Donald R. Fredkin, Ph.D.
John M. Goodkind, Ph.D.
Robert J. Gould, Ph.D.
Francis R. Halpern, Ph.D.
Shang-Keng Ma, Ph.D.
Thomas M. O'Neil, Ph.D.
Lu Jeu Sham, Ph.D.
Wayne Stein, Ph.D.
Nguyen-Huu Xuong, Ph.D.

Assistant Professors:

Oscar Lumpkin, Ph.D.
Werner A. W. Mehlhop, Ph.D.
Herbert B. Shoe, Ph.D.
Wayne Vernon, 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 teaches him 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 integrated, descriptive and analytical treatment of those areas of physics in which quantum effects are important, particularly atomic and nuclear physics and elementary particles.

Students who plan to do graduate study in physics should choose German, Russian or French (preferably German or Russian) for meeting the language requirement.

Students entering the upper division with a deficient background will have to make up this deficiency in the junior year. For example, a student who failed to take Mathematics 2D and 2E or Natural Science 2DL and 2F will be required to take these courses in the junior year in place of the noncontiguous minor. Such a student may find it necessary to use some or all of his senior year free electives to complete the non-contiguous minor.

The following courses are required for the physics major:

(a) Lower-division preparation required:

Natural Science 2A-2B-2C, or Physics 3A-3B-3C-3D, Natural Science 2D-2DL-2F, or Science 3A-3AL-3B-4A-4B-4C-4D-4E (or upper-division chemistry course with associated laboratory).

Mathematics 2A-2B-2C-2D-2E.

(b) Upper division:

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	Physics 132 or 170
Physics 130A	or 131	* Restricted Elective
Physics 140A		Physics 130B
		Physics 140B

* Restricted electives may be chosen from upper division or graduate courses in natural sciences or mathematics, subject to the approval of the Physics Department. One of the restricted electives in the junior year must be in mathematics; Mathematics 120 is strongly recommended.

Physics Major and 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 preparation required:

Natural Science 2A-2B-2C, or Physics 3A-3B-3C-3D, Natural Science 2D-2DL-2E-2F-2FL, or Science 3A-3AL-3B-3BL-4A-4B-4C-4D-4E, and Natural Science 2E.

Mathematics 2A-2B-2C-2D-2E.

(b) Upper division:

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	

* Mathematics 120 is recommended.

Physics Major and 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 preparation required:

Natural Science 2A-2B,2C, or Physics 3A-3B-3C-3D, Natural Science 2D-2DL-2E-2F-2FL, or Science 3A-3AL-3B-3BL-4A 4B-4C-4D-4E, and Natural Science 2E.

Mathematics 2A-2B-2C-2D-2E.

(b) Upper division:

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	

* Mathematics 120 is recommended.

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 Physics Department. Examples of such programs are the following:

1. Mathematics 2D, 110A; Physics 110A, 130A-130B-130C
2. Mathematics 2D, 110A; Physics 110A, 130A, 160, 161
3. Mathematics 2D, 2E; Physics 100A-100B-100C, 120A
4. Mathematics 2D, 2E; Physics 110A-110B, 140A-140B.

Because of the large number of mathematics prerequisites required for physics courses, students who elect noncontiguous minors in the field of physics may 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 examinaton is identical to the first-year written examination for Ph.D. students. A list of acceptable courses is available in the Physics Department office. There is no foreign language requirement.

Doctor's Degree Program The Ph.D. program consists of three components: graduate courses, apprenticeship in research, and thesis research. In addition, opportunities 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 UCSD. 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)

* Students who have not had an introductory course in solid-state physics may take Physics 152.

Second-Year Oral Examinations A student is 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 I (3)

Physics 212C (Quantum Mechanics) Fall
Physics 210A (Statistical Mechanics) Fall
Physics 210B (Statistical Mechanics) Winter

Group II: (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) Winter

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 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 committees.

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 Perspective sequence of Fourth College. (The Physics part of the Science sequence (4A, B, C) of Muir College is the responsibility of the Department of Applied Physics and Information Science.) The Physics 3 sequence provides a solid foundation in physics; it is particularly recommended for students majoring in physical science or engineering.

NS1D-1DL-1E-1EL. Physics
See Course Listings: *Natural Sciences*

NS2A-2B-2C. Physics
See Course Listings: *Natural Sciences*

3A. Physics (4)
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. Three hours lecture, two hours recitation. ***Prerequisites: 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. Three hours lecture, two hours recitation. ***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. Three hours lecture, two hours recitation, and three hours 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, Schrödinger equation, square well, barrier penetration, history of hydrogen atom problem, Schrödinger solution of hydrogen atom problem. Three hours lecture, two hours recitation, three hours laboratory. ***Prerequisite: Physics 3C.*** (F)

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-15B-15C. Physics
See Course Listings: *Science and Technology*

Scientific Perspective 31A-31B-31C. The Perspective of Physics
See Course Listings: *Scientific Perspective*

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. ***Prerequisite: Physics 110A; prerequisite or co-registration: Mathematics 2E.*** (W)

115A-115B-115C. The Perspective of Physics (4-4-4)
An introduction to physics both classical and modern, with the development of mathematics where required. 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 in other fields. (F,W,S)

120A-120B-120C. 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)

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, Physics 110A.*** (F)

130B. Quantum Physics (4)
Atomic structure according to wave mechanics; Schrödinger equation for hydrogen-like atoms; Pauli principle, Heisenberg principle; particle in a periodic poten-

tial. 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. Four hours. *Prerequisite: Physics 130A.* (W)

132. Modern Physics Laboratory (2)
Experiments in atomic physics, optics, physical electronics, fluid dynamics, surface physics, etc. Four hours. *Prerequisites: Physics 130A, 130B.* (S)

140A-140B. 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)

152. Introduction to Solid-State Physics (4)
Crystal symmetry, free electron gas, band structure, properties of insulators, semiconductors and metals; atomic diffusion, alloys, electronic transport phenomena. Four hours lecture. *Prerequisites: Physics 130B, 140B.* (S)

153. Topics in Biophysics (4)
This course will cover a discussion of the physical probes used to explore the relation between structure and function of biomolecules. Three hours lecture. *Prerequisites: Senior standing in physics, chemistry, or biology, 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.* (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.* (F) Not offered 1974-75.

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. Optional supplementary material will be assigned on an extracurricular basis for students interested in FAA license examinations. Three hours lecture. *Prerequisites: Natural Science 1D, 1E or Natural Science 2A, 2B or Science 4A, 4B, 4C.* (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.*

199. Special Project (2 or 4)
Independent reading or research on a problem by special arrangement with a faculty member. Four hours. *Prerequisite: consent of instructor.* (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. *Prequisite: 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-210B. Statistical Mechanics (3-2)
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, 140B, 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-212B. Quantum Mechanics (4-4)
Physical basis of quantum mechanics, the Schrödinger 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. *Prerequisites: 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 213.*** (S)

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 electron 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 permitted.) (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.*** (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.) (S)

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.) (F)

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.) (F)

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, ferro-electric resonances, surface physics, superconductivity, ferro-electrics, 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, 212B.*** (Satis- factory/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, 218B.*** (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-210B; 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 (0-1)
Discussion of recent research in astrophysics and space physics. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

254. Atomic and Molecular Physics Seminar (0-1)
Discussion of current research in atomic and molecular structures and collisons. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

255. Theoretical Solid-State Seminar (0)
Discussions of current research in theoretical solid-state physics. (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. Colloquium (0-1)
Discussions of recent research in physics directed to the entire physics community. (Satisfactory/Unsatisfactoy grades only.) (F,W,S)

270. The Physics of Music (3)
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). *Prerequisites: Freshman calculus, mechanics, electricity and magnetism.* (Satisfactory/Unsatisfactory grades permitted.) (S)

285. 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. (Satis- factory/Unsatisfactory grades permitted.) (W)

298. Independent Study (1-4)
Prerequisites: Consent of instructor and Department Chairman. (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

299. Research in Physics (1-12)
(Satisfactory/Unsatisfactorygrades 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)*
Theodore H. Bullock, Ph.D. *(Neurosciences)*
Darrel 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)*
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:

Colin M. Bloor, M.D. *(Pathology)*
James W. Covell, M.D. *(Medicine, Bioengineering)*
Dean L. Franklin *(Adjunct, Medicine)*
Charles E. Spooner, Ph.D. *(Neurosciences)*

Assistant Professors:

Stephen R. Gross, Ph.D. *(Medicine)*
Morton P. Printz, Ph.D. *(Medicine)*
James T. Stull, Jr., Ph.D. *(Medicine)*
Palmer W. Taylor, Ph.D. *(Medicine)*

* * *

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.

Doctor's 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 participate in a laboratory rotation program so that he can become familiar with the research activities of the faculty. Additional course work will depend upon the student's interests and the direction of his thesis project. The student is expected to have chosen such a project and taken his 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 major interest; the second deals with his 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 excercises and discussion sections of the School of Medicine core courses.

Courses

203. Biomathematics and Computing (2)
Essentials of probability, biomedical statistics and computing. (W)

204A. Cell Biology (4)
This course 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 (7)
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 development, 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 design of modern instruments and techniques — both laboratory and clinical — through 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)
A course designed to complement the pharmacology taught in the core curriculum, by introduction of new topics or review of areas that involve both organ physiology and pathology. Specific aspects will be assigned to individual students and discussed by the group. ***Prerequisites: P/P 206 and 206L and permission of instructor.*** (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)
Physiology of the respiratory system, including structure and function of the lung, ventilation, diffusion, pulmonary circulation, gas exchange and ventilation-perfusion relationships, mechanics of breathing, blood gas transport, comparative physiology of gas exchange, environmental physiology or respiration. ***Prerequisites: P/P 206 and 206L.*** (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. Biochemical and Molecular Pharmacology (3)
A survey of the biochemical and molecular basis of drug action. Emphasis will be placed on the fundamental concepts and newer developments in drug-receptor interactions, drug metabolism and disposition. ***Prequisite: P/P 204 or equivalent.*** (F)

248. Introduction to Drug Action and Pharmacology (4)
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)

297. Graduate Seminar (1)
Discussion of current research and pertinent literature by graduate students. Assignments will be rotated among participating students. (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. (F,W,S)

Political Science

Revelle Office: 1512 Humanities-Library Building
Muir Office: 5029 2D

Courses

Lower Division

10-11-12. Introduction to Political Science (4-4-4)
Utilizing text, reading, and case studies, the three quarters will constitute an introductory course to political science and institutions. In the context of their historical past, present situations in political, democratic, and foreign policy will be presented. (F,W,S)

Upper Division

100. Systems of Political Thought (4)
To induce students to think systematically about politics, especially those broad socio-economic problems which periodically disrupt the established procedures of political decision-making; to be aided in this aim by other political thinkers who have reflected on the characteristics of political authority, social organization, justice, freedom, and the distribution of property. ***Prerequisite: lower-division political science.***

101-102. Comparative Politics (4-4)
A focus on the problems of political and economic development, on the politics, economics, and ideologies of Western Europe and Communist systems. The course will also develop new perspectives of society in the United States and frequent reference to conditions and trends in American political life. ***Prerequisite: lower-division political science.***

103. China in World Politics (4)
This course will examine many of the major issues in the international world 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 perception 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.***

104. Global Ecology (4)
An analysis of the basic principles of ecology as they influence relations among nations. Population pressures and distributions, access to resources, and patterns of environmental deterioration will be analyzed and their impact on the present and future international system will be outlined. Topics to be covered include: the development gap, the green revolution, trends in resource utilization, technology transfer, patterns of international cooperation, etc. ***Prerequisite: one course in Political Science or consent of the instructor.***

105. Technology and Society (4)
This course concentrates on the impact of industrial revolution and new technologies on social life and social institutions. The impact of the technological revolution on political organization, the scope of centralized control, economic planning and coordination, and the quality of life are discussed. The development of new technologies and their social and economic cost will be analyzed as well as the shape of emerging post-industrial societies. ***Prerequisite: one course in Political Science or consent of the instructor.***

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: one course in Political Science or consent of the instructor.***

120. The Supreme Court and Fundamental Freedoms (4)
The course will focus on selected legal problems in the area of constitutional rights. Source material will include both writings about these problems and opinions of appellate courts, largely the Supreme Court of the United States. Examples of topics to be covered are: the Supreme Court and racial discrimination, war and the Court, speech and protest, criminal due process.

