

STAT 100




UCSD

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1973-1974 GENERAL CATALOG



June, 1973



UCSD

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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 Admissions Office 1301 Basic Science Bldg.
Medicine

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 Assistance 250 Matthews Campus

Residence Status

Registrar & Admissions 102 Matthews Campus

Financial Aids (Loans & Grants for Undergraduates)

Financial Aids Office 213 Matthews Campus

Scholarships

Financial Aids Office 213 Matthews Campus

Fellowships

Office of Graduate Studies
and Research 108 Matthews Campus

Employment

Student Employment Office 210 Matthews Campus

Student Activities

Urey Hall Lobby Revelle Campus

Foreign Students' Problems

Office of International
Education Matthews Campus

Selective Service & Veterans' Affairs

Office of Student Affairs 250 Matthews Campus

Handicapped Students

Office of Student Affairs 250 Matthews Campus

Extension Studies

University Extension 103 Matthews Campus

Provosts

John Muir College H&SS Building Muir Campus
Revelle College Revelle Provost Building Revelle Campus
Third College Building 412 Matthews Campus

General Information

Public Affairs Office 101 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 Calendar

	FALL QUARTER 1973	WINTER QUARTER 1974	SPRING QUARTER 1974
GRADUATE STUDENTS: APPLICATIONS FOR FELLOWSHIPS			
Deadline date for filing application materials	Feb. 1		
Notice of Awards	Apr. 1		
Acceptance of Awards	Apr. 15		
NOTE: Most departments adhere to the above schedule for assistantships also, but many will accept later applications.			
UNDERGRADUATE STUDENTS: ADMISSION			
Opening date for filing application materials	Nov. 1, '72	July 2, '73	Oct. 1, '73
ALL CONTINUING UNDERGRADUATE AND GRADUATE STUDENTS: REGISTRATION DEADLINES			
Filing enrollment cards			
Without penalty	May 25	Nov. 16	Mar. 1
With penalty	Sept. 24	Jan. 7	Apr. 1
Payment of Fees			
Without penalty	Sept. 25	Jan. 8	Apr. 2
With penalty/petition	Oct. 5	Jan. 18	Apr. 12
ALL NEW UNDERGRADUATE AND GRADUATE STUDENTS: REGISTRATION DEADLINES			
Paying of Fees			
Without penalty	Sept. 25	Jan. 8	Apr. 2
With penalty/petition	Oct. 5	Jan. 18	Apr. 12
Filing enrollment cards (including preferred program card)			
Without penalty	Sept. 25	Jan. 8	Apr. 2
With penalty/petition	Oct. 5	Jan. 18	Apr. 12
GRADUATE STUDENTS: ADMISSION*			
Foreign students: Deadline date for filing application materials	June 1	Sept. 1	Dec. 1
Domestic students: Deadline date for filing application materials	Aug. 1	Nov. 1	Feb. 1
GRADUATE STUDENTS: APPLICATION FOR INTERCAMPUS EXCHANGE PROGRAM			
QUARTER BEGINS	Aug. 27	Dec. 13	Mar. 11
INSTRUCTION BEGINS	Sept. 17	Jan. 3	Apr. 1
GRADUATE STUDENTS: FILING APPROVED LEAVE OF ABSENCE	Sept. 24	Jan. 7	Apr. 1
UNDERGRADUATE STUDENTS: DEADLINES FOR CHANGE OF PROGRAM			
Adding Courses	Oct. 5	Jan. 18	Apr. 12
Dropping Courses without Late Fee	Oct. 5	Jan. 18	Apr. 12
Changing to or from P/NP	Oct. 5	Jan. 18	Apr. 12
Dropping courses without penalty of "F" grade	Nov. 2	Feb. 15	May 10


1973-1974

	FALL QUARTER 1973	WINTER QUARTER 1974	SPRING QUARTER 1974
GRADUATE STUDENTS: DEADLINES FOR CHANGE OF PROGRAM			
Adding or dropping courses without penalty/petition	Oct. 5	Jan. 18	Apr. 12
GRADUATE STUDENTS: MASTERS DEGREE			
Filing for advancement to candidacy	Oct. 5	Jan. 18	Apr. 12
Filing approved thesis	Dec. 7	Mar. 22	June 14
GRADUATE STUDENTS: DOCTOR OF PHILOSOPHY DEGREE			
Filing for advancement to candidacy	Oct. 5	Jan. 18	Apr. 12
Filing draft dissertation with doctoral committee	Nov. 9	Feb. 22	May 17
Filing approved dissertation and related materials	Dec. 7	Mar. 22	June 14
GRADUATE RECORD EXAMINATION (GRE) TEST DATES	Oct. 27	Jan. 19	Apr. 27
THANKSGIVING VACATION (ACADEMIC & ADMINISTRATIVE HOLIDAYS)	Nov. 22-23		
GRADUATE STUDENTS: REMOVING INCOMPLETE GRADES (E) ASSIGNED IN PREVIOUS QUARTERS	Nov. 30	Mar. 15	June 7
UNDERGRADUATE STUDENTS: REMOVING INCOMPLETE GRADES (I) ASSIGNED IN PREVIOUS QUARTER	Nov. 30	Mar. 15	<u>June 7</u>
INSTRUCTION ENDS	Dec. 1	Mar. 16	June 8
FREE DAY	Dec. 3	Mar. 18	June 10
FINAL EXAMINATIONS	Dec. 4-8	Mar. 19-23	June 11-15
QUARTER ENDS	Dec. 8	Mar. 23	<u>June 15</u>
GRADUATE STUDENTS COMPLETION OF REQUIREMENTS			
Final date for completion of all requirements for degrees to be awarded at end of quarter	Dec. 7	Mar. 22	June 14
Final date for completion of all requirements for degrees to participate in commencement	-		June 14
CHRISTMAS HOLIDAYS (ADMINISTRATIVE HOLIDAYS)	Dec. 24-25 Dec. 31-Jan. 1		
ADMINISTRATIVE HOLIDAY	-	Feb. 18	-
MEMORIAL DAY (ACADEMIC AND ADMINISTRATIVE HOLIDAY)	-		May 27
GRADES MAILED TO ALL STUDENTS (APPROXIMATE)	Dec. 28	Apr. 8	July 1

* Some departments/groups may have earlier deadline dates; others accept applications for admission to the Fall Quarter only. Therefore, applicants should contact their prospective major departments at an early date.



AN INTRODUCTION TO



**THE
UNIVERSITY
OF
CALIFORNIA**

SAN DIEGO

1973-1974

Understanding involves a spiritual revolution. You cannot legislate or dictate it. It means throwing out the ego, and bringing in compassion. And it starts with me.

Senior, Revelle



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

Counselor, Muir

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 probably is 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.

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.

UCSD welcomes explorers.

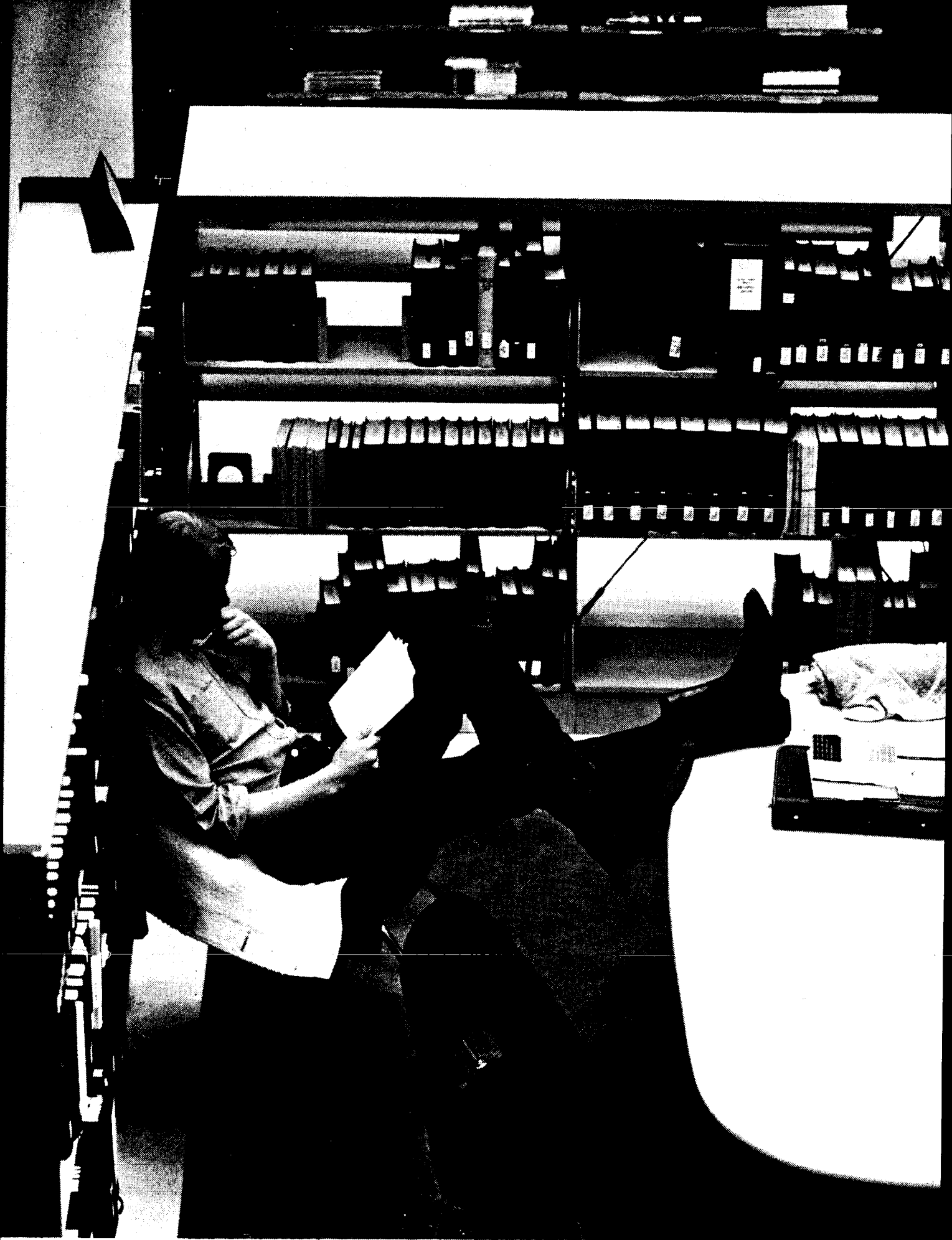
When I first came here from high school I was psyched out, scared I wouldn't be able to do the work. But I found it's not too hard if you keep up and don't fall behind. Keeping up is the main thing.

Freshman, Muir

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.



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

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

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 plans to 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 chapter titled "Choosing a College at UCSD," later in this publication.



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.

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.

Senior, Muir

JOHN MUIR COLLEGE

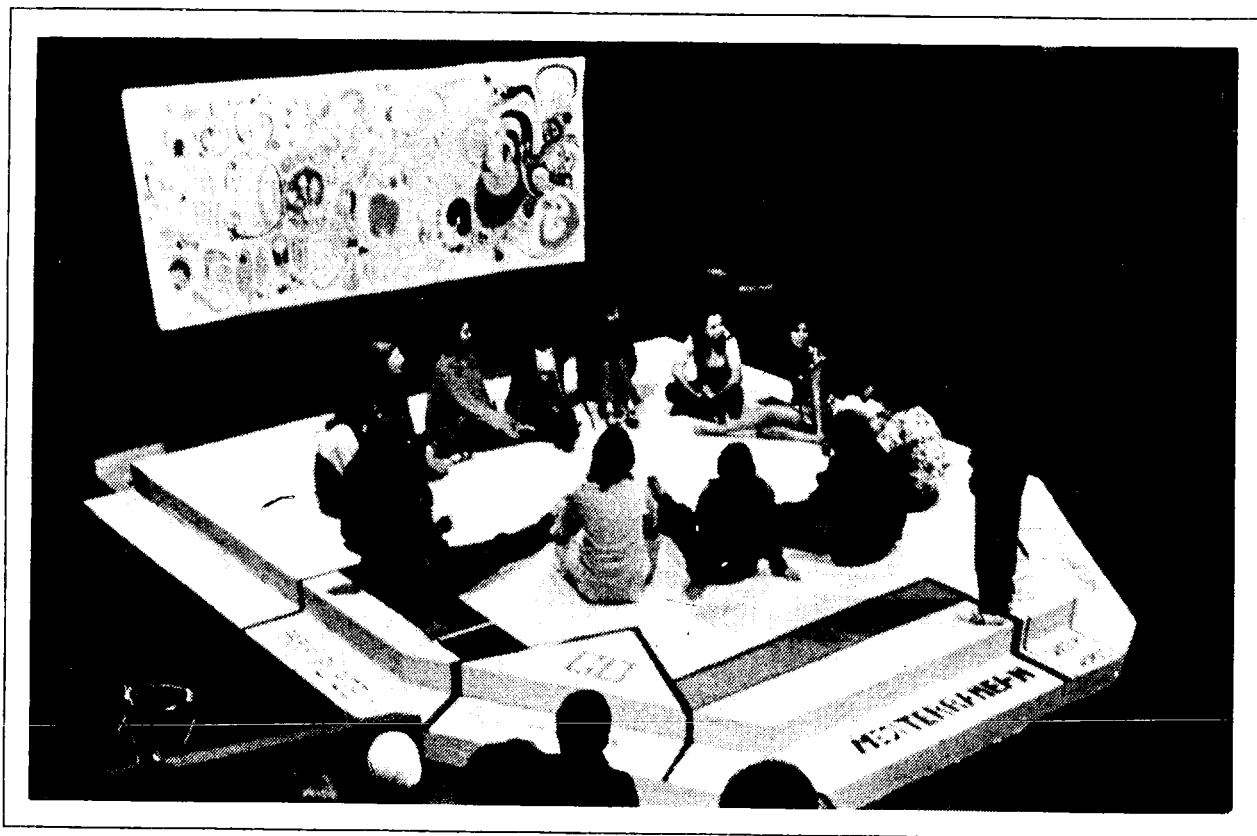
Muir defines itself as "a liberal arts college in which the student is encouraged to define his goals and take responsibility in determining how to realize them." At Muir, a balanced program of instruction is offered in all of the principal areas of learning, but the student has wide latitude in fulfilling 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 work that is judged by a committee, and every project ends with the creation 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.



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

Junior, Muir



THIRD COLLEGE

This newest of the UCSD college "family" is dedicated to the education of large numbers of minority youth who possess the will and the potential to become leading citizens within their own communities, to alleviate their contemporary social and economic problems and, in so doing, to benefit society at large. Relevant to these goals, Third College offers interdisciplinary majors in Science and Technology, Urban and Rural Studies, Third World Studies, and Communications. The student body of Third College is not limited, of course, to members of minority groups, and the student bodies of Revelle and Muir include sizeable percentages of minority students as well.

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 Donut Tree.

They teach you a lot about people. Including yourself.

Freshman, Revelle

To fulfill graduation requirements, Third College students must complete five course sequences during their lower-division years. These are: *Third World Studies*, *Communications*, *Science and Technology*, *Mathematics*, and *Urban and Rural Studies*. *Third World Studies* focuses on the historical aspects of non-Western cultures and on problems facing Chicano, Black, Native American, and Asian-American peoples in today's world. *Communications* investigates institutions, media, and forms of human behavior that together influence the development of individual and group consciousness. *Science and Technology* gives students an understanding of the basic laws of nature and their relation to the foundations of a technological society. The sequence is designed to introduce all students

to the sciences of biology, chemistry, and physics and their importance to the human organism and its environment. In the *Mathematics* sequence, innovative teaching techniques and materials are employed. *Urban and Rural Studies* investigates the many interdependent factors which determine the structure and quality of life in urban and rural areas.

A major concern of Third College has been the thorough examination of past and present conditions in the lives of Blacks, Chicanos, Native Americans and Asian-Americans in an effort to understand better these groups and their problems, and to encourage more meaningful involvement by them in the community at large.

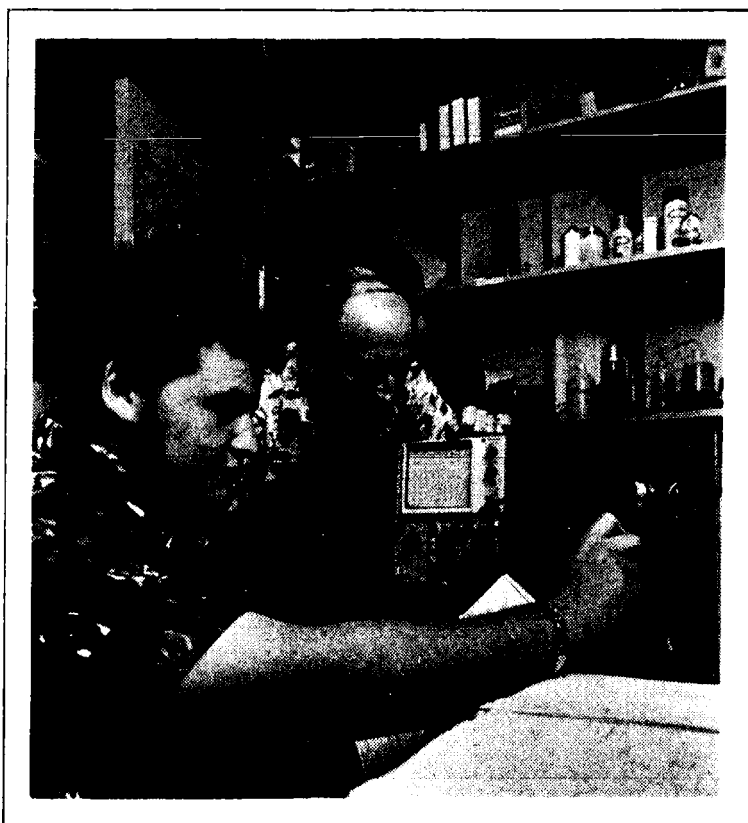
FOURTH COLLEGE

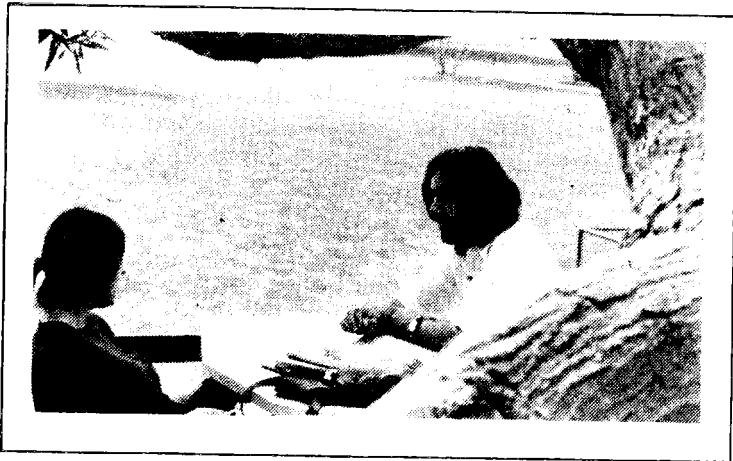
This College is still in its initial planning stages, with opening — subject to approval by the Board of Regents — scheduled for the Fall of 1974. Its general concept is to emphasize professional and pre-professional training, offering courses, programs and majors which students will find useful in a variety of professions including engineering, medicine, the performing arts, administrative sciences, education, law and architecture. Comparable training also is available at Revelle, Muir and Third, but Fourth College intends to give special weight to the student's plans for the future in arranging his or her program of study.