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.***

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.***

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; neoimperialism; political change.

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 Third World peoples within the United States. ***Prerequisite: sophomore standing.***

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.

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 his 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)

201. Graduate Seminar (4)
Seniors admitted with consent of instructor.

Psychology

OFFICE: 5217 Psychology-Linguistics Building

Professors:

Norman H. Anderson, 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:

Jean M. Mandler, Ph.D.
Harry L. Munsinger, Ph.D.
David E. Rumelhart, Ph.D.

Assistant Professors:

Lynn A. Cooper, Ph.D.
Ebbe B. Ebbesen, Ph.D.
Norbert Kerr *(Acting)*
Vladimir J. Konecni, Ph.D.
James L. McClelland *(Acting)*
Elissa L. Newport *(Acting)*
J. Edward Russo, Ph.D.
Ben A. Williams, Ph.D.

* * *

Ursula Bellugi-Klima, Ed.D., *Associate Adjunct Professor of Psychology*
Robert Galambos, Ph.D., M.D., *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, animal learning, physiological psychology, developmental psychology and social psychology. The Department emphasizes modern research in the experimental and theoretical analysis of huan 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 two majors: one is designed for the student with a general interest in psychology (General Major), while the other program is designed for students who are interested primarily in the experimental study of behavior (Experimental Major).

The General Major is designed to give the student interested in psychology a broad overview of the field of psychology. It is assumed that most students who choose the general major do not expect to go to graduate school in psychology but instead hope to use their psychology major in other ways. To develop a firm grasp of present-day

psychology, it is necessary to have some understanding of experimental methods, statistics and the historical development of both the ideas and techniques that have been used by psychologists. The basic knowledge is taught in a three-course sequence taken during the junior year: Basic Statistics (110), General Introduction to Experimental Psychology (108) and The History of Psychology (131). To give the student an understanding of the state-of-art in psychological knowledge, the student will choose three courses from the 120 series. These will be taken concurrently with the courses outlined above during the junior year. In addition to the above requirements, students who elect the General Major must complete six upper-division psychology electives, usually in their senior year.

The Laboratory Major is designed to involve students in psychological research. It is assumed that students who choose the Experimental Major plan to go to a graduate or professional school.

To understand modern experimental psychology requires skills in laboratory techniques and a thorough knowledge of quantitative methods, including computer techniques, the construction and evaluation of theories, probability theory, statistics and experimental design. These skills are taught in the junior year through the sequence of courses: Psychology 105, 106, 107 and 110, 111, 112 and 115, 116, 117. The Psychology 105 and 110 series are lecture-seminar courses which introduce the study of contemporary issues and numerical methods in experimental psychology. The Psychology 115 series is a laboratory which introduces the experimental techniques necessary to study the issues raised in the 105 and 110 series. The three sequences are designed to be taken concurrently, during the entire junior year, for they offer an integrated introduction to the experimental areas.

In the senior year, students in the Experimental Major take an additional six upper-division psychology courses. Three of these electives can, but need not, be the three-quarter sequence of Psychology 194 in which each student performs a research project of his choice, guided by a member of the staff. If a student elects the 194 sequence he will receive department credit for each quarter only if he satisfactorily completes the entire sequence.

A minimum of six upper-division courses in psychology is required in addition to the 105, 110 and 115 course sequences.

Majors will be assisted by departmental advisers in selecting a program suitable for their particular interests. A qualified major may elect to take graduate seminars in psychology, subject to approval by his adviser and the instructors of the relevant courses.

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.

Prerequisites for entering the General Major are one year of college-level mathematics, three science courses and APIS 10. Prerequisites for entering the Experimental Major are one year of calculus, either Mathematics 1C or 2C, four science courses and APIS 10. Science requirements for both majors may be met by taking any selection of the lower-division science courses offered in the colleges. APIS 10 is required to give students some knowledge of computer programming.

The College Science and Mathematics Requirements Each college imposes its own science and mathemtics 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.

Major Programs in Psychology

(Recommended Schedule — General Major)

FALL	WINTER	SPRING
Junior Year		
Psychology *	Psychology *	Psychology *
Psychology 110	Psychology 108	Psychology 131

Senior Year

Psychology elective	Psychology elective	Psychology elective
Psychology elective	Psychology elective	Psychology elective

* Upper-division course number to be assigned.

(Recommended Schedule — Laboratory Major)

Junior Year

Psychology 105	Psychology 106	Psychology 107
Psychology 110	Psychology 111	Psychology 112
Psychology 115*	Psychology 116*	Psychology 117*

Senior Year

Psychology 194	Psychology 194	Psychology 194
Psychology elective	Psychology elective	Psychology elective
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* Note that 115, 116 and 117 each carry two credits (half-course).

The Noncontiguous Minor for Revelle College A limited number of students may enroll in psychology 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.

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. The Department concentrates especially on human-information processing. In addition, the Department has programs of study in animal learning, social psychology, physiological psychology (including motivation and emotion) and developmental psychology.

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.

Doctor's Degree Program

Qualifying Examination By the end of the second year a student proceeding to the Ph.D. degree is expected to pass a qualifying examination, consisting of two sessions. The first session, examining the candidate's knowledge in general experimental psychology, is a three-hour examination, open-book, consisting of seven questions administered and graded by a committee of five faculty members and will be offered three times a year. The second session will be conducted by the student's doctoral dissertation committee and will deal with the problems, experiments and interpretations which the student expects to encounter in his dissertation.

Course of Study All students are expected to fulfill the requirement in quantitative methods (normally Psychology 201A-201B). Other courses are divided into seven areas according to content. The areas include developmental, human-information processing, learning and motivation, physiological, sensory, social and human judgment. Within areas, courses are divided into basic seminars and advanced seminars. ***Basic seminars*** (Psychology 202-219) are intended to cover current psychological knowledge and to provide the basis for more intensive and specialized study. ***Advanced***

seminars (Psychology 220-239) focus on specific areas of current knowledge and research. Certain graduate and upper-division courses in other departments may be considered as advanced seminars with the approval of the Department.

In the first year of study, the student is required to take at least six ourses from within the Department. The coursesmust be chosen from at least four different areas and at least one course must be an advanced seminar. Course work in the second year will usually be confined to advanced seminars and interdisciplinary work. There are no further course requirements.

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. (Psychology 500.)

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.

Comprehensive Evaluation Each student's work will be evaluated by the staff at the end of the first year of residence. This evaluation will consider all aspects of the student's performance: his work in courses and seminars, his ability to perform research, and his teaching. In addition, each student must submit a research paper based on his work during the first year. Admission to second-year standing depends upon the outcome of this evaluation. During the second year, the Department will survey the student's general preparation in psychology, including performance on the Qualifying Examinations. Additional written or oral evidence of competence in certain areas may be sought at this time and, where necessary, additional course work may be required.

Courses

Lower Division

10. Developmental Psychology (4)
An introduction to the psychological development of the human organism with special reference to cognitive development in the child. Three hours lecture, one hour recitation.

11. Perception and Information Processing (4)
An introduction to basic pinciples of perception, learning and information processing. Three hours lecture, one hour recitation.

14. Social Psychology (4)
An introduction to concepts and methods in social psychology. Three hours lecture, one hour recitation.

90. Freshman Seminars (0)
Freshman seminars organized around the research interests of various faculty members. ***Prerequisites: freshman standing and consent of instructor.***

Upper Division

105. Introduction to Experimental Psychology (4)
Introduction to experimental work in operant psychology. ***Prerequisites: Mathematics 1C; co-registration in Psychology 111 and 116.***

106. Introduction to Experimental Psychology (4)
Introduction to experimental work in social psychology. ***Prerequisites: Mathematics 1C; co-registration in Psychology 111 and 116.***

107. Introduction to Experimental Psychology (4)
Introduction to experimental work in human information processing. ***Prerequisites: Mathematics 1C; co-registration in Psychology 112 and 117.***

108. General Introduction to Experimental Psychology (4)
An introduction to methods in psychology.

110. Experimental Method of Quantitative Techniques (4)
Introduction to the experimental method in psychology and to mathematical techniques necessary for experimental research. ***Prerequisites: Mathematics 1C; co-registration in Psychology 105 and 115.***

111. Experimental Method of Quantitative Techniques (4)
Intermediate examination of the experimental method in psychology and mathematical techniques necessary for experimental research. ***Prerequisites: Mathematics 1C; co-registration in Psychology 106 and 116.***

112. Experimental Method of Quantitative Techniques (4)
Advanced examination of the experimental method in psychology and to mathematical techniques necessary for experimental research. ***Prerequisites: Mathematics 1C; co-registration in Psychology 107 and 117.***

115. Laboratory in Psychology (2)
Laboratory work in operant psychology to accompany Psychology 105. ***Prerequisites: Mathematics 1C; co-registration in Psychology 105 and 110.***

116. Laboratory in Psychology (2)
Laboratory work in social psychology to accompany Psychology 106. ***Prerequisites: Mathematics 1C; co-registration in Psychology 106 and 111.***

117. Laboratory in Psychology (2)
Laboratory work in human information processing to accompany Psychology 107. ***Prerequisites: Mathematics 1C; co-registration in Psychology 107 and 112.***

120. Sensation, Perception & Cognition (4)
An introduction to problems and methods of study of perceptual and cognitive processes.

121. Experimental Child Psychology (4)
A lecture course in the methods and theory of child development. Each student will be expected to gain knowledge of human development. ***Prerequisites: None — upper-division.***

122. Social Psychology (4)
Introduction to group behavior, attitude change, social perception. ***Prerequisite: permission of instructor.***

123. Physiological Psychology (4)
Intensive introduction to current knowledge of physiological factors in learning, motivation, perception and memory.

130. Developmental Psychology and Education (4)
An introduction to the child's cognitive, perceptual, linguistic and social development with emphasis on their 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 (departmental stamp).*

131. History and Systems in 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: four previous courses in psychology.*

132. Sensory Mechanism (4)
An introduction to sensory mechanism involving auditory and visual phenomena. *Prerequisite: Psychology 107.*

135. Human Information Processing (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 11 or 107.* Some knowledge of programming would be useful (e.g., APIS 10).

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. *Prerequisites: three psychology courses.*

137. Developmental Psychology (4)
Intensive survey of current knowledge of cognitive and intellective factors in human development.

138. Introduction to Mathematical Psychology (4)
An introduction to mathematical models in learning, perception, memory and sensory processes. *Prerequisites: Psychology 115, 116 and 117 or Psychology 11 and Mathematics 180A.*

139. 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. *Prerequisites: Psychology 105-115.*

140. Control and Analysis of Human Behavior (4)
An examination of the principles and techniques currently or potentially involved in the control and modification of human behavior. *Prerequisites: Psychology 105, 110 and 115 sequences.*

141. Choice and Decision (4)
Introduction to theory, method and empirical findings in the areas of choice and decision behavior. Three hours lecture. *Prerequisite: psychology major or Mathematics 181A and Psychology 11.*

142. Experimental Social Psychology (4)
Introduction to the experimental investigation of human and animal scial behavior.