One unique feature of the new College will be the "College Colloquium," a series of lectures and group discussions for entering students. In these, students will gain an intimate view of the way UCSD operates, and will learn how to use to best advantage the resources and facilities of a great University.

Faculty here are like people nearly anywhere, I guess, only smarter. Sometimes I think they get hung up on research, but most of the time they're there if you need to talk.

Junior, Revelle





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.

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



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

People here sometimes seem less warm and outgoing than people back home. It's as if the sun had bleached them out. But it's nice being here - like spending a day at the beach.

Senior, Muir





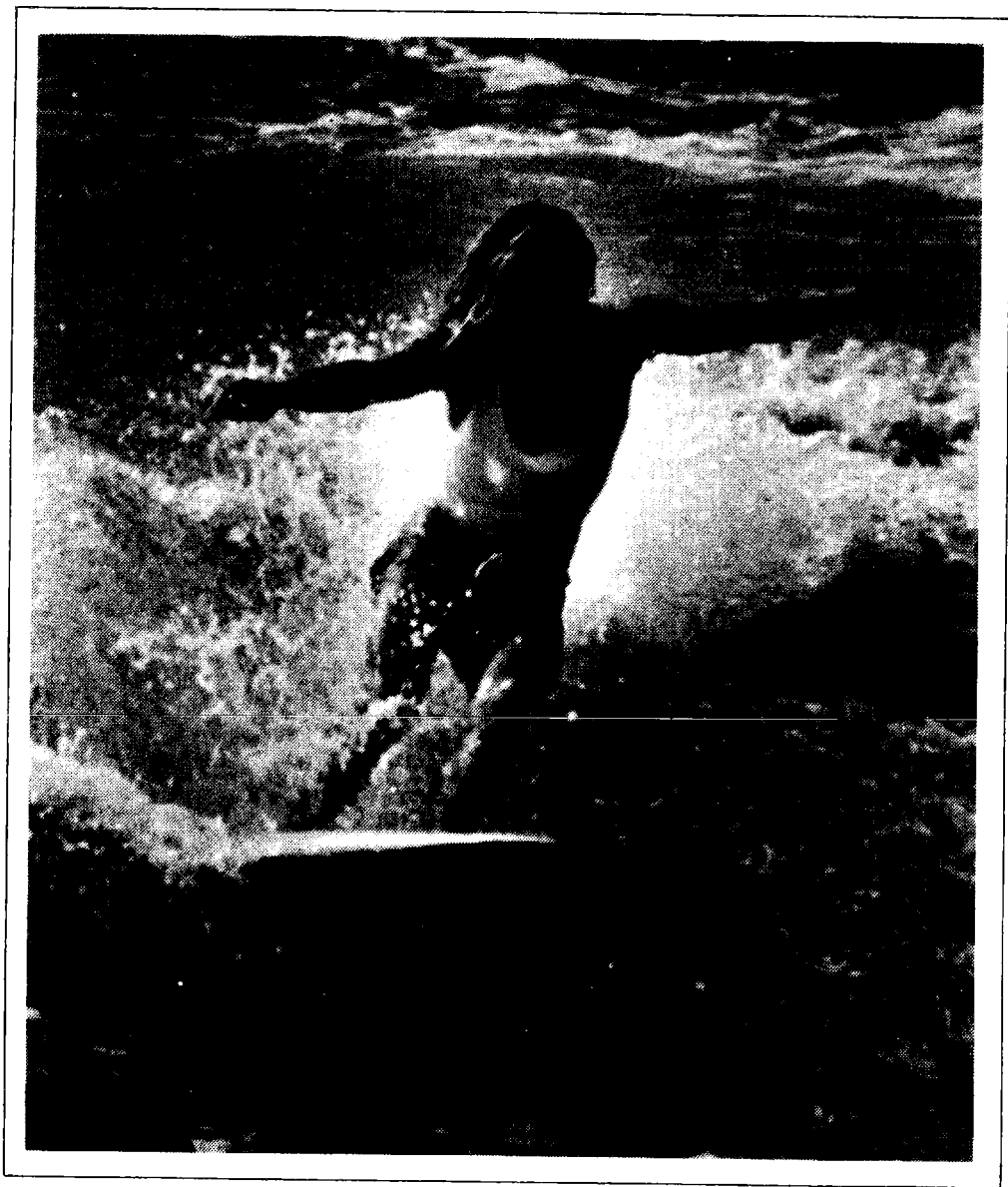
For theater-lovers there's Balboa Park's Old Globe, home of the National Shakespeare Festival every summer. Next door to Old Globe, the Cassius Carter Center Stage Theater presents a lively season of plays, while downtown the Off-Broadway Theater brings big-name entertainers to San Diego in revivals 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 Donut Tree and Muir's Five-and-Dime are favored by students throughout the day and evening for dates and rap sessions. Construction has begun on the new University Student Center, a \$650,000 structure which will provide many meeting rooms and recreational facilities for students. The Center will open some time early in 1974. In the Fall of 1974, UCSD's new \$5.2-million Fine Arts Building (the Mandeville Center) is scheduled for completion and inauguration. 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 Llagunas 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 race each year, is still largely unexplored wilderness.

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

“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.

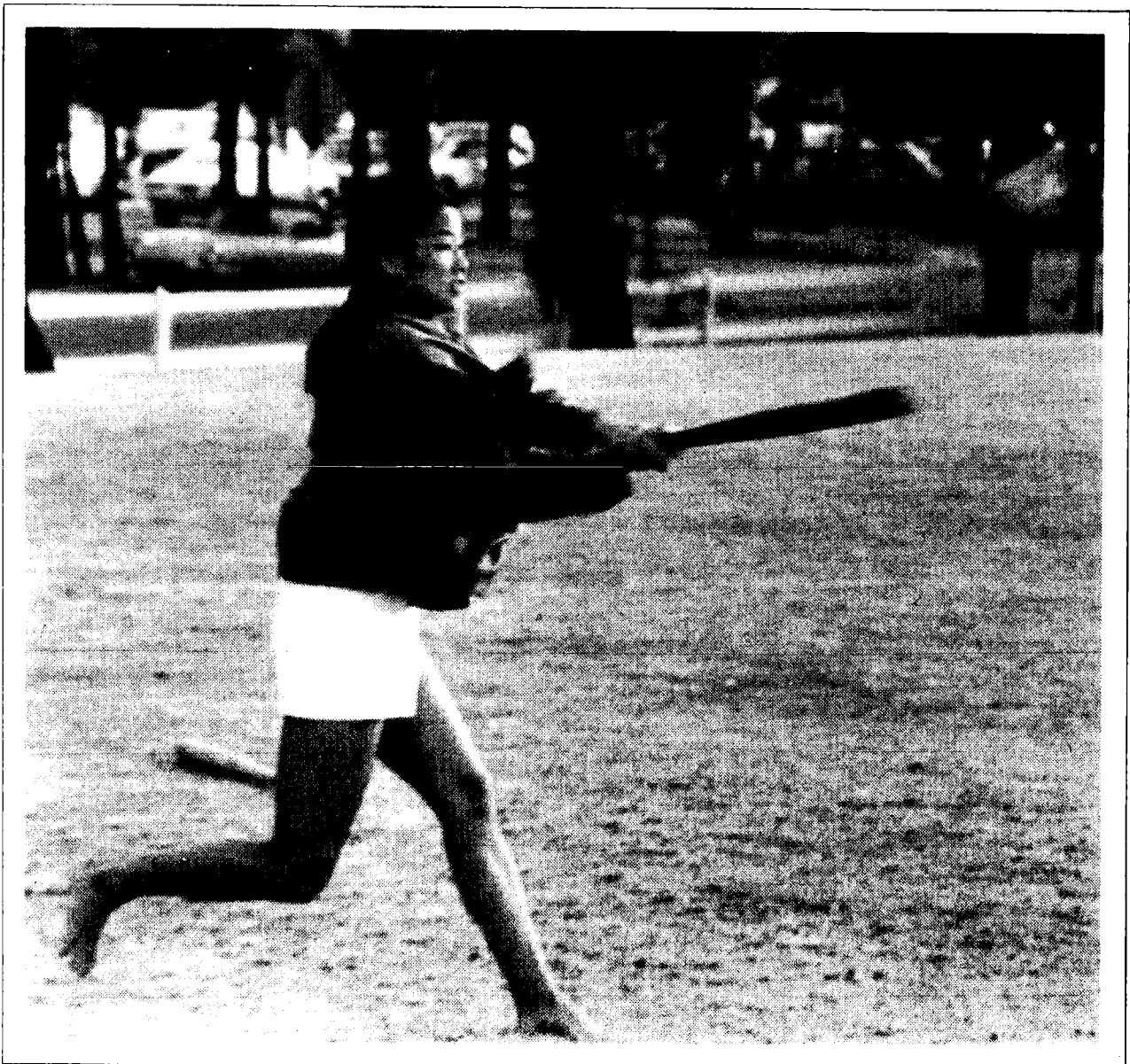
UCSD fields more intercollegiate athletic teams — 28 — than any other college or university in the nation. The total is all the more remarkable in light of the fact that UCSD has no big-time football or basketball team, and that the student body recently voted four-to-one against athletic scholarships.

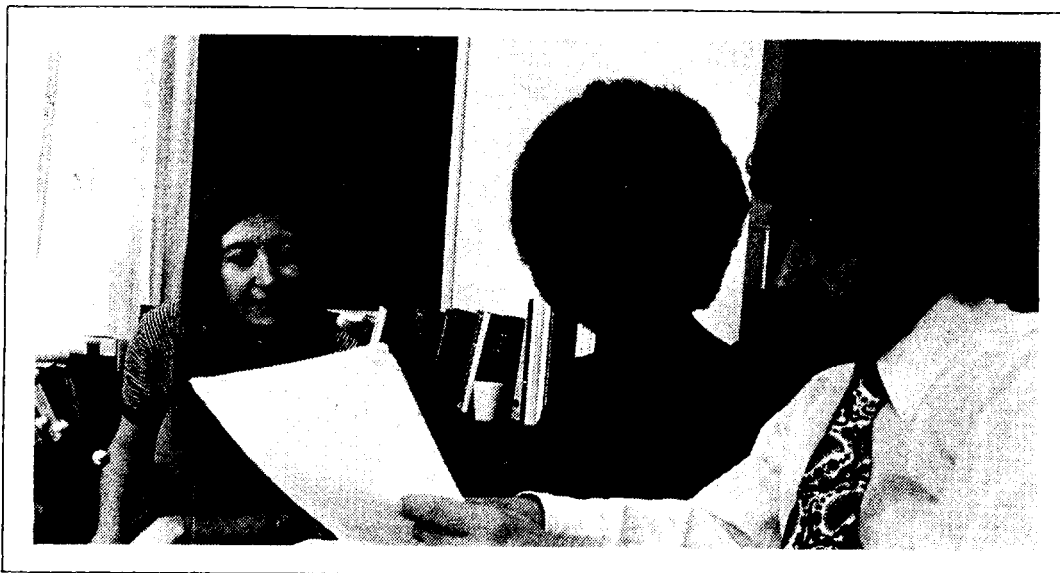
More than half the kids here take part in sports. The money they spend at other colleges for big-league athletes they spend here in everything from coed soccer and water polo to karate and sailing.

Junior, Revelle

The University’s amateur sports program has produced some championship teams. In 1970, 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!)





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 Provosts' offices, faculty members (who can help you to select a curriculum that is right for you), and a staff of specialists in Counseling and Psychological Services (who can help you appraise your needs.)

With or without such help, you will probably select a major by your second year at 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 the health fields, or lead to jobs quite unrelated to biology.

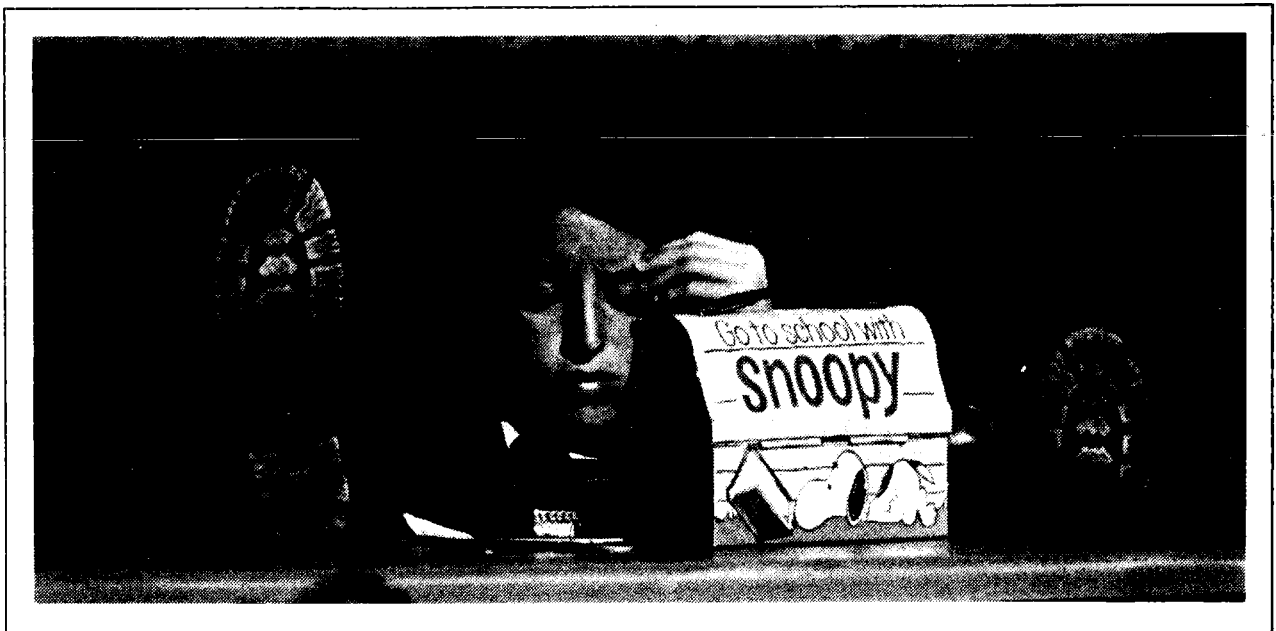
A firm commitment to a particular field is not expected. However, by graduation day, in your own best interests, you should know where you want to begin, and have a direction in mind.

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

The following majors are available to all undergraduate students at UCSD:

Anthropology	Health Sciences	Music
AMES *	History	Philosophy
APIS **	Linguistics	Physics
Biology	English/American Literature	Physics-Earth Sciences
Chemistry	General Literature	Psychology
Chemistry-Earth Sciences	Spanish Literature	Sociology
Chinese Studies	French Literature	Third World Studies
Classical Studies	German Literature	Urban and Rural Studies
Communication Arts	Mathematics	Visual Arts
Drama	Mathematics-Earth Sciences	
Economics	Muir Special Project	<i>* Applied Mechanics and Engineering Sciences</i>
		<i>** Applied Physics and Information Science</i>



NEED MORE INFORMATION? CHECK THE FOLLOWING:

- How do I apply for admission? Page 33. (See also "Note," below.)
- How much does it cost? See "Fees and Expenses," Page 37.
- How does UCSD grade? Page 40.
- What about scholastic requirements? Page 28.
- How do I go about choosing a college at UCSD? Page 47.
- What kinds of services and facilities are available at UCSD for students? Page 101.
- Who are the top people at UCSD? Page 288.
- How do I find my way around on campus? Page 284.
- What's the history of UCSD? Inside Back Cover.
- How many students and faculty were there at UCSD in 1973? Inside Back Cover
- Where do I write for more information? Inside 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.



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 next chapter, which describes the educational philosophies of the three 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 next 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.

Following is a list of all majors available to undergraduate students at UCSD:

Anthropology
Applied Mechanics and Engineering Sciences
Applied Physics and Information Science
Biology
Chemistry
Chemistry — Earth Sciences
Chinese Studies
Classical Studies
Communications
Drama
Economics
Health Sciences
History
Linguistics
English/American Literature
General Literature
Spanish Literature
French Literature
German Literature
Mathematics
Mathematics — Earth Sciences
Muir Special Project
Music
Philosophy
Physics
Physics — Earth Sciences
Psychology
Sociology
Third World Studies
Urban and Rural Studies
Visual Arts

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 this as the "a to f" requirement. 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.
- 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 a nonresident applicant, 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. The grades you earn in repeated courses, however, will not be counted higher than C in determining your scholarship average. 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. 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 13, 1973	SAT only
November 3	SAT only
December 1	SAT and ACHIEVEMENT
January 12, 1974	ACHIEVEMENT only
February 2	SAT only
April 6	SAT only
May 4	ACHIEVEMENT only
June 22	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.

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, with a grade of C or better, appropriate college courses in the high school subjects that you lacked, and
 - c. 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.

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 application and the related materials to the Admissions Office on the campus where you wish to enroll on or after the appropriate date below:

Application Filing Dates

Fall Quarter 1974	November 1, 1973
Winter Quarter 1975	July 1, 1974
Spring Quarter 1975	October 1, 1974

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

There are three stages of notification in the admissions cycle. Included on the back cover of the application packet are two reply cards which are used in the first two stages of communication; you should be sure to return them, self-addressed and stamped, with your application. When the application is received in the Admissions Office, one card is sent to you to acknowledge receipt of the application. The second card is sent after any necessary redirection has been completed. This card will advise you of the campus where your application will be processed. Upon receipt of this card you are assured of admission to that campus if you meet the standard admission requirements as explained in this chapter. In most instances the second card will be returned to applicants within three months after filing.

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 Registration 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), or 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
Board and Room in Residence Halls ^o	433.00	433.00	433.00	1299.00
Books (Approx.)	75.00	75.00	75.00	225.00
Personal Expenses	150.00	150.00	150.00	450.00
Total	\$864.00	\$864.00	\$864.00	\$2592.00

^oFigures 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 earliest opening day of the term on any of the University of California campuses.

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 is a minor and remains in this state after his parent, who was a resident of California but has established residence elsewhere, shall be entitled to retain residence classification until one year after the student turns eighteen, thus enabling the student to establish residency, so long as continuous attendance is maintained at the University.

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.

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 continuous full-time attendance at the University who had resident classification on March 7, 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 "F" 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 and 2 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. The Passed/Not Passed grade system can be used best in helping a student develop a minor.

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. D or F grades may not be repeated 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 550 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 4 quarter units or 3 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 practicable, 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 session at any campus of the University of California, and has not since registered at any other institution, may apply for transfer in the same status to another campus of the University. The student who wishes to transfer must file an application on his present campus. Application forms for intercampus transfer are available in the Registrar's Office.

Choosing a College at UCSD

As a member of the nine-campus system of the University of California, UCSD is a full-fledged university in every sense of the term. Graduate and undergraduate programs in a wide range of disciplines are offered, leading to the bachelor's, master's and Ph.D. degrees. UCSD's Scripps Institution of Oceanography is world renowned in its field, and the University's School of Medicine has won national distinction. UCSD's undergraduate programs already have been singled out for special honors, despite the comparative youth of the San Diego campus.

So UCSD is, first and foremost, a university. There is one feature which sets UCSD apart, however, from most other large universities in California and elsewhere. Early in UCSD's development, its planners adopted the "small-college" concept so successfully pioneered by Oxford University. In doing so, they reasoned that some students learn more, with greater satisfaction, in a small-college environment than they do in a conventional large university with its crowded lecture halls, impersonal relations between faculty and students, and immense student body.

Carrying forward this visionary plan, three colleges have been established at UCSD since its founding in 1964, and a fourth is being organized. The colleges now operating are Revelle, John Muir and Third. Fourth College will enroll its first freshmen in the Fall of 1974, if present plans are approved by the University of California Board of Regents.