143. Emotions (4)
Introduction to current theories and research in emotion, with special reference to theories of anxiety. Three hours lecture. *Prerequisite: senior majoring in psychology, or three upper-division psychology courses.*

144. Theories in Social Psychology (4)
A survey of theories and systems in social psychology. *Prerequisite: Psychology 14.* (Psychology 134 and 144 may not both be taken for credit.)

145. Psycholinguistics (4)
Presentation and discussion of grammar and psychology, theories of grammatical development, semantics, and the biological basis of language. *Prerequisite: permission of instructor.* (Normally limited to major in psychology and linguistics and graduate students in tose departments.)

146. Cognitive Processes (4)
An introduction to contemporary models of cognition and the process of thinking. *Prerequisite: Psychology 135 or equivalent.*

147. Psychology of Knowledge and Explanation (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; senior majoring in psychology, philosophy, anthropology, sociology, or political science.*

148. Cognitive Algebra (4)
General theory of judgment based on algebraic models. Emphasis on varied substantive applications, including person perception, social attitudes and opinions, decision-making, and psycholo-physical judgment. *Prerequisites: Psychology 107 and 112 or equivalent.*

149. Behavior Genetics (4)
An exploration of the nature/nurture controversy with particular attention to human intelligence.

151. The Psychology of Music (4)
The physiological basis of hearing; peripheral and central mechanisms. Auditory sensation. Pattern recognition. Physiological basis of pattern recognition. Two-channel listening. Short-term memory in music with demonstrations. Aesthetics. Development of motor skills and techniques. *Prerequisites: none.*

160. Psychology of Internal Experience (4)
An examination of historical and current approaches to the study of internal experience. Topics to be covered include perceptual phenomena, imagery, dreaming, hallucinations, hypnotic and altered states. Emphasis throughout on techniques that can be used to provide objective information about subjective experience. *Prerequisite: consent of instructor.*

161A, 161B, 161C. Application of Social Psychology in Naturalistic Settings (4-4-4)
Emphasizes learning of experimental and quasi-experimental methodology applicable to social problems. Students carry out field research in areas such as psychology of law (judicial decision making), traffic-related behavior (risk-taking), environmental psychology and other areas of student interest. *Prerequisite: major in psychology.*

180. Special Topics (4)
Selected seminars by members of the staff. *Prerequisite: major in psychology.*

190. Senior Research Pro-Seminar (1)
Presentations by individual faculty members describing current research in their laboratories and potential senior research projects.

194. Research in Psychology (4)
Research seminars and research, under the direction of a member of the staff. *Prerequisites: Psychology 105, 110, 115.*

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.*

199. Independent Study (2-4)
Independent study or research under direction of a member of the staff. *Prerequisite: special permission of Department.*

Graduate

201A-201B-201C. 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.

202. Sensory Mechanisms (3)
An introduction to problems and methods. Seminar.

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. Developmental Psychology (3)
The original behavioral repertory of the child and its subsequent development. Seminar.

208. Choice and Decision-Making (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 as they relate to decision-making, psychophysics, social and personality psychology. Seminar. ***Prerequisite: graduate study in psychology.***

210. Motivation and Learning (3)
Basic problems in theory and research on human and animal motivation and learning. Seminar. ***Prerequisite: graduate study in psychology.***

211. Piagetian Theory (3)
Selected topics in Piaget's theory of cognitive development. Seminar.

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 Psychophysics (2)
Advanced seminar.

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)
Advanced seminar on recent research in vision. ***Prerequisite: graduate student in psychology.***

228. Advanced Topics in Mathematical Psychology (2)
Advanced seminar on selected mathematical models in learning, perception, sensory processes, memory and decision.

229. Selected Topics in Social Psychology (2)
Advanced seminar on theoretical issues in attitudes and social 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 agression, 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. ***Prerequisite: none.***

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.

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 Study and Thesis Research (1-12)
(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: 2126 Humanities and Social Sciences Building

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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. General Chemistry
Introductory chemistry with emphasis on the applications of chemistry to molecular biology. Required for Muir students majoring in biology. Three hours lecture. (W)

3AL. General Chemistry Laboratory
This laboratory course should be taken with Science 3A.

3B. General Chemistry
A continuation of General Chemistry 3A. Three hours lecture. ***Prerequisite: Science 3A.*** (S)

3BL. General Chemistry Laboratory
This laboratory course should be taken with Science 3B. ***Prerequisite: Science 3AL.*** (S)

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, circular, and harmonic motion. The concepts of work and energy. The conservation of energy, linear momentum, and angular momentum. Two hours lecture, two hours recitation. ***Prerequisite: Math 1A or 2A. Concurrent registration permissible.*** Mr. Rotenberg and Staff (F).

4B. Waves Energy and Properties of Matter (4)
An introduction to continuum 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: Math 1B or 2B. Concurrent registration permissible.*** Mr. 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, Math 1C or 2C. Concurrent registration permissible.*** Mr. 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.*** Mr. Luo, Mr. Lee. (F,W,S)

4F. Electric Circuits Laboratory (4)
Experimental introduction to electric circuits and systems. Measurement and observation of electrical properties of various elements, linear and nonlinear circuits, frequency response, wave shaping. Two hours lecture and three hours laboratory. ***Prerequisite: Science 4C or consent of instructor.*** Staff. (S)

Upper Division

140A. Organic Chemistry (Muir)
The properties and reactions of alkanes, cycloalkanes, arenes, alkyl halides and alcohols. The mechanism of Sn1, Sn2, E1, and E2 reactions. ***Prerequisite: Science 3C.*** (W)

140B. Organic Chemistry (Muir)
Continuation of Science 140A. The properties and reactions of aldehydes, ketones, carbohydrates, carboxylic acids, esters, amides, proteins, and aromatic compounds. Special emphasis is placed on organic reactions analogous to reactions which occur in typical biochemical pathways. ***Prerequisite: Science 140A.*** (S)

143A. Organic Chemistry Laboratory (Muir)
Independent experience in modern methods of organic product isolation, identification, synthesis, and instrumentation. Introduction to spectroscopic and electromagnetic measurement and correlation with theoretical properties and mechanism of action. ***Prerequisite: concurrent enrollment in Science 140B.*** (S)

(Note: Transfer students who have completed equivalent lower-division courses in organic chemistry have met this requirement.)

Science and Technology

OFFICE: Building 303, Matthews Campus

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Professors:
Russell F. Doolittle, Ph.D. ***(Chemistry)***
Richard W. Dutton, Ph.D. ***(Biology)***
William R. Frazer, Ph.D. ***(Physics)***
William Nachbar, Ph.D. ***(AMES)***
Laurence E. Peterson, Ph.D. ***(Physics)***
Sheldon Schultz, Ph.D. ***(Physics)***

Associate Professors:
Elvin J. Harper, Ph.D. ***(Chemistry)***
Trevor C. McMorris, Ph.D. ***(Chemistry)***
Melvin I. Simon, Ph.D. ***(Biology)***
Faustina F. Solis, M.S.W. ***(Community Medicine)***
Frank B. Thiess, Ph.D. ***(Mathematics)***
Joseph W. Watson, Ph.D. ***(Chemistry, Provost of Third College)***
Juan Yguerabide, Ph.D. ***(Biology)***

Assistant Professors:
Edward C. Alexander, Ph.D. ***(Chemistry)***
Willie C. Brown, Ph.D. ***(Biology)***
Arthur F. Diaz, Ph.D. ***(Chemistry)***
P. A. George Fortes, Ph.D. ***(Biology)***
Leonard R. Haff, Ph.D. ***(Mathematics)***
Katja Lindenberg, Ph.D. ***(Chemistry)***
Oscar J. Lumpkin, Ph.D. ***(Physics)***

Roy H. Ogawa, Ph.D. *(Mathematics)*
Ramon Pinon, Jr., Ph.D. *(Biology)*
Jeffrey F. Raskin, M.A. *(Visual Arts)*
Herbert B. Shore, Ph.D. *(Physics)*
Meredith G. Somero, Ph.D. *(Biology)*
James W. White, Ph.D. *(Mathematics)*
Daniel E. Wulbert, Ph.D. *(Mathematics)*

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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 college-level mathematics. The mathematics requirements may be satisfied by one of the following three methods:

1. Mathematics 4A-4B: The course is arranged so that students may elect subunits of special interest to themselves in graph theory, statistics, computer science, theory of games, etc. This sequence (followed by Math 4C) is additionally designed for those who wish to pursue a science major, but are not yet prepared to begin the calculus sequence.
2. Mathematics 1 or 2 sequences: Strongly recommended for science or mathematics majors who have sufficient high school background in mathematics.
3. Two mathematics courses of any other college-algebra level or above.

Major In Human Biology (formerly called Health Sciences)

The Human Biology Major is designed to prepare students for medical or dental school, or graduate study in biology.
See *Biology*.

Major In Chemistry

Third College students interested in science may also major in chemistry with emphasis either in biochemistry or material science. This program covers a broad range of interests, including preparation for medical school, dentistry, secondary school secience teachigg, environmental chemistry and other areas.
See *Chemistry*.

Science Majors

Science and Technology is an interdisciplinary program of the Third College. Therefore, students declaring a science or mathematics major are expected to satisfy the lower-division science and mathematics requirements of the College in addition to the departmental major requirements of the respective science or mathematics department offering the major. (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.

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 tomic and molecular structure and the nature of chemical reaction. Laboratory optional. (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, and environmental adaptation. (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. Includes one afternoon of laboratory per week. (W)

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 kinema-

tics, dynamics, energy, momentum, and thermodynamics. ***Prerequisites: SciTech. 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 electrochemistry, kinetics and thermodynamics. ***Prerequisites: SciTech. 10B or consent of instructor.*** (F)

12AL. Chemistry (4)
Laboratory course: introduction to gravimetric, volumetric, and potentiometric methods of analysis. ***Prerequisite: SciTech 10B or consent of instructor. Should be taken concurrently with 12A.*** (W)

12B. Chemistry (4)
The second part of the introductory-chemistry sequence. The areas of electro-chemistry, kinetics, and thermodynamics are further developed. ***Prerequisite: SciTech. 12A or permission of instructor.*** (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: SciTech. 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. Three hours lecture, two hours recitation, three hours laboratory. ***Prerequisites: SciTech. 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. Three hours lecture, two hours recitation, three hours laboratory. ***Prerequisites: SciTech. 15A, concurrent enrollment in Math 2A.*** (W)

15C. Physics (4)
Introduction to mechanics of fluids, thermal physics, optics, description of the structure of atoms and nuclei. Three hours lecture, two hours recitation, three hours laboratory. ***Prerequisite: SciTech. 15B.*** (S)

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)*

Assistant Professor:
Dennis C. Pirages *(Political Science) (Associate Program Director)*

* * *

James R. Arnold *(Professor of Chemistry)*
Hannes Alfvén *(Professor of APIS)*

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. Student's 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
(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 (F)

100B. Seminar on the Results and Value of the Space Programs
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 (W)

101A. Arms and Arms Control
(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 offered 1974-75.) (F)

101B. Seminar on Arms and Arms Control
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 offered 1974-75.) (W)

104. Global Ecology
(Same as Political Science 104) A course on technology and the international system, constructed around global ecological issues. An analysis of the basic principles of ecology as they influence relations among nations. Topics to be covered include the development gap, the green revolution, resource utilization, technology transfer, and international cooperation. Mr. Pirages (F)

105. Technology and Society
(Same as Political Science 105) Analyzes the social impact of science and technology. Problems of coordination in advanced industrial societies will be discussed as well as information flow, social cybernetics, science, and models of social reality and problems of social change. Mr. Pirages (W)

107. Technology and Human Values
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 (S)

110. Energy: Demands, Resources, Technology, and Policy
A survey course on energy stressing the following: 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 environmental and economic impacts. Mr. Penner

Additional STPA Core Courses to be arranged for 1975-76 include:
Public Policy Formation
Comparative Science Policy
Additional Current Issues Analyses

Related Courses in other departments and programs (as of 1973-74; change somewhat from year to year):
Economics 105, 107, 116A, B, 160, 161
Communications 180, 191
AMES 149A, B, C
Sociology 131
Philosophy 112A, B
APIS 181A, B, C
History 190A, B, C
Urban & Rural Studies 141, 144, 146
Frontiers of Science 111

Scripps Institution of Oceanography

OFFICE: 1156 Ritter Hall

Professors:

Gustaf Arrhenius, D.Sci., 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)*
Edward C. Bullard, Sc.D., F.R.S. *(Geophysics)*
Theodore H. Bullock, Ph. D. *(Neurophysiology)*
Charles S. Cox, Ph.D. *(Oceanography)*
Harmon Craig, Ph.D. *(Geochemistry and Oceanography)*
Joseph R. Curray, Ph.D. *(Marine Geology, Chairman of the Department)*
Seibert Q. Duntley, Sc.D. *(Physics)*
Albert E. J. Engel, Ph.D. *(Geology)*
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)*
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. Nierenberg, Ph.D. *(Physics, Vice Chancellor of Marine Sciences and Director of Scripps Institution of Oceanography)*
Fred B Phleger, Ph.D. *(Oceanography)*
Russell W. Raitt, Ph.D. *(Geophysics)*
Richard H. Rosenblatt, Ph.D. *(Marine Biology, Vice Chairman of the Department)*
George G. Shor, Jr., Ph.D. *(Marine Geophysics)*
Fred N. Spiess, Ph.D. *(Oceanography)*
Victor Vacquier, M.A. *(Geophysics)*
Benjamin E. Volcani, Ph.D. *(Microbiology)*
Edward L. Winterer, Ph.D. *(Geology)*
Milton A. Bramlette, Ph.D. *(Geology, Emeritus)*
Edward W. Fager, Ph.D. *(Marine Ecology, Emeritus)*
Denis L. Fox, Ph.D. *(Marine Biochemistry, Emeritus)*
Carl L. Hubbs, Ph.D. *(Biology, Emeritus)*
Martin W. Johnson, Ph.D. *(Marine Biology, Emeritus)*
Norris W. Rakestraw, Ph.D. *(Chemistry, Emeritus)*
Roger Revelle, Ph.D. *(Oceanography, Emeritus)*
Per F. Scholander, M.D., Ph.D. *(Physiology, Emeritus)*

Francis P. Shepard, Ph.D. *(Submarine Geology, Emeritus)*
Charles D. Wheelock, M.S. *(Naval Architecture, Emeritus)*
Claude E. ZoBell, Ph.D. *(Marine Microbiology, Emeritus)*

Associate Professors:
Russ E. Davis, Ph.D. *(Oceanography)*
James T. Enright, Ph.D. *(Behavorial Physiology)*
David Epel, Ph.D. *(Biology)*
Carl H. Gibson, Ph.D. *(Engineering Physics and Oceanography)*
James W. Hawkins, Ph.D. *(Geology)*
Myrl C. Hendershott, Ph.D. *(Oceanography)*
Robert R. Hessler, Ph.D. *(Oceanography)*
Walter F. Heiligenberg, Ph.D. *(Behavioral Physiology)*
Nicholas D. Holland, Ph.D. *(Oceanography)*
John D. Mudie, Ph.D. *(Geophysics)*
William A. Newman, Ph.D. *(Oceanography)*
Robert L. Parker, Ph.D. *(Geophysics)*
Melvin N. A. Peterson, Ph.D. *(Oceanography)*
Charles W. Van Atta, Ph.D. *(Engineering Physics and Oceanography)*

Assistant Professors:
Jeffrey L. Bada, Ph.D. *(Oceanography)*
Wolfgang H. Berger, Ph.D. *(Oceanography)*
Paul K. Dayton, Ph.D. *(Oceanography)*
D. John Faulkner, Ph.D. *(Marine Chemistry)*
Joris M. T. M. Gieskes, Ph.D. *(Oceanography)*
Miriam Kastner, Ph.D. *(Geology)*
Kenneth H. Nealson, Ph.D. *(Marine Biology)*
George N. Somero, Ph.D. *(Biology)*
Clinton D. Winant, Ph.D. *(Oceanography)*

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Elbert H. Ahlstrom, Ph.D., *Adjunct Professor of Oceanography*
John R. Hunter, Ph.D., *Associate Adjunct Professor of Marine Biology*
Reuben Lasker, Ph.D., *Adjunct Professor of Marine Biology*
Theodore Enns, Ph.D., *Research Physiologist and Lecturer*
Richard W. Eppley, Ph.D., *Research Biologist and Lecturer*
Osmund Holm-Hansen, Ph.D., *Research Biologist and Lecturer*
Joseph L. Reid, M.S., *Research Oceanographer and Senior Lecturer*
William R. Riedel, M.S., *Research Geologist and Senior Lecturer*
John R. Beers, Ph.D., *Associate Research Zoologist and Lecturer*
Edward Brinton, Ph.D., *Associate Research Biologist and Lecturer*
Angelo F. Carlucci, Ph.D., *Associate Research Biologist and Lecturer*
Abraham Fleminger, Ph.D., *Associate Research Biologist and Lecturer*
Theodore D. Foster, Ph.D., *Associate Research Oceanographer and Lecturer*
Jonathan Berger, Ph.D., *Assistant Research Geophysicist 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 will normally concentrate his work 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 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, fishery biology, taxonomy and zoogeography of oceanic organisms, behavior as it affects distribution, and sampling problems. Theoretical, experimental, and direct observational approaches to these problem areas are undertaken by both faculty and students.

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 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 and evolution of marine animals and plants, developmental biology and larval ecology.

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 oceanic islands, abyssal plains and deep-sea trenches, 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 ar-

rays, 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 non-linear 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 curriculum is interdepartmental, combining the resources 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 (French for the marine biology program).
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 program 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); a course in general geology, and a year of general biology (or zoology, or botany). Normal preparation should also include at least one course in three of the following 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 the 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 UCSD after admission). Training in several of the following areas is strongly recommended: cellular biology, molecular biology, comparative physiology, genetics, developmental biology, ecology, comparative anatomy, vertebrate and invertebrate zoology, plant taxonomy. 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. See *Graduate Division Announcement: the Master's Degree.*

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 his 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, 270L, 275, 276A-276B, 280, 280L, and either 293A or 294A. Other course work ordinarily will be recommended by the student's advisory committee, usually including 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 At the time of the student's departmental examination (to be taken during the Spring Quarter of the student's first year), the student will be expected to demonstrate his 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 his advisory committee. All students are expected to enroll in a seminar course and actively participate 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 advisor.

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-248B-248C). 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 his studies.

Geophysics There is no single course of study appropriate to the geophysics curriculum; instead, the individual interests of the student will allow him, in consultation with his adviser, to choose 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 his second year of residence each student will be given an oral departmental examination, which is intended to cover his 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, 212A-212B, 214, 216A, 220, 223, 225, or 211B, 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 four basic courses: SIO 210A, 240, 260 and 280; 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 his 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 his 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/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 proposed thesis research and satisfy the committee, in an oral examination, of his 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 area of interest. He 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 research 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 his candidacy committee. The student's oral presentation and defense of his 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 his 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

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-207B. 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. Mr. Isaacs (W, S)

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.* Mr. Hendershott, Mr. 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.* Mr. Arthur, Mr. Cox (F)

(Satisfactory/Unsatisfactory grades permitted.)

211A-211B. Ocean Waves (3-3)
Propagation and dynamics of waves in the ocean including the effects of stratification, rotation, topography, wind and nonlinearity. *Prequisites: SIO 210A, 214.* Mr. Davis, Mr. 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.* Mr. 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.* Mr. Arthur, Mr. 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.* Mr. Duntley (F)

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, turbulent flow. *Prerequisite: partial differential equations.* Mr. Davis (F)

215. Experimental Fluid Mechanics (3)
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.* Mr. Winant (S)

216A-216B. Physics of Sediment Transport (3-3)
Mechanics and energetics of sediment transport by water, wind, waves, and density flows. Application to the nearshore environment and to the formation of sedimentary structures, and to beaches and harbors. Laboratory and field demonstrations. *Prerequisite: consent of instructor; SIO 214, 211A recommended.* Mr. Inman (W, S)

219. Special Topics in Physical Oceanography (1-4)
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 algegbra.* Mr. 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: SIO220.* Mr. 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.* Mr. Haubrich (W)

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.*** Mr. Munk (S)

226A-226B. 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. Mr. Anderson, Mr. Mudie, Mr. Raitt, Mr. Shor, Mr. Spiess (W, S)

227A-227B. 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.*** Mr. Brune, Mr. 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.*** Mr. 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.*** Mr. Parker (S)

231A-231B. 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.*** Mr. Brune (F, W)

232. Interpretation of Seismograms (1)
Principles and practice in the interpretation of seismograms. A variety of seismogram types will be analyzed in detail. ***Prerequisite: consent of instructor.*** Mr. Brune (W)

239. Special Topics in Geophysics (1-4)
Staff (F, W, S)

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.*** Mr. Menard (W)

241A-241B. 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.*** Mr. Curray (S, W)

242A-242B. 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.*** Mr. 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.*** Mr. Winterer, Mr. Riedel (F)

244. Seminar in Sedimentary Petrology (2)
Discussions of current research in sedimentary mineralogy, geochemistry, and petrology. The subject(s) will vary from year to year. (Satisfactory/Unsatisfactory grades permitted.) Ms. Kastner (W)

245A. Sedimentary Petrology (3)
Characteristics and origin of sediments and sedimentary rocks. ***Prerequisite: consent of instructor.*** Mr. 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.*** Ms. Kastner (F)

246A. Problems in Paleoceanography (2)
Discussion of current research concerning the physics, chemistry, and biology of ancient oceans. Seminar. Mr. Berger (S)

246B. Biogenous Deep-Sea Sediments (3)
A survey of the biology and chemistry of fossils in deep-sea deposits, and of factors controlling their distribution. Laboratory: introduction to ecological and preservational analysis of biogenous remains. Mr. 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. Mr. Menard (W)

248A-248B-248C. Seminar in Marine Geology (3-3-3)
An advanced discussion of the geomorphology, sedimentation, stratigraphy, vulcanism, structural geology, tectonics, and geological history of the oceans. ***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.)