Each UCSD college has its own campus, administrative buildings, residence halls, classrooms and recreational facilities. Each campus "family" is small enough to give each college a personality of its own, and an intimacy not generally found on the campuses of large universities.

Each UCSD college also has its own unique educational philosophy, around which its graduation requirements are built. These are important distinctions which you, as an entering student, should fully understand because on applying for admission you will be asked to specify the college with which you wish to affiliate. As an entering student, you enroll not only in UCSD; you enroll as well in Revelle, Muir, Third or Fourth College.

In most traditional universities, "college" describes an academic unit offering certain specialized areas of study. Thus, in a conventional university, there may be a "college of engineering," or a "college of law", for example. At UCSD, however, *every* major is offered in *every* college. Your choice of a college should be made not on the basis of the subject you wish to study, but on the general academic environment and the overall curriculum of one college as compared to the others. The question is not "which college is best for pre-med, or literature" but rather "which college provides the environment in which I will work best while studying a pre-med or literature curriculum?"

Apart from their different philosophical approaches to education, the various colleges differ in "breadth" or general-education requirements which must be met for graduation. Although you may sign up for courses in one or more colleges in satisfying your general degree requirements, you *must* meet the "breadth requirements" of your own college before graduation.

Bear all of these considerations in mind as you read the following descriptions of Revelle, Muir and Third College, and of the projected Fourth College. Much of the success you will enjoy at UCSD will hinge on 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 knowledge 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 interests, 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 (calculus).
3. Three courses in a social science.
4. Five courses in the natural (physical and biological) sciences.
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 liberal education, the student will be brought into contact with a significant area of mathematics. Furthermore, he will gain the facility to apply mathematics in his 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 his future plans.* Both sequences include integral and differential calculus and linear algebra. (See *Departments 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.

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 *Departments 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 extra-curricular 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.

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 *Departments of Instruction: Humanities*.

Fine Arts

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

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 ^o 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

^oA 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 *Departments 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 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 eighteen 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 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 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 overall 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
Allison, Henry E., Ph.D.	Professor	Philosophy
Anagnostopoulos, Giogios, Ph.D.	Assistant Professor	Philosophy
Arnold, James R., Ph.D.	Professor	Chemistry
Attiyeh, Richard E., Ph.D.	Associate 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
Block, Barry, Ph.D.	Associate Professor	Physics
Blume, Bernhard, Ph.D.	Professor Emeritus	Literature

Bond, Frederick T., Ph.D.	Associate Professor	Chemistry
Bradner, Hugh, Ph.D.	Professor	AMES
Brueckner, Keith A., Ph.D.	Professor	Physics
Burbidge, E. Margaret, Ph.D.	Professor	Physics
Burbidge, Geoffrey, R., Ph.D.	Professor	Physics
Butler, Warren L., Ph.D.	Professor	Biology
Casalduero, Joaquin, Ph.D.	Professor Emeritus	Literature
Catalan, Diego (M-P), Ph.D.	Professor	Literature
Cespedes, Guillermo, Ph.D.	Professor	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
Elliott, Robert C., Ph.D.	Professor	Literature
Ellis, Albert T., Ph.D.	Professor	AMES
Emmerson, Richard D., Ph.D.	Assistant Professor	Economics
Fahey, Robert C., Ph.D.	Associate Professor	Chemistry
Feher, George, Ph.D.	Professor	Physics
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
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
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
Lindenberg, Katja L., Ph.D.	Assistant Professor in Residence	Chemistry
Livingston, Robert B., M.D.	Professor	Neurosciences
Longino, Helen E., Ph.D.	Assistant Professor	Philosophy
Loomis, William F., Jr., Ph.D.	Assistant Professor	Biology
Lovberg, Ralph H., Ph.D.	Professor	Physics
Luke, Jon C., Ph.D.	Assistant Professor	Mathematics
Ma, Shang-keng, Ph.D.	Associate Professor	Physics
Makkreel, Rudolph A., Ph.D.	Assistant Professor	Philosophy
Malmberg, John H., Ph.D.	Professor	Physics
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	Chemistry
McIlwain, Carl E., Ph.D.	Professor	Physics
Mehlhop, Werner A. W., Ph.D.	Assistant Professor	Physics
Meinwald, Jerrold, Ph.D.	Professor	Chemistry
Miles, John W., Ph.D.	Professor	AMES
Miller, David R., Ph.D.	Associate Professor	AMES
Miller, Stanley L., Ph.D.	Professor	Chemistry
Moore, Stanley, Ph.D.	Professor	Philosophy
Mosshammer, Alden A., Ph.D.	Assistant Professor	History
Nachbar, William, Ph.D.	Professor	AMES
Nauen, Franz G., Ph.D.	Assistant Professor	History
Newmark, Leonard D., Ph.D.	Professor	Linguistics

Nguyen-Huu, Xuong, Ph.D.	Associate Professor	Physics/Biology/ Chemistry
Norman, Donald A., Ph.D.	Professor	Psychology
O'Brien, Brian B.	Instructor	Biology
Olafson, Frederick A., Ph.D.	Professor	Philosophy
Olfe, Daniel B., Ph.D.	Professor	AMES
O'Neil, Thomas M., Ph.D.	Associate Professor	Physics
Orr, Daniel, Ph.D.	Professor	Economics
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
Ramanathan, Ramachandra, Ph.D.	Associate Professor	Economics
Ramm, Wolfhard, Ph.D.	Assistant Professor	Economics
Rand, Sinai, Ph.D.	Associate Professor	AMES
Randel, Fred V., Ph.D.	Assistant Professor	Literature
Reissner, M. Erich, Ph.D.	Professor	AMES
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., Ph.D.	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, Alan 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
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
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
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.	Associate 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, Curtis A., Ph.D.	Professor	History
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 opportunities, can be unusually profound and meaningful, especially if learning is truly joined with living, if knowledge gained in the classroom, the library, and the laboratory can in some real way be applied to the experience of the Muir student and the problems of contemporary society.

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

Appropriately, therefore, the general education requirements and the curriculum as a whole encourage active rather than passive learning. Active learning necessitates self-education and opportunities for independent study. The major programs provide many forms of this. They are not confined to the last two years, but may be undertaken by students of the college whenever the departments or the directors of interdisciplinary majors judge them to be 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

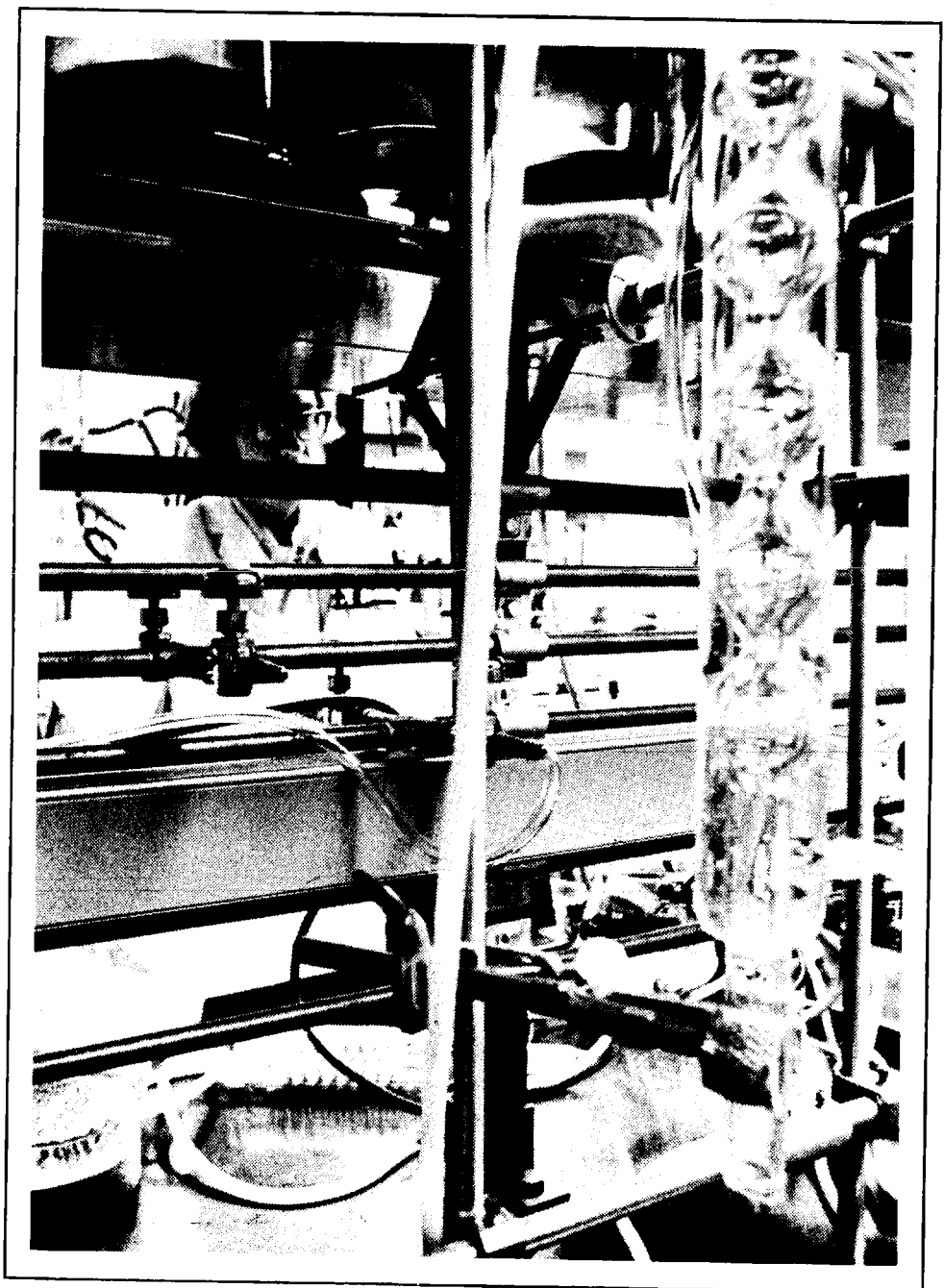
complete a special project. As the name implies, this is a specialized form of concentration. It normally consists of a combination of regular course work and independent study. Each such project must be approved by the Provost. (See the paragraph *Major Programs and Special Projects*, below.)