249. Special Topics in Marine Geology (1-4)
Staff (F, W, S)

250. Geochemistry (3)
The chemistry of low temperature mineral-water systems. Calculation and representation of equilibrium and of reacting systems. Electrolyte chemistry of natural waters. Application of methods developed to chemistry of weathering, underground waters, lakes, marine environments. Staff (S)

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.*** Mr. 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/Unsatisfatory grades permitted.) Mr. 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. Mr. Lal (S)

253A. Igneous 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).*** Mr. 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).*** Mr. Curray, Mr. Hawkins, Mr. 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.*** Mr. 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.*** Mr. 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). Mr. 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). Mr. 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)
Discussions of current research in petrology and mineralogy. Mr. 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. Mr. 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. Mr. 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*** Mr. Geiskes (F)

262. Major Sedimentary Cycle (3)
Role of the oceans in the major sedimentary cycle, with emphasis upon the interaction of the oceans with the atmosphere, biosphere, and sediments. Geochronologies in the sedimentary cycles. Mr. Goldberg (W)

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. Mr. 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.*** Mr. Arrhenius (W)

265. Marine Natural Products (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.*** Mr. Faulkner (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).*** Mr. 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.*** Mr. 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.) Mr. Bada (F)

269. Special Topics in Marine Chemistry (1-4)
Staff (F, W, S)

270. Biological Oceanography: Processes and Events (3)
An analysis of the concepts and theories used to explain the biological events observed in the ocean. ***Prerequisites: SIO 210A, 280 or the consent of instructor.*** Mr. McGowan, Mr. Mullin (W)

270L. Laboratory in Biological Oceanography (2)
Laboratory and discussion of the phylogeny, comparative morphology; life histories and taxonomy of marine organisms. Emphasis will be placed on planktonic groups. ***Prerequisite: SIO 280 (or concurrent registration), or the consent of instructor.*** Mr. Brinton (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.* Mr. McGowan (S)

273A-273B. 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. *Prerequisite: basic knowledge of calculus and statistics recommended.* Mr. Heiligenberg (F,W)

273L. Experimental Laboratory in Animal Behavior (2)
Quantitative behaviorial experiments on fish and invertebrates, focussing on social behavior and orientation. *Prerequisite: consent of instructor.* Mr. Heiligenberg (S)

275. 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.* Mr. Dayton (W)

276A-276B. 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.* Mr. Enright, Ms. Venrick (W, S)

277. Deep-Sea Biology (2)
The ecology, zoogeography, taxonomy, and evolution of deep-sea organisms, with emphasis on the benthos. *Prerequisite: consent of instructor.* Mr. 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.* Mr. McGowan, Mr. Mullin, Mr. Newman, Mr. 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. *Prerequisite: registration in SIO 280.* Mr. Fliminger 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 instructor.* Mr. Holland, Mr. 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.* Mr. 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.* Mr. 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 miscroscopy, cytochemistry and autoradiography. *Prerequisites: basic courses in biology and chemistry; consent of instructor.* Mr. 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.* Mr. 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.* Mr. 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.* Mr. 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.* Mr. 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.* Mr. 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.* Mr. 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.* Mr. 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.* Mr. 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.*** Mr. 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. Advanced Invertebrate Zoology (4)
The natural history, zoogeography, taxonomy and phylogeny of invertebrates. ***Prerequisite: consent of instructor.*** Mr. Newman (S)

293B. Advanced Invertebrate Zoology (4)
The natural history, zoogeography, taxonomy and phylogeny of the arthropods, with emphasis on marine forms. ***Prerequisite: consent of instructor.*** Mr. Newman, Mr. Hessler (W)

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.*** Mr. 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.) Mr. Rosenblatt (F, W)

296. Special Topics in Marine Biology (1-4)
(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.) Mr. 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 standing. 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:
Bennet M. Berger, Ph.D.
Aaron Cicourel, Ph.D. *(Chairman)*
Fred Davis, Ph.D.
Joseph R. Gusfield, Ph.D.
Cesar Grana, Ph.D.
Jack D. Douglas, Ph.D.

Associate Professor:
Randall Collins, Ph.D.

Assistant Professors:
Kenneth H. Jennings, Ph.D.
Bruce C. Johnson, Ph.D.
Bennetta Jules-Rosette, Ph.D.
Hugh B. Mehan, Ph.D.
Anthony Ngubo, Ph.D.
Gail M. Omvedt, Ph.D.
Reyes Ramos, Ph.D.
Will H. Wright, Ph.D.

* * *

Sociology at UCSD

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 UCSD, 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 seven required courses — three lower-division and four upper-division. The remaining eight 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 a 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 UCSD in order to petition to have their sociology courses fom other colleges accepted to apply toward their major here.

In addition to declaring their major on the IBM card during registration, all students wishing to major in Sociology are asked to fill out the ***Application for Major in Sociology*** form available in the Sociology Department office (7001 H/SS). This form is the students' assurance that they will indeed be listed with the Department of Sociology as majors and that the Department will keep an up-to-date record of their progress toward the degree.

It is preferable that students not declare their major 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 interaction: 100, 103, 104, 106, 107, 109, 116, 117.
B. Social organization and institutions: 105, 110, 111, 112, 113, 115, 124, 136, 143, 161.
C. Social control and social problems: 119, 120, 121, 122, 127, 140, 142.
D. Social change, development and comparative sociology: 130, 131, 132, 133, 135, 137A, 137B, 138, 141.
E. Social bases of knowledge: 149, 150, 151, 152, 153, 156, 159.

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/fail 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 whcch 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 requirements, students may offer up to four upper-division courses from among the regular offerings in the Departments of Anthropology, Economics, History, Political Science and Psychology. Courses from other departments (for example, Linguistics, Urban and Rural Studies, etc.) 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, in-

cluding the sciences, as well as humanities 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 his dissertation in approximately three to four years after entrance in 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/her work, each student will be evaluated by the department in a written statement of evaluation at the end of his/her 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 previous written work as represented by three papers chosen by the candidate and filed with his committee. Typically, the Qualifying Examination is taken early in the fall of the student's third year of graduate work.

Dissertation Research and Preparation The nature and requirements for disserta-

tion 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 his/her 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 his/her dissertation and conducted by the student's committee. The examination will be open to all faculty and students in the department.

Courses

Lower Division

1A-1B Sociological Analysis (4-4)
An introduction to the major ideas, conceps and methods in the study of societies; social interaction and social structure; 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 activities. *Prerequisites: Sociology 1A-1B.*

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-1B, 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.

103. The Acquisition of Social Rules (4)
The course examines "socialization" as the acquisition of rules by children and others new to social groups. The course further examines the development of adult social competence.

104. Communications (4)
An analysis of the construction of messages in television and newspapers. The major emphasis will be on the development of the news media and the construction of news messages.

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 phenomna 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. The 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. Discussion materials will be drawn largely from Central African and contemporary Western societies.

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 associations, 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 educationl 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.

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 uses of rules, especially laws. Such subjects as addiction, marijuna 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.

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.

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 functionalism and discussed as a way to tie in social structure with social process.

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; patterns 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 processes 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.

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 bases 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 West (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 discussed 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 as 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.

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 "natural 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.

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. The Structure of Sociological Method (4)
An investigation of selected sociological methods viewed as idealized prescriptions for adequate scientific procedure and as incomplete descriptions of actual research occasions. These occasions as social events are analyzed with the theories they are usually used to test. ***Prerequisite: one upper-division sociology course.***

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.)

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.

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 social 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 (1-4)
Supervised teaching in lower-divisional contact classes, supplemented by seminar on methods in teaching sociology. (Satisfactory/Unsatisfactory grades only.)

Subject A

OFFICE: 2024 Humanities and Social Sciences Building
Adela B. Karliner, M.A., *Supervisor of Subject A*

During his first term in residence, each student whose ECT score is unsatisfactory must enroll in Literature/English 10 (for Revelle and Muir College students), Communications 10 (for Third College students) or Fourth College 10 (for Fourth College students). Pending satisfactory passage of this course, continued enrollment is mandatory.

See also "Subject A" under Admissions, Literature/English 10, and Communications 10,11

Writing Clinic
The staff of Subject A 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: 508 Matthews Campus
Hugh Mehan, Ph.D., Assistant Professor of Sociology *(Director of the Program)*
Jean M. Mandler, Ph.D., Associate Professor of Psychology
Cynthia L. Wallace, Supervisor of Student Teaching

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The Program The Teacher Education Program (TEP) is a campus-wide program physically located at Third College which is designed to provide the UCSD student with a "partial" elementary education credential within the framework of existing academic departments. There is no school of education at UCSD. Students who satisfy program

requirements will graduate from UCSD with a complete major in their selected field of specialization *as well as* a "partial" elementary education credential. To obtain a "lifetime" elementary education credential in California, the teacher must complete a fifth year of college within seven years of the B.A. or B.S. and teach successfully for three years. The main themes of the TEP are multicultural and child-centered education. A multicultural 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/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.

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:

Diversified Area Requirement The Diversified 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 UCSD satisfy many of these requirements. Courses are offered in each of these four areas which enable the teacher candidate to tutor in the respective discipline in a local school. (See *TEP 186 through 189.*). The candidate can take a total of three tutoring courses as long as he/she tutors in a different subject area each time; these courses will be credited toward the Diversified Area Requirement. The tutoring 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 20 quarter hours of courses which deal with the sociology of education and cross-curricular 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) stronginterest 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 "partial" elementary education credential. Students are advised to consult with TEP staff to determine how they can best fulfill the Diversified Area Requirement.

Sociology 116. The Social Organization of Education (4)
Introduction to the history and philosophy of education in America and comparison with other societies; the role of the school in the socialization of the child. *Prerequisite: consent of instructor.* (F)

Psychology 130. Developmental Psychology and Education (4)
An intensive examination of the psychological development of the human organism with special reference to cognitive, linguistic, intellectual, and social development of the child. *Prerequisite: consent of instructor.* (W)

Sociology 117. Classroom Interaction (4)
The application of sociolinguistic theory — the ethnography of communication to the classroom. *Prerequisite: consent of instructor.* (S)

TEP 180. Practicum in Student Teaching (16)
The student engages in classroom observation, course preparation, actual teaching, and student evaluation in a local school under the direction of a participating master teacher. Student teaching is daily for the equivalent of an elementary school semester. *Prerequisite: affirmed teacher candidate.* (F)

TEP 191A-B-C. Innovative Instructional Practices (4-4-4)
This three-course sequence provides the prospective elementary school teacher with a theoretical and practical grounding in various pedagogical techniques which are consistent with the child's developmentally acquired ability to learn. *Prerequisite: affirmed teacher candidate.* (W,S,F)

Tutoring/Aide Program

The UCSD Tutoring/Aide Program enables students to engage in tutoring or classroom aide activity in elementary and secondary schools. The program provides a vehicle for students to gain practical experience about the learning process in actual classrooms and relate this experience to theories of interpersonal relations, cross-cultural communications and education. The courses in the program are open to all UCSD students and are particularly recommended for minority students and/or candidates to the Teacher Education Program. The student can tutor for a total of three quarters as long as (s)he tutors in a different subject area each quarter. The following courses are available every quarter; the course description is the same for all four courses except that the subject area differs. The prerequisite for all four courses is consent of the instructor.

TEP 186. Practicum in Learning/Math and Science (4)
The primary focus of the course will be on the tutoring process. Students will be assigned to tutor a small number of elementary or secondary school students under the supervision of a participating teacher in a local school. The student will tutor children in math or science at least four hours per week. Concurrent with tutoring/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 187. Practicum in Learning/English (4)
(F,W,S)

TEP 188. Practicum in Learning/Social Sciences (4)
(F,W,S)

TEP 189. Practicum in Learning/Languages and Fine Arts (4)
(F,W,S)

Third World Studies

OFFICE: Building 410, Matthews Campus

Professor:

Carlos Blanco-Aguinaga, Ph.D. *(Spanish Literature. Coordinator of Third World Studies)*

Assistant Professors:

Ismith M. Khan, Ph.D. *(Caribbean and Comparative Literature)*
Anthony Ngubo, Ph.D. *(Sociology)*
Edward Reynolds, Ph.D. *(History)*
Benjamin K. T'sou, Ph.D. *(Linguistics)*

* * *

Richard J. Arneson, M.A. *(Acting Assistant Professor in Philosophy)*
Richard Romo, M.A. *(Acting Assistant Professor in History)*
Rosaura Sanchez, M.A. *(Acting Assistant Professor in Literature, Coordinator of Bilingual Sequence)*
Emory J. Tolbert, Ph.D. *(Assistant Professor of History)*
Sherley Ann Williams, M.A. *(Assistant Professor in Literature)*

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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 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.

1B. Responses to the Colonial Experience (4)
Primary resistance, nativistic movements, messianic movements, anti-colonial movements and movements for national independence will be discussed as responses to the colonial experience. Reasons for their emergence at different times and for their occurrence in different forms will be advanced. (W)

1C. The Contemporary Scene (4)
Neo-colonialism and neo-imperialism will be examined as new types of relationships emerging between the metropolitan powers and their former colonial possessions. The effects of supranational movements (Pan Africanism, Black Nationalism, Pan Ethnicism) on the world today and their possible contributions to the growth and development of a Third World will be discussed. (S)

7A, 7B, 7C. 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. The Colonial Experience (4)
European colonialism will be viewed as the common experience shared by all Third World peoples. Policies developed by the major colonial powers for administering their respective colonial possessions will be discussed, as

well as the effects these various policies had on political, social and economic systems in the colonies. Students who have completed 1A will not receive credit for 101A. ***Prerequisite: upper-division standing.(F)***

101B. Responses to the Colonial Experience (4)
Primary resistance, nativistic movements, messianic movements, anti-colonial movements and movements for national independence will be discussed as responses to the colonial experience. Reasons for their emergence at different times and for their occurrence in different forms will be advanced. Students who have completed 1B will not receive credit for 101B. ***Prerequisite: upper-division standing. (W)***

101C. The Contemporary Scene (4)
Neo-colonialism and neo-imperialism will be examined as new types of relationships emerging between the metropolitan powers and their former colonial possessions. The effects of supranational movements (Pan Africanism, Black Nationalism, Pan Ethnicism) on the world today and their possible contributions to the growth and development of a Third World will be discussed. Students who have completed 1C will not receive credit for 101C. ***Prerequisite: upper-division standing. (S)***

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) missions 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)***

111. Writing the Short Story (4)
Course dicusses the fundamentals of short-story writing. Students' works will be read and discussed in class, along with the works of some of the best contemporary short-story writers. The course aims at helping students to get started, as well as offering constructive criticism to those who have already put their hands to it. ***Prerequisite: upper-division standing, or consent of instructor. (W)***

112. Writing the Long Narrative (4)
The student will work throughout the quarter on a single project, either fiction (novel) or nonfiction (biography, history). Excerpts of students' works will be read and discussed in class; constructive criticism will be offered. ***Prerequisite: any course in fiction writing or example of student's work submitted to instructor.***

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.

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)

140. 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.

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.***

142. 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)

143. 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 characterisitics of the Chicano community by providing a criticial analysis of the societal context in which "La Raza" has sought to maintain and develop its culture. ***Prerequisite: consent of instructor.***

152. Contemporary Caribbean Literature(4)
There has been an unusual outburst of literary activity in the Caribbean since 1950 which is a unique cultural expression of Blacks, East Indians, Chinese, and Spaniards brought to the area by colonial powers. The distinctive qualities and problems of the literature of this multi-racial society boom of colonialism will be studied through the works of McKay, Selvon, Lamming, Naipaul, Harris, Salvey, and Khan, focusing on their parallels in contemporary America. ***Prerequisite: upper-division standing or consent of instructor.*** (F)

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 experience by Chicano authors, whether in novels, short stories, poetry, or dramatic works. ***Prerequisites: speaking and reading knowledge of Spanish or consent of instructor.*** (S)

154. Literature and Third World Societies (4()
This course will investigate novelistic and dramatic treat-

ments 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.

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 between 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

Professors:
Nolan E. Penn, Ph.D. *(Psychiatry)*
Charles W. Thomas, Ph.D.

Associate Professors:
Robert J. Heifetz, Ph.D.
Faustina Solis, M.S.W. *(Community Medicine)*

Assistant Professors:
Joyce B. Justus, Ph.D. *(Anthropology, Coordinator of Urban and Rural Studies Program)*
Susan J. Kleinberg, Ph.D. *(History)*

Lecturers:
Earl B. Gilliam, L.L.B., *Senior Lecturer*
E. Walter Miles, Ph.D., *Senior Lecturer*
Roger S. Ruffin, *Senior Lecturer*
William J. Siembieda, M.P.A., *Lecturer*
Milton J. Silverman, *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.

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, History, Political Science, Psychology and Sociology. 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. (All five to be in the same discipline.)
2 - courses from another social science.
8 - URS courses to include: 110, 120A and 120B, 130, 186 (Field Studies), 190 (Senior Seminar).

In the Senior Fieldwork Seminar, URS 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 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.

** 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.

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 (migration); (c) factors influencing the location of people and firms within and between cities; (d) urban problems (pollution, housing, transportation, crime, poverty); (e) urban government (revenues and expenditures, taxes, governmental services). Mr. Emmerson.

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. Ms. Justus.

25. Law and Society (4)
This course will examine aspects of the legal process, including how and when the process is involved, judicial decision-making, the role of the lawyer. Illustrative cases will be drawn from diverse areas, e.g., commitment of the mentally ill, conscientious objection to the draft, economic equalization under the Constitution. Staff.

Upper Division

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/offiial 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.***

110. 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, translatin 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-120B. 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. Mr. Heifetz

121. Policy and Planning in Higher Education (4)
Outlines origins and functions of higher education, relationship between manpower needs and educational resources, trends in the distribution of costs and benefits of higher education, structure of organization and control, innovative reforms and exploration of new directions and implementation strategies. ***Prerequisite: upper-division standing or permission of instructor.***

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. ***Prerequisite: 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.

149. Ethnocentric Support Systems in the Delivery of Human Services
Presents a new conceptual model of ethnocentric support systems which promote competence at the person-to-person and social levels. Ethnocentrism is conceived as a growth-producing strategy in people of color, for handling problems of service, delivery and assessment. Mr. Thomas, Ms. Solis.

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 Aspects 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.***

160. Introduction to Law and the Judicial Process (4)
This course deals with forces influencing the making of the law, especially 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.

161. American Criminal Justice (4)
Police, prosecution and court practices and procedures from arrest to trial and conviction of criminal offenses in federal and state courts of the United States. Current thinking and problems in the area of police practices and constitutional guarantees and safeguards of the accused. Problems of and necessity for court reform.

162. Applications of the Law: The Judge's View (4)
An in-depth analytical study of the daily applications of the law and legal system. Issues such as being stopped for questioning, police entry into homes, sentencing and seizure of property, bail procedures, selections of juries, ultimate decision by trier of fact, sentencing process and the response of the court and the law to the people it serves will be studied. ***Prerequisites: URS 122 and consent of instructor.***

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.

164. Legal Appraisal of American Institutions (4)
Appraisal of traditional governmental institutions and non-traditional institutions such as poverty, racism and crime. Evaluation of these institutions as possible products of an American life-style which was the result of an historical commitment to economic abundance and territorial expansion. ***Prerequisites: URS 122 and 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: Building 402, Matthews Campus

Professors:
David Antin, M.A.
Harold Cohen, Diploma of Fine Arts
Manny Farber
Allan Kaprow, M.A.

Associate Professor:
Newton Harrison, M.F.A. *(Chairman)*

Assistant Professors:
David T. Sanford, M.A.
Jehanne Teilhet, M.A.
Michel Todd, M.A.
Ellen Van Fleet, M.A.
Barbara Strasen *(Acting)*

Lecturers:
Doris Fienga, Ph.D.
Fred Lonidier, M.F.A.
Philip A. Steinmetz
Stanton Kaye

* * *

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 Visual Arts Department is biased in the direction of actively producing artists and critics whose presence at the center of the contemporary art world necessitates reconsideration and re-evaluation of artistic productions, their information structure and significance. Consequently, a flexible introductory program

of historically based courses, Visual Arts 13A-13B, 14A-14B, 15A-15B-15C, 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. See courses listed under ***Muir College*** and ***Revelle College*** in ***Choosing a College at UCSD.***

Art Majors Majors are required to take three introductory art-history courses, Beginning Painting and Beginning Sculpture. 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 and five advanced-level studio art courses.

All prospective majors are urged to keep in touch with the Department Office for meetings, etc. pertaining to them.

The Master of Fine Arts Program The MFA program at UCSD is aimed primarily at students who are already on their way to becoming artists and at certain students from other disciplines with especially relevant backgrounds who wish to participate productively in the reevaluation of art through criticism or art making. The program emphasizes a continual examination of the meaning and nature of art making, stressing the strategies and roles of the artist in the art situation. Students are required to become acquainted with a variety of disciplines, ideas, and processes within the field as well as to work at some time during their stay with most of the departmental faculty. Although courses are essential to the program, it is imperative that students spend an equal amount of time on the development of their own work. The department currently offers courses in painting, sculpture, art history, art criticism, film-making, film criticism, photography and video tape. We plan to add others in performance and events.

At present the department has the funds to support approximately 75 percent of the graduate students with Teaching Assistantships. A GPA of 3.25 or above is required for consideration for a Teaching-Assistant position.

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 — If at all possible, personal interviews with some member of the department's faculty are encouraged.

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.

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 department on or before January 15, 1975.

Requirements for the Degree The MFA 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 MFA:

First Year Review — At the end of the first year in residence, students make a formal presentation of their work to the faculty. 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.

72 Units of Course Work — (specific information on course distribution requirements can be obtained from the department).

MFA Final Presentation — During the last quarter in residence, each student is required to present to the public a coherent exhibition of his own 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 will be required to present some form of a thesis. The exact nature of this requirement is under review. More information can be obtained from the Visual Arts Department.

Applications and additional information can be obtained from the Visual Arts Department Office.

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 designed to prepare students for upper-division studio classes.

10. Introduction to Art (4)
Fundamental aspects of the visual arts. Introduction to problems in art history, aesthetics, and other conceptual material relevant to the visual experience.

13A. The Art Course "Primitive Art History": Primitive Arts (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. The Art Course "Primitive Art History": African and 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: 13A.*

14A. The Art Course "Oriental Art History" (4)
An introduction to the art of Asia, especially the art of Southeast Asia, with emphasis on Buddhist Art.

14B. The Art Course "Oriental Art History" (4)
Early Chinese art, mainly bronzes and jades — Shang through Han Dynasties. Later Chinese art; emphasis on landscape painting covering five dynasties through Ch'ing Dynasty.

15A. The Art Course "European Art History": Ancient — Greece, Etruria, and Rome. (4)
The architecture, sculpture, and painting of ancient Greece, Etruria, and Rome from the Geometric Period in Greece to the rule of Constantine in Rome.

15B. The Art Course "European Art History" (4)
Renaissance in fifteenth century Italy, covering architecture, sculpture and painting.

15C. The Art Course "European Art History" (4)
European Modernism from beginnings to Art Nouveau through Cubism, Futurism, Dada, and ending with Surrealism. The course will concentrate on painting and sculpture, but refernnce to developments in architectural and decorative arts, poetry, and theater will be made.

60. Beginning Photography
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.

Upper Division

105A-105B-105C. Drawing (4-4-4)

A — A course in beginning drawing covering line, value, texture, gestures form, 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-106B-106C. 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-107B-107C. 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.*

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.*

111. History of Sculpture (4)

A history of sculpture from ancient times through the present.

113A-113B-113C-113D-113E. Primitive Art History (4-4-4-4-4)

A — An introduction to the cultures of Africa, Eskimo, N.W. Coast Indian, Polynesia and Melanesia. The emphasis is placed on the artist, the aesthetic process and the end product, and its relationship to the culture. The arts of preliterate people cannot be divorced from the oral tradition, dance, music, religion and politics.