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

Psych. 10, 11, 14, 16, 17 (3 of 5)
Linguistics 1A, 1B, 1C
Economics 1A, 1B, 1C
Economics 2A, 2B, 2C
Anthropology 22, 23, 24
Sociology 1A, 1B, 1C
Political Science 10, 11, 12

MATHEMATICAL SCIENCE

Math 1 A, B, C
Math 2 A, B, C
Math 2 B, C, D

Math 2 B, C, E
Math 5 A, B, C

NATURAL SCIENCE

Biology 6, 7, 8, 10, 11 (3 of 5)
Science 3 A, B, C
Science 4 A, B, C
APIS 20 A, B, C

EXPERIMENTAL AND INTERDISCIPLINARY COURSES

Cultural Traditions:

Oceania
Caribbean
Judaic Studies
East Asian
Chicano-Latin American

FINE ARTS

Music 1A, 1B, 1C
Drama 41, 42, 43
Drama 11, 12, 13, 16
Visual Arts 15A, 15B, 15C, 60, 88
Visual Arts 14A, 14B, 14C, 60, 88
Visual Arts 13A, 13B, 13C, 60, 88
Music 11A, 11B, 11C

HUMANITIES

English 21, 22, 23
Literature 1 A, B, C
Literature 3 A, B, C
Literature/English 21, 22, 23
History 1 A, B, C
History 3A, 3B, 3C
History 5 A, B, C
Philosophy 20, 21, 22
Philosophy 30 A, B, C

LANGUAGE LEARNING

Any three of the following:

Language 1, 2, 3, 4, 5, 6
Literature 10, 11, 11

used only as a Humanities sequence
used only as a Humanities sequence
used only as a Humanities sequence
used only as a Fine Arts sequence
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 have been approved for 1973-74 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.
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 such study 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
Alfven, 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	Political Science
Benamou, Michel, Ph.D.	Professor	Literature
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
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
Flanigan, Francis J., Ph.D.	Assistant Professor	Mathematics
Fussell, Edwin S., Ph.D.	Professor	Literature
Gaburo, Kenneth L., D.M.A.	Professor	Music
Gaffney, Floyd, Ph.D.	Associate Professor	Drama
Golber, David L., Ph.D.	Assistant Professor	Mathematics
Gragg, William B., Ph.D.	Associate Professor	Mathematics
Grana, Cesar, Ph.D.	Professor	Sociology
Green, David M., Ph.D.	Professor	Psychology
Guillen, 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
Howell, Stephen H., Ph.D.	Assistant Professor	Biology
Hudson, Gary, M.F.A.	Assistant Professor	Visual Arts
Humble, Keith, Dip. in Music	Associate Professor	Music
Jameson, Fredric R., Ph.D.	Professor	Literature
Jordan, David, Ph.D.	Associate Professor	Anthropology
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
Leonard, John G., Ph.D.	Assistant Professor	History
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.	Associate 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, Agrigation	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
Obeyesekere, Gananath, Ph.D.	Professor	Anthropology
Ogdon, Wilbur L., Ph.D.	Professor	Music
Oliveros, Pauline, A.B.	Assistant Professor	Music
Orloff, Marshall J., M.D.	Professor	Surgery
Parrish, Michael E., Ph.D.	Associate Professor	History
Price, Paul A., Ph.D.	Assistant Professor	Biology
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
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.	Assistant Professor	Literature
Yip, Wai-lim, Ph.D.	Associate Professor	Literature
York, Herbert F., Ph.D.	Professor	Physics

* * *

Honorary Fellows of the College

Hannes Alfven, *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*

THIRD COLLEGE

The Third College admitted its first students in the Fall of 1970. The Third College is unique in several respects. It is dedicated to the education of large numbers of minority students who possess the will and the potential to become leaders in determining the future of their communities. Third College is dedicated as well to the alleviation of contemporary social and economic problems and, as a consequence, to the general public good. Intimate student-faculty participation is an integral part of the development and operation of Third College.

Educational Aim of Third College

The Academic Plan developed for Third College has as its primary emphases the education of minority students, and the study and alleviation of contemporary social problems. Today, our society is in the midst of a moral, social and technological evolution. Large segments of our citizenry are alienated from prevailing institutions and concepts. Ethnic minorities are separated from the mainstream of society by frightening social and economic barriers. The deterioration of our physical environment and the impact of an overwhelming technology are increasingly affecting values and ways of our daily life. Rapid communication and economic and political interdependence among all people on the earth demand that our thinking expand from national to world-wide dimensions. These grave problems require the education of citizens who will be committed to their solution, will learn to analyze them objectively and will acquire the technical competence to cope with them. This is the educational aim of Third College.

Organizational Structure of the College

It is essential to the success of Third College that a cohesive college community be developed. Students and faculty will need to cooperate closely in all aspects of the college, with a fundamental educational role assigned to students. Because they are participating to this extent in the educational program of the college, it is clear that student perceptions of the successes and failures of the program will be both appropriate and valuable. Student participation in the planning of the college has been extensive. The Academic Plan of the college was drafted by joint student-faculty committees, with many of the concepts originating from the students.

The General Education Requirements

Third College students are expected to complete the following set of core courses:

1. Three quarters (12 units) in Science and Technology covering Biology, Chemistry, and Physics
2. A three-quarter (12 units) sequence in Urban and Rural Studies
3. A three-quarter (12 units) sequence in Third World Studies
4. A two-quarter (8 units) sequence in Communications
5. Two quarters (8 units) in Mathematics
6. One quarter (4 units) in Composition

It is strongly recommended that students take the core courses in sequence during their freshman (and sophomore) year at Third College. All required Third College courses are (4) quarter-units each.

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 *Departments 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 Third College Program and Core Courses

The following are the Third College Programs which cover the core courses of the college. For further information and course descriptions refer to these titles under *Departments of Instruction*.

1. **SCIENCE AND TECHNOLOGY** The Science and Technology basic sequence is designed to provide all students with a fundamental background in biology, chemistry and physics. The relationship and importance of these disciplines to the human organism and its environment is stressed. The Biology (Health Sciences) major in Third College is the first specialized science program of the College and is designed to prepare students for medical or dental schools or careers in the allied health professions.
2. **URBAN AND RURAL STUDIES** Urban and Rural Studies investigates the many interdependent factors which determine the structure and quality of life in urban and rural areas. Examples of central factors in this program are economic distribution of private and governmental monies, the responsiveness of the society to varying cultural, environmental, and ecological needs, and the participation of the individual and groups in determining policy and allocation of resources and services.
3. **THIRD WORLD STUDIES** Third World Studies seeks to provide students with information about and an understanding of external Third World cultures and of the problems facing Asian-American, Black, Chicano, and Native American peoples in the past and present. The psychological, sociological, and economic factors determining the progress of the Third World are studied in depth.

4. **COMMUNICATIONS** Communications provides students with a focus for inquiry into the institutions, media, and forms of human behavior that together influence the development of individual and group consciousness. At the same time, the program affords students the chance to experiment and expand their skills in using communications media.
5. **MATHEMATICS** The intent of the mathematics requirement is to provide students with the basic mathematic principles and problem-solving skills necessary in preparation for an advanced academic setting and to acquaint students with the important role which mathematics plays in present-day society.
6. **COMPOSITION** Composition is designed to sharpen the student's communicative skills through the written word by focusing on the basic language patterns and special needs of students (particularly of minority students) and dealing with them on a tailored basis.
7. **TEACHER EDUCATION** Recognizing the campus-wide need for teacher training, a **TEACHER EDUCATION PROGRAM** has been developed under the auspices of Third College. This teacher preparation program has a multi-cultural emphasis, focusing on the interrelationship of language, culture, and learning particularly as applied to the education of minorities. An official outline and details of the courses for the Teacher Education Program may be found under *Departments of Instruction*.

In addition, a Bilingual Sequence is offered under the Third World Studies Program. Courses are offered in such areas as Spanish for Chicanos, Chicano Dialectology, Chicano Literature and Spanish Phonetics.

The Majors

As a liberal arts college Third College offers an academic program which covers the humanities, the social sciences and the natural sciences and mathematics. The Third College student may major in any of the wide range of undergraduate majors offered at UCSD as well as any of the interdisciplinary campus-wide majors initiated and centered in Third College — Communications, Urban and Rural Studies, and Third World Studies.

The following is a sampling of the majors available to Third College students.

- Anthropology
- Applied Mechanics and Engineering Sciences
- Applied Physics and Information Science
- Biology (Health Science)
- Chemistry
- Communications
- Economics
- History
- Linguistics
- Literature
- Mathematics
- Music
- Philosophy
- Physics

Psychology
 Sociology
 Third World Studies
 Urban and Rural Studies
 Visual Arts

Students in Third College are expected to satisfy the major requirements and complete the required courses set by the department offering the major. For further information and course descriptions refer to the respective Department of Instruction.

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; and
5. complete a departmental, interdisciplinary, or individual major.