B — This course is a critical aesthetic survey of West African arts in their cultural setting and the subsequent areas of the Americas. Emphasis will be placed on those West African tribes which were captured into slavery. *Prerequisite: 113A or consent of instructor.*

C — A critical analysis of what the arts of Polynesia can tell the student 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. *Prerequisite: 113A or consent of the instructor.*

D — Analyzes 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. *Prerequisite: 113A or consent of the instructor.*

E — An advanced course which will analyze theories on what the arts can tell the student about a culture, e.g., why people in pre-literate cultures, who live in rectangular houses, tend to emphasize rounded forms in their art. *Prerequisites: 113A and consent of the instructor.*

114A-114B-114C-114D. Oriental Art History (4-4-4-4)

A — An introduction to the art of Asia, especially the art of Southeast Asia, with emphasis on Buddhist Art. *Prerequisite: two quarters of The Art Course.*

B — Early Chinese Art, mainly bronzes and jades, Shang through Han Dynasties. Later Chinese art, emphasis on landscape painting covering five dynasties through Ch'ing Dynasty. *Prerequisite: two quarters of The Art Course.*

C — Covers the pre-historic period, and the Kamakura through Tokugana periods. *Prerequisite: two quarters of The Art Course.*

D — Begins with a survey of non-Muslim periods, and later focuses on Buddhist and Hindu Art. There will be brief coverage of miniature painting and Muslim architecture. *Prerequisite: two quarters of The Art Course.*

115A. European Art History "Ancient" (4)

The architecture, sculpture, and painting of ancient Greece, Etruria, and Rome from the Geometric Period in Greece to the rule of Constantine in Rome. *Prerequisite: two quarters of The Art Course.*

115B. European Art History: "Renaissance in Fifteenth Century Italy" (4)

Fifteenth-century architecture, sculpture, and painting in Italy. *Prerequisite: two quarters of The Art Course.*

115C. European Art History: "Baroque Art" (4)

The architecture, sculpture, and painting of the seventeenth century, principally in Rome and its transalpine expansion. *Prerequisite: two quarters of The Art Course.*

115D. European Art History: "Michelangelo, Raphael, Durer" (4)

A study of the works of Michelangelo, Raphael, and Durer considering the historical and cultural context within which they worked. *Prerequisite: two quarters of The Art Course.*

115E. European Art History: "Seventeenth Century Dutch and Flemish" (4)

A study of the works of Rubens and Rembrandt and the historical and cultural context within which they were produced. *Peerequisite: two quarters of The Art Course.*

117. Eighteenth Century Art History (4)

A general survey of the painting, sculpture and architecture of the eighteenth century in Europe and America. *Prerequisite: Visual Arts 15A, 15B, 15C, or equivalent.*

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. *Prerequisite: two quarters of The Art Course.*

120. Contemporary Art History (4)

Deals particularly with problems that have arisen in the twentieth century in painting, sculpture, and art criticism. *Prerequisite: two quarters of The Art Course.*

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 art criticism.

125. Advanced Art of India (4)

An advanced-level upper-division course in the study of Hindu art (mainly sculpture and architecture) and iconography, and examination of Hindu concepts (religious and philosophical) and mythology as reflected in the visual arts. *Prerequisite: Visual Arts 114D.*

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 113A, 113B and consent of the instructor.***

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 collages 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-145B. 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.***

146. 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.***

147. Landscape Architecture (4)
This course presents a basic study of landscape architecture of the past, as represented in European, Japanese, and Persian gardens, as well as their contemporary equivalents. There will be practical experience in designing and executing landscape situations.

155A-155B. Art of Cloisonne (4-4)
A — A basic course in the techniques of cloisonne, beginning with the making of two cloisonne jewels and their settings covering the sixth to the thirteenth century. Each an important example of the cloisonne jewelers' art and craft.

B — Jewels and settings of an increasing complexity of design and technique will be taught. Additional enameling techniques used in conjunction with enameling will be offered (repousse and plique a jour). Accomplished students will begin to design and carry out their own motifs. ***Prerequisite: Visual Arts 155A.***

160A-160B. Photo-Silkscreening Techniques (4-4)
A — Instruction in photo-silkscreening techniques and their application as artistic media.

B — Instruction in photo-silkscreening techniques and their application as artistic media. ***Prerequisite: Visual Arts 160A.***

166A-166B. 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-167B. Photographic Strategies (4-4)
A — An introduction to the aesthetic problems in photography. ***Prerequisite: Visual Arts 60.***

B — An advanced study of the aesthetic problems of photography, and the relationship of photographic image to cultural phenomenon. May be repeated for credit twice. ***Prerequisites: Visual Arts 166A and Visual Arts 167A.***

185A. Film-Making (4)
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 (4)
This course will stress small three-minute productions. A more critical stance will be taken toward the epistomology 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.***

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 preparations — 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.***

186B. Film Workshop (4)
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 and stage will be emphasized. A 10-minute film will be required for the final project and it will be critically evaluated. ***Prerequisite: VA 186A or consent of the instructor.***

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. ***Prerequisite: VA 88.***

188. Hard Look at the Movies (4)
The aim is to remove the passivity from movie-going, to make the viewer more analytically alert. The course asserts that narrative does not exist separate from structure, and to achieve this dual focus, the student is put through a three part endeavor. He learns to discriminate about formal elements (such moves as sync-sound and the long take), to read films directly without literary or literary bias and become sensitive to esthetic weight. ***Prerequisite: Visual Arts 88.***

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: VA 88.***

191. Advanced Seminar in Photography (4)
For advanced 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 Comtemporary Art (4)
A seminar dealing with the problems in twentieth-century art, including painting, sculpture and art criticism. May be repeated once for credit.

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.

Graduate

205. Advanced Problems in Drawing (4)
Students will be given the opportunity to explore the relation between 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.

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.

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 hierglyphs 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.

235. Drawing to Anti-Drawing (4)
An inquiry into the position of alternative modes. Is "painting without drawing" a tenable concept, and, if not, what kind of activity may drawing become? The graduate student is required to arrange an extra meeting with the professor each week to discuss his work.

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.

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 (4)
For students who have learned the fundamentals of film-making but need to further refine the skills of the medium on an advanced level. ***Prerequisite: VA 185B.***

286. Advanced Film Workship (4)
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: VA 186B or consent of the instrucotr.***

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 varity of practical aspects of the film, including direction, script-writing, criticism, and photography.

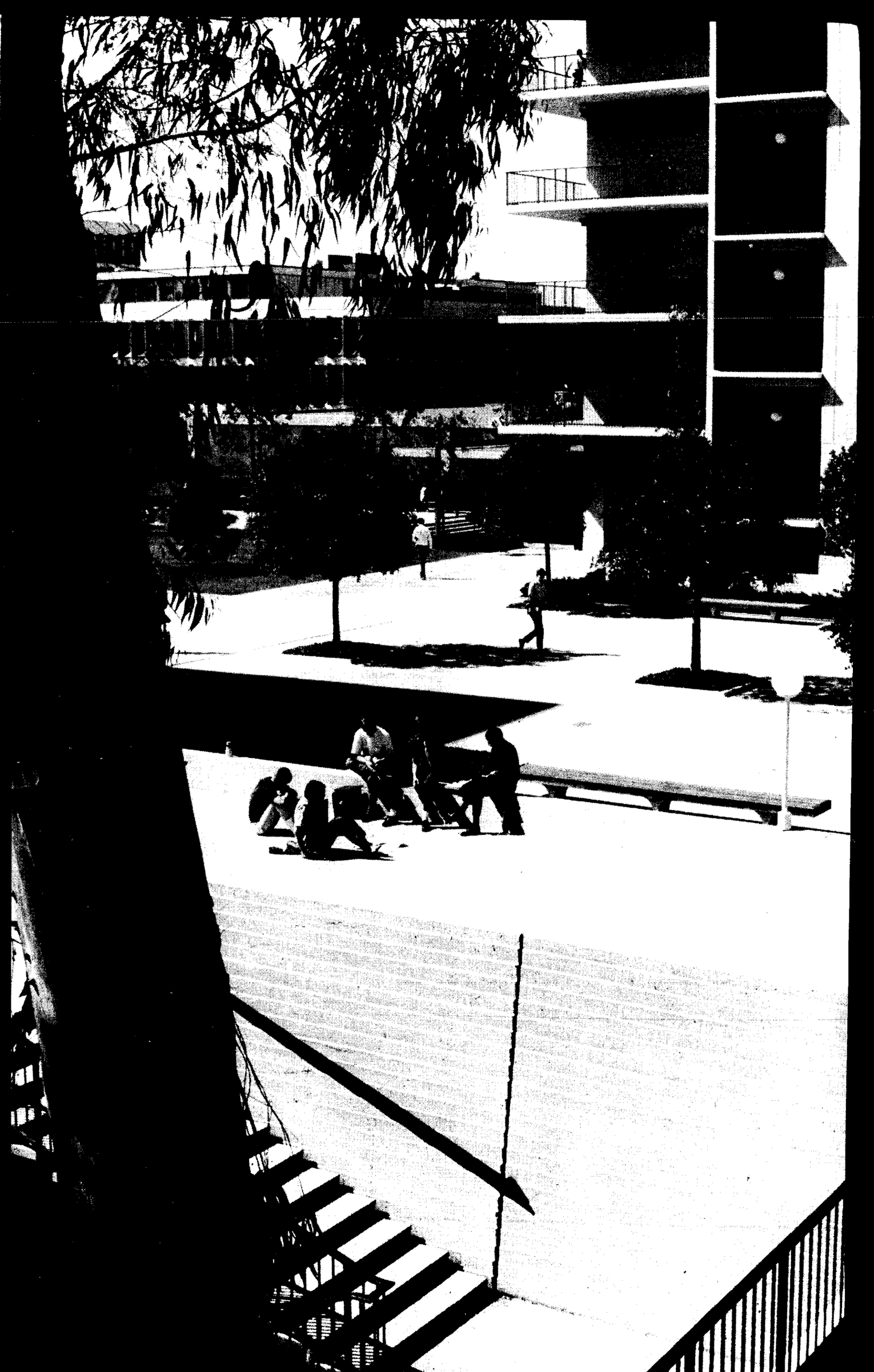
295. Individual Studies for Graduate Students (1-12)
Individual research for graduate students in preparation for their comprehensive exhibition for the MFA degree.