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
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
Heifetz, Robert J., Ph.D.	Associate Professor	Urban and Rural Studies
Justus, Joyce E., Ph.D.	Assistant Professor	Anthropology
Khan, Ismith M., M.A.	Assistant Professor	Literature
Lumpkin, Oscar, Ph.D.	Assistant Professor	Physics
McMorris, Trevor, Ph.D.	Associate Professor	Chemistry
Mehan, Hugh B., Ph.D.	Assistant Professor	Sociology
Ogawa, Roy, Ph.D.	Assistant Professor	Mathematics
Orr, Daniel, Ph.D.	Assistant Professor	Economics

Penn, Nolan E., Ph.D.	Professor	Psychiatry
Pinon, Ramon, Jr., Ph.D.	Assistant Professor	Biology
Ramanathan, Ramachandra, Ph.D.	Associate Professor	Economics
Raskin, Jeffrey F., M.A.	Assistant Professor	Visual Arts
Real, Michael R., Ph.D.	Assistant Professor	Communications
Reynolds, Edward, Ph.D.	Assistant Professor	History
Sanchez, Rosaura, Ph.D.	Assistant Professor	Literature
*Schiller, Herbert I., Ph.D.	Professor	Communications
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
	* * *	
Arneson, Richard, B.A.	Acting Asst. Prof.	Philosophy
Brightman, Lehman, M.A.	Lecturer	Interdisciplinary
Gandy, Oscar H., Jr., M.A.	Lecturer	Communications
Haff, Leonard R., M.S.	Acting Asst. Prof.	Mathematics
Kleinberg, Susan J., M.A.	Acting Assistant Professor	History
Moss, Robert C., Jr., B.A.	Assistant Supervisor	Physical Education
Ngubo, Anthony, M.A.	Lecturer	Sociology
Romo, Richard, M.A.	Acting Asst. Prof.	History
Siembieda, William J., M.C.P.	Lecturer	Urban and Rural Studies
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, LL.B.	Senior Lecturer	Urban and Rural Studies

Silverman, Milton J., J.D.	Lecturer	(Lawyer)
Smythe, Dallas, Ph.D.	Visiting Professor	Communications

°On leave 1973-74

FOURTH COLLEGE

Subject to approval by the University of California Board of Regents, Fourth College will enroll its first students in the Fall of 1974.

Fourth College will emphasize professional and pre-professional training, offering courses, programs, and majors which students will find useful in a variety of professions including engineering, medicine, the performing arts, administrative sciences, education, law, and architecture. Counseling services will be developed to guide students with various professional interests in the selection of their courses of study. Special emphasis will be given to programs related to matters of social policy and the process of public decision making.

Although special majors will be developed at Fourth College, all departmental majors now available at UCSD will be open to students enrolled on the new campus.

One unique feature to be offered at Fourth College will be the "College Colloquium" for entering students. Through involvement in a series of lectures and weekly discussions in relatively small groups, students will gain insight into the way a University operates and will learn how to utilize the University's resources and facilities to best advantage.

As is the practice at Revelle, Muir, and Third Colleges, a program of general education requirements will be specified by Fourth College to provide a sound liberal arts education as well as professionally relevant training. These will include offerings in the natural sciences, mathematics, computer science, and courses in the social sciences and humanities/fine arts. Of interest will be a special course in writing designed to aid students in developing their ability to communicate more effectively.

Graduate Studies

At the University of California, San Diego, all programs leading to masters' degrees and the Doctor of Philosophy degree are administered by the Office of Graduate Studies and Research with the advice of the Graduate Council. 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 1973-74

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 ^o		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.
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, they appoint individual advisers for each graduate student. Among many important duties, the Graduate Adviser is expected to perform the following:

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 keep records on all graduate students in the department or group and to supply information as requested by the Dean regarding graduate students and graduate work.
6. To assist the Dean in the observance of University regulations regarding graduate students, graduate study, and graduate courses.
7. To advise the Chairman of the Department and the Dean in the construction and administration of the graduate program in his department.

GRADUATE STUDENT COUNCIL

The purpose of the Graduate Student Council is to represent the interests of the graduate student body to the UCSD and statewide university administration. It also participates in the Graduate Senate of the University of California, an organization composed of graduate-student associations from all the UC campuses. Two representatives are elected from each graduate department to the Graduate Student Council.

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 1973-74 academic year it is estimated that quarterly expenses will approximate the following.

Estimated Expenses (Quarterly)

Fees Per Quarter*

	RESIDENT	GRADUATE STUDENTS	NONRESIDENT
Tuition			\$500
Registration Fee	\$100		\$100
Educational Fee	\$120		\$120
Student Center Fee	\$ 6		\$ 6
Room and Food		\$570°	
Books		\$ 85°	
Personal Expenses		\$170°	

Students should also be aware of the following charges:

Application fee for admission	\$20
Changes in study list after announced deadline dates.....	3
Duplicate registration and/or other cards from enrollment packet	3
Duplicate student 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 of students for laboratory costs, for athletic and gymnasium facilities and equipment, for counseling and placement as provided on the local campus, and for such consultation, medical advice, and hospital care or dispensary treatment only as can be provided by the local campus Student Health Service, provides for an expansion of the financial aids program throughout the University and provides capital improvements oriented toward extracurricular benefits for students. No part of this fee is remitted to students who may not desire to make use of all or any of these privileges.

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 is enrolled in at least one-half (six units) the normal full-time academic program. Students interested in this provision should contact the Financial Aids Office, Building 213, Matthews Campus.

Nonresident Tuition Fee

(Note: The following information is from the Office of the General Counsel, University of California, Berkeley, 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 earliest opening day of the term on any of the University of California campuses.

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 membership 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 is a minor and remains in this state after his parent, who was a resident of California but has established residence elsewhere, shall be entitled to retain residence classification until one year after the student turns eighteen, thus enabling the student to establish residency, so long as continuous attendance is maintained at the University.

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.

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 continuous full-time attendance at the University who had resident classification on March 7, 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.

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 Automobile Parking Services in Campus Services and Facilities.)

Reduced Registration Fee

(This does not apply to the Educational Fee and Student Center Fee.)

One-half of the established registration fee may be waived for:

1. Graduate students 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. Students 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.

Filing Fee

A student on an approved leave of absence who has completed all requirements except for the final reading of his 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. 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 each for additional copies. Transcripts must be requested several days in advance of date needed.

ADMISSION**General Requirements**

An applicant for graduate admission to the University must present evidence of his preparation and capacity for advanced work in one of the departments in instruction. He should hold a bachelor's degree or the equivalent, and his background should be 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 must devote some time to certain undergraduate courses selected in consultation with his 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 preparation is judged inadequate as a foundation for advanced work, or if the department's facilities are already filled to capacity.

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

The University of California, San Diego, does not discriminate against nor in any way discourage applicants for graduate study on the basis of religion, age, sex, ethnic origin, marital status or need. Any evidence that a UCSD department is not adhering to this policy should be reported to the Office of Affirmative Action or to the Office of the Chancellor.

Procedures

A prospective graduate student should file with his 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 a transcript of his record from each college and university attended. Official admission will not be granted until the application fee has been received. In addition, the Confidential Financial Statement indicating adequate financial support must be submitted by all foreign students requesting a foreign student visa. 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. This form and all supporting materials should be filed with the applicant's prospective major department at least two months before the opening of the quarter in which he plans to enroll. If seeking financial assistance, applicants must file all materials on or before February 1. Some departmental deadline dates for admission 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, as some departments have special requirements. 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 9 graduate units a quarter is considered "part-time". He is admitted as a regular student and must pay the same fees as a full-time student.

Visiting Student

A student who is registered at UCSD for a limited period of time, such as a reciprocity student in the Education Abroad Program, should be admitted in regular status even if he plans to continue his 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 wishes to re-enroll. He must submit supplementary transcripts for all academic work taken since last enrolled in UCSD and a non-refundable fee (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.

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

Reapplication

A student who failed to register in the quarter for which he filed an application and was accepted for graduate study must complete and submit a new application. The application must be accompanied by transcripts for all academic work completed since the first application. It will not be necessary to pay another fee if reapplication is made within two years.

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 toward tuition and/or fees; and loans and grants-in-aid.

Application Procedures

Application materials with instructions can be obtained from an academic department office 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).

In order for a student to be considered for a fellowship, traineeship, or graduate scholarship for the ensuing academic year, his 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 April 1. UCSD adheres to the practice 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 (3.25 GPA or better).

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 to render any services. Part-time students and non-degree students are not eligible. Fellowships usually range from \$2,400 to \$3,000 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 (3.25 GPA or better). 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.

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. San Diego Fellowships
7. U.S. Public Health Service Predoctoral Traineeships
8. 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.

SAN DIEGO FELLOWSHIPS

UCSD is committed to providing opportunities for educationally disadvantaged students and those from minority backgrounds to pursue graduate programs. A limited number of San Diego Fellowships are available to U.S. citizens who do not qualify for regular University fellowships and assistantships but whose records and letters of recommendation indicate their potential for successfully undertaking graduate study. San Diego Fellowships are awarded on the basis of strong academic promise and financial need. Application is made when filing for admission through the student's prospective department.

Financial Aids

For information concerning student employment (services and opportunities), 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.

Registration Procedures

1. Obtain copy of *Schedule of Classes*. (May be purchased from UCSD bookstore for \$.25)
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.
5. Pay required fees to Cashier's Office prior to the Registrar's deadline date. When fees are paid, present for validation the Fee Card enclosed in registration packet together with student Identification Card.

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 his enrollment packet with appropriate signatures) with Registration and Scheduling, Room 211, Matthews Campus, by the deadline dates published in the *Schedule of Classes*.

Additionally, a \$10.00 late registration fee will be assessed if the student has not completed his registration (paid his fees) prior to 3:30 P.M. on the deadline for completing registration as outlined in 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.

All new students are required to complete a health-history form as provided by the Student Health Service and to provide such evidence of good health as may be required. Additionally, physical examination by a personal physician is strongly recommended for all entering students, particularly to discover and resolve physical problems that might cause a student difficulty while attending UCSD. However, such an examination is not an admission requirement.

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 has withdrawn from UCSD, and he will be dropped from the Official Register of graduate students. If he decides to continue his 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 department.

Preferred Program Card (Study List)

Each quarter in which he 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 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 hold a fellowship, traineeship, or similar appointment administered by the University.

Withdrawal

A student withdrawing from the University during a quarter because of illness or an emergency 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 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 register in the final quarter in which he expects to receive his degree.

GRADES

Standards of Scholarship

A graduate student must maintain a minimum grade-point average of 3.0 (B) to continue in good standing. 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 overall grade-point average falls below 3.0 at any time, or if his 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.

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 ^o	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 reported by instructor)	No grade points

^oLegislation is pending to change "E" to "I".

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

If a student wishes to alter his GPA by repetition of a course, he must submit a *General Petition*, after he has taken the course, requesting replacement of all grades for that course by "S". He must obtain approval of the Graduate Adviser and the Chairman of his (major) Department, have the petition certified by the Office of the Registrar, and submit it to the Dean of Graduate Studies for approval.

"E" (Incomplete) Grade

An "E" is assigned when a student's work is of passing quality but incomplete for reasons beyond his 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 pm 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 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 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 in a manner compatible with the University's function as an educational institution. Rules concerning student conduct, student organizations, use of University facilities, and related matters are set forth in University policies and campus regulations, copies of which are available at the Office of Student Affairs.

Academic Residence

A student establishes academic residence each quarter by the satisfactory completion of a minimum of 6 units of work, 4 of which must be at graduate level. At least three quarters of continuous academic residence at the University of California, San Diego is required for any advanced degree. At the discretion of the Graduate Council, candidates for some degrees may be given credit for residence at other Universities, provided at least three consecutive quarters are passed in residence at this University.

Language Requirements

Each department may establish its own foreign-language requirements. Some departments may require special language proficiency for specific programs. Under such circumstances, the testing of proficiency is the department's responsibility and no record of the results is kept by the Office of Graduate Studies and Research or the Office of the Registrar.

Other departments require a knowledge of one or more foreign languages which become an integral part of the student's preparation for a doctor's degree; the following regulations pertain only 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, the student must satisfy any formal language requirements established by the major department and administered by the Graduate Council for that degree. Students are advised to adequately prepare required language study before entering graduate school, if possible, and to take the necessary language examinations early in their graduate careers. Otherwise their programs may be delayed. Special non-credit reading courses in most of the required foreign languages are available for students who wish to prepare for these examinations. The Department of Linguistics is responsible for administering foreign-language requirements on behalf of the Graduate Council.

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 department should petition for permission to use his 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 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 should file his application with the Department of Linguistics at least 30 days in advance of the proposed date of the examination. In the event he 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 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 department or the Office of the Registrar. The completed petition should state clearly the reason(s) for requesting the exception and bear the required signatures, before being filed with the Office of the Registrar. If the petition is approved, the student receives a copy of the properly executed petition; if disapproved, the petition is returned to the department.

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.

Teaching

Some departments require all students seeking a graduate degree to participate in the teaching program of the department by enrolling in a course in the 500 series. The nature and extent of the duties required for each department are described under *Departments 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, and 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-List Limits

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), pay a \$3 fee to the Cashier, and submit a General Petition explaining the circumstances.

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 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 return to his home country upon completion of his studies in the United States. He 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 has completed all requirements for his 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.

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 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), or at the University of California, Santa Barbara, which acts as the administering body for all the UC campuses.

Intercampus Exchange Program

A graduate student registered on any campus of the University of California who wishes to seek further opportunity for contact with scholars or with fields of study and research not available on his 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 the late filing of the Preferred Program Card (Study List) on the host campus. The application must be signed by his adviser and the Dean of Graduate Studies of his home campus, and the Chairman of the Department and the Dean of Graduate Studies of the host campus. He completes registration by paying required fees on his 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 home campus. He will have library, infirmary and student privileges on the host campus. Grades obtained in courses taken by the student will be transferred to his home campus for entry on his 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 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 in which he plans to seek the Ph.D. degree. He 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.

POSTDOCTORAL STUDY

In order to obtain an accurate census of Postdoctoral Scholars on campus and to establish a means of defining and developing their role in UCSD's academic program, postdoctoral scholars who meet the requirements for eligibility are required to be enrolled.

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 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 to secure the privileges and perquisites of his 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 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 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 his 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 members (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:

Eighteen units in graduate courses, including at least 12 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:

Twenty-four units in graduate courses, including at least 14 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 his 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:

Forty-eight units in graduate courses in the major field including six from approved upper division, 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.

COURSE REQUIREMENTS

Only courses with assigned grades "A", "B", "C", "P" or "S" are counted in satisfaction of the requirements 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, but the period involved will not change the residence requirement of two years. He may be given appropriate credit for the work.

A STUDENT MUST BE REGISTERED IN THE FINAL QUARTER IN WHICH THE DEGREE WILL BE AWARDED. (See *Registration in the Final Quarter*.)

THE DOCTOR OF PHILOSOPHY DEGREE

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 professorial titles of any rank. The committee members shall be chosen from at least two departments, at least two members shall represent academic specialties 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, which shall be public and so announced, and authorizes the issuance of the *Report of the Qualifying Examination/ Advancement to Candidacy*. 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 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, the last 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 candidate's final examination is conducted by his Doctoral Committee three academic quarters or more after advancement to candidacy. The examination is generally oral. The dissertation must be approved by each member of the Doctoral Committee and filed with the University Librarian, who accepts the dissertation 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 Philosophy, 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:
California State University, San Diego 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 qualifications 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
Aptitude 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:

California State University, San Diego 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 PM at California State University, San Diego. 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) (California State University, San Diego Testing Office, Administration 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

Adaptive Learning Program

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. A "writing clinic" is open to all students who need short-term help in writing papers. A "math clinic" provides problem-oriented, short-term aid to students in math and the sciences. Further information: Sixth Floor, Building 2D, Muir Campus, Extension 2401.

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 1202, Building 2A, Muir Campus, Extension 1984. (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 and serves also as a source of information on all types of educational exchange experiences.

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

The Study Centers' primary purpose is to provide a sound academic experience in a different educational system. They also enable the 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 2.75 grade-point average (except for the United Kingdom where a 3.0 grade-point average is required); 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, and Lebanon, 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 eleven 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.

Each student will be concurrently enrolled on his home campus 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 1974-75 will be accepted from October 9, 1973 through January 14, 1974. (Applications for the United Kingdom and Ireland must be filed no later than November 15, 1973.)

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

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.

Teacher Education Program

The Teacher Education Program (TEP) 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. For further information, see "*Teacher Education Program*" under *Departments of Instruction*.

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 30,000.

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 allows regular University students to take Extension courses, and non-students to take regular University courses. A limited number of University students – graduate or undergraduate may enroll in Extension courses free of charge. Enrollment of non-students in regular University courses is subject 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. All of these facilities, with collections aggregating in excess of 1,000,000 volumes, are open to all students. The Central University Library 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 and the Spanish Civil War. The Cluster I Undergraduate Library, in the Humanities-Library Building on Revelle Campus, has a general collection designed to serve the basic needs of undergraduate students. For further information on technical collections, see *Research at UCSD*.

COUNSELING SERVICES

Career-Education Planning Services

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

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 Financial Aids Office will attempt to help students find supplemental financial aid. Applications and requests for information should be addressed to Financial Aids Office, University of California, San Diego, P. O. Box 109, La Jolla, California 92037. (Phone 453-2000, ext. 1946)

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 Financial Aids 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 Financial Aids Office on time. Note deadlines 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:

- (1) 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).

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 Financial Aids Office,

Building 213, Matthews Campus. We ask all married students 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 two hundred scholarships each year 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 Honorary) and promise. Eligibility for a scholarship is determined from the applicant's statements on his application form, appropriate letters of recommendation, official transcripts and the Parents' Confidential Statement, and/or acceptable proof of independence and a Student's Confidential Statement.

Applying for a Scholarship

Applications are available in the Financial Aids 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

Awards are announced by May. 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 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 unique to the San Diego Campus, and 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 need not 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 faculty sponsor must submit a project proposal, including a tentative budget by April 20th 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 Grant (BEOG)

The BEOG is a new Federally funded entitlement program. Application and award procedures have not yet been published (as of 3-1-73).

Educational Fee Grants

To qualify, a student must be eligible for financial aid and in his first year (undergraduate) of attendance at the University of California. Eligible students will receive grants up to a maximum of \$100 per quarter for the first three quarters of attendance.

Improved Access Grants

This program is restricted to students who transfer to the University of California from a post-secondary educational institution (with preference to community college transfers) other than the University of California who have completed (including work in progress) at least 84 quarter units (or 56 semester units) and not more than 135 quarter units (90 semester units) of acceptable transfer work at the time of admission. To be eligible, a

student must have a cumulative grade-point average of not less than 2.0 in acceptable transfer courses and be eligible for financial aid.

College Opportunity Grant (Special Application Required)

The College Opportunity Grant is awarded by the State of California to entering undergraduates who are United States citizens and California residents, and who demonstrate financial need. COG awards are renewable and range from \$300 to \$1,536 per academic year. The award may also include payment of all or part of the 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 is January, 1974.

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 and job referrals. The Work-Study Program provides experience in many fields, including city planning, mental health, community service in economically depressed areas, recreation, library work, experimental sciences (chemistry, physics, biology, oceanography and related fields), hospital and business administration, and office work. Pay 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 Office of Financial Aid 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 (\$678 for 1973-74). 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 1974-75 CALIFORNIA STATE SCHOLARSHIP AND FELLOWSHIP DEADLINE IS NOVEMBER, 1973.

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 Financial Aids 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 Financial Aid 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 a student's higher education including graduate study. A student who terminates his higher education will be required to begin payment of his loan nine months subsequent

to his termination. The repayment period may not exceed ten years and the note will bear interest at the rate of 3 per cent 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 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 a cosigner. Foreign students may apply for this loan. Regents' Loans, normally repayable in five years, bear an interest rate of 3 percent on the unpaid balance, beginning upon graduation or withdrawal from the University.

National Direct Student Loans

A student is eligible for a National Direct Student Loan if he 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 3 percent per annum and may extend up to a ten-year period. Cancellation provisions in effect under the former legislation for National Defense Student Loans