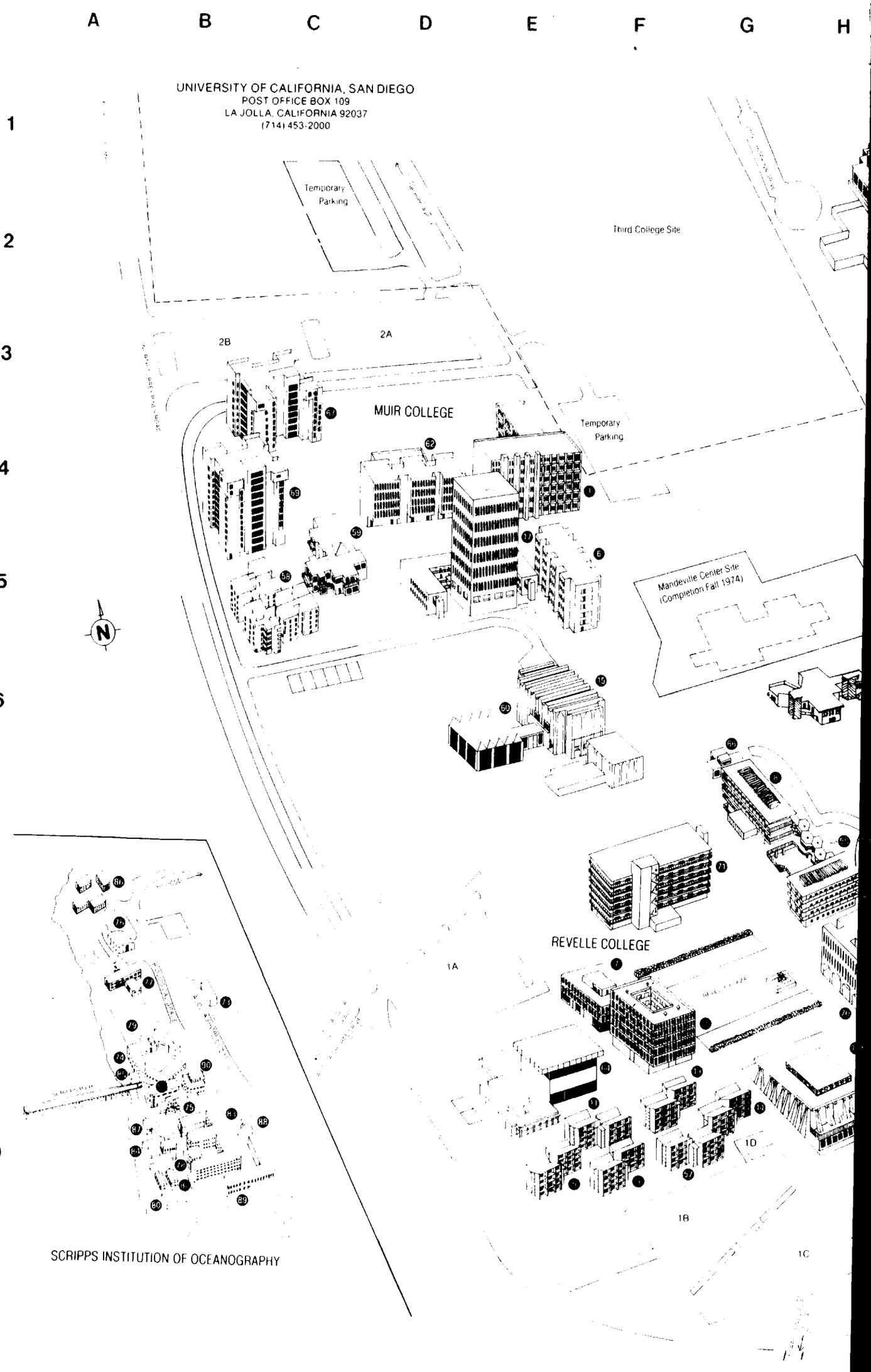
297. Seminar in Art Theory (4)
A seminar led by different faculty members each quarter, providing an intensive analysis of the theoretical aspects of the visual arts. May be repeated for credit.

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.***

500. Apprentice Teaching (1-3)
Apprentice teaching in undergraduate courses given or participated in by the Visual Arts Department.

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LA JOLLA, CALIFORNIA 92037
(714) 453-2000
Temporary Parking
Third College Site
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Temporary Parking
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REVELLE COLLEGE
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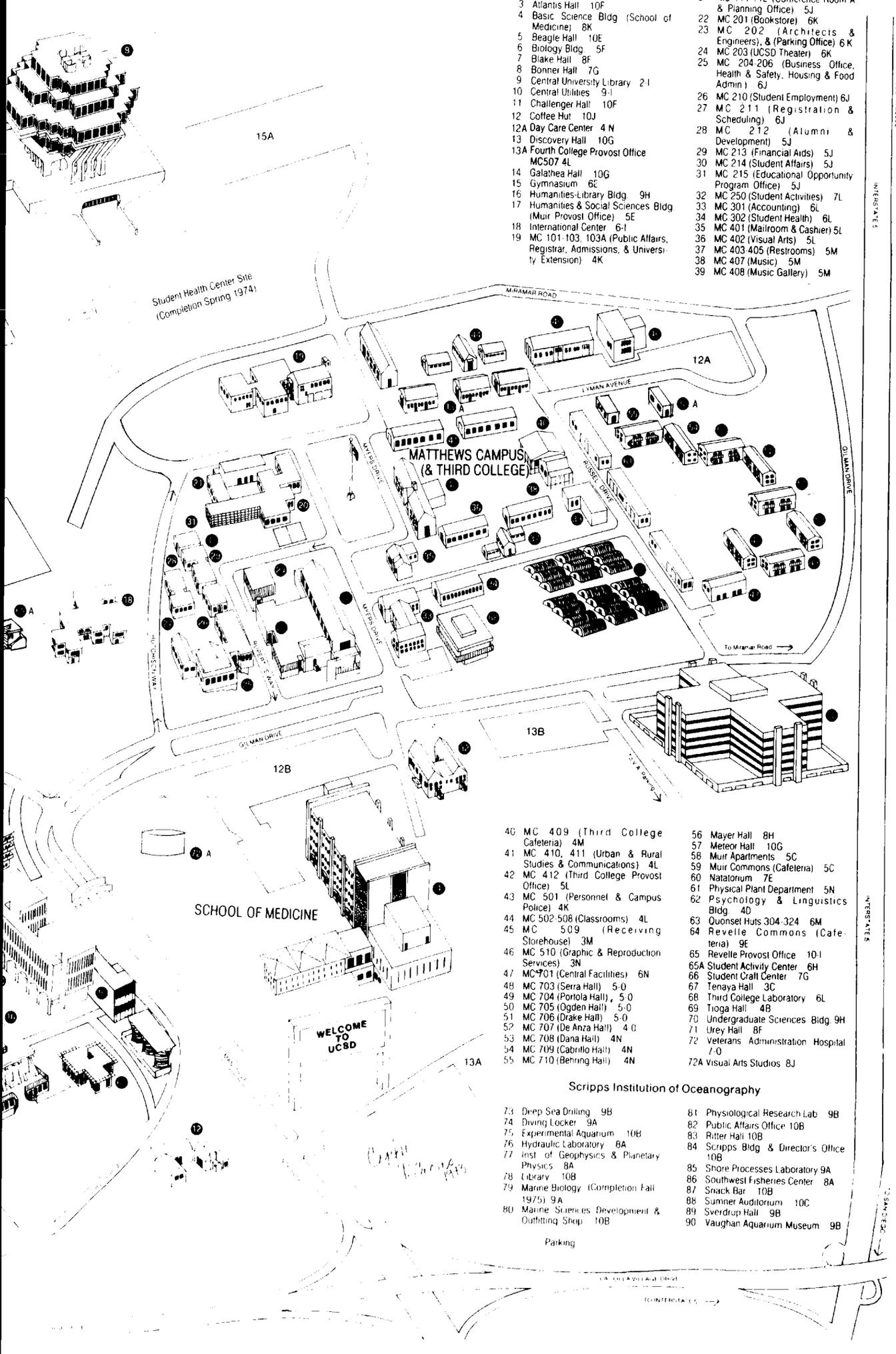
SCRIPPS INSTITUTION OF OCEANOGRAPHY

I J K L M N O



1 Applied Physics & Mathematics Bldg 4E
2 Argo Hall 9F
3 Atlantis Hall 10F
4 Basic Science Bldg (School of Medicine) 8K
5 Beagle Hall 10E
6 Biology Bldg 5F
7 Blake Hall 8F
8 Bonner Hall 7G
9 Central University Library 2-I
10 Central Utilities 9-I
11 Challenger Hall 10F
12 Coffee Hut 10J
12A Day Care Center 4 N
13 Discovery Hall 10G
13A Fourth College Provost Office MC507 4L
14 Galathea Hall 10G
15 Gymnasium 6E
16 Humanities-Library Bldg. 9H
17 Humanities & Social Sciences Bldg (Muir Provost Office) 5E
18 International Center 6-I
19 MC 101-103, 103A (Public Affairs, Registrar, Admissions, & University Extension) 4K
20 MC 104-110 (Chancellor's Complex) Dean of Graduate Studies 5J
21 MC 111-112 (Conference Room A & Planning Office) 5J
22 MC 201 (Bookstore) 6K
23 MC 202 (Architects & Engineers), & (Parking Office) 6 K
24 MC 203 (UCSD Theater) 6K
25 MC 204-206 (Business Office, Health & Safety, Housing & Food Admin.) 6J
26 MC 210 (Student Employment) 6J
27 MC 211 (Registration & Scheduling) 6J
28 MC 212 (Alumni & Development) 5J
29 MC 213 (Financial Aids) 5J
30 MC 214 (Student Affairs) 5J
31 MC 215 (Educational Opportunity Program Office) 5J
32 MC 250 (Student Activities) 7L
33 MC 301 (Accounting) 6L
34 MC 302 (Student Health) 6L
35 MC 401 (Mailroom & Cashier) 5L
36 MC 402 (Visual Arts) 5L
37 MC 403-405 (Restrooms) 5M
38 MC 407 (Music) 5M
39 MC 408 (Music Gallery) 5M
40 MC 409 (Third College Cafeteria) 4M
41 MC 410, 411 (Urban & Rural Studies & Communications) 4L
42 MC 412 (Third College Provost Office) 5L
43 MC 501 (Personnel & Campus Police) 4K
44 MC 502-508 (Classrooms) 4L
45 MC 509 (Receiving Storehouse) 3M
46 MC 510 (Graphic & Reproduction Services) 3N
47 MC 701 (Central Facilities) 6N
48 MC 703 (Serra Hall) 5-0
49 MC 704 (Portola Hall), 5-0
50 MC 705 (Ogden Hall) 5-0
51 MC 706 (Drake Hall) 5-0
52 MC 707 (De Anza Hall) 4-0
53 MC 708 (Dana Hall) 4N
54 MC 709 (Cabrillo Hall) 4N
55 MC 710 (Behring Hall) 4N
56 Mayer Hall 8H
57 Meteor Hall 10G
58 Muir Apartments 5C
59 Muir Commons (Cafeteria) 5C
60 Natatorium 7E
61 Physical Plant Department 5N
62 Psychology & Linguistics Bldg. 4D
63 Quonset Huts 304-324 6M
64 Revelle Commons (Cafeteria) 9E
65 Revelle Provost Office 10-I
65A Student Activity Center 6H
66 Student Craft Center 7G
67 Tenaya Hall 3C
68 Third College Laboratory 6L
69 Tioga Hall 4B
70 Undergraduate Sciences Bldg. 9H
71 Urey Hall 8F
72 Veterans Administration Hospital 7-0
72A Visual Arts Studios 8J

Scripps Institution of Oceanography

73 Deep Sea Drilling 9B
74 Diving Locker 9A
75 Experimental Aquarium 10B
76 Hydraulic Laboratory 8A
77 Inst. of Geophysics & Planetary Physics 8A
78 Library 10B
79 Marine Biology (Completion Fall 1975) 9A
80 Marine Sciences Development & Outfitting Shop 10B
81 Physiological Research Lab 9B
82 Public Affairs Office 10B
83 Ritter Hall 10B
84 Scripps Bldg & Director's Office 10B
85 Shore Processes Laboratory 9A
86 Southwest Fisheries Center 8A
87 Snack Bar 10B
88 Sumner Auditorium 10C
89 Sverdrup Hall 9B
90 Vaughan Aquarium Museum 9B

Parking

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University Librarian
Melvin J. Voigt

UCSD Facts and Figures (as of May 1, 1974)

On-campus student enrollment (Spring Quarter)		
Undergraduate		5789
Graduate		1132
Medical School (excluding 337 hospital residents and interns)		232
	Total	7153
On-campus faculty members		627
Members, National Academy of Sciences		42
Fellows, American Academy of Arts and Sciences		34
Nobel Prize Laureates		3
Total land area — UCSD		
Main campus		1232 acres
Outlying areas		652 acres
	Total	1884
Books in Library collection (March 31)		1,023,099
University Extension enrollment (Spring Quarter)		7,800

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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.

UCSD — 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 firt 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 UCSD 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 Pcific Ocean. Much of the land is covered with groves of eucalyptus, grown from seed brought from Australia.

The Master Plan for UCSD 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 (beginning Fall Quarter, 1974) — are in operation.

UCSD is accredited by The Western Association of Schools and Colleges.

UCSD 7374-36

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University of California, San Diego

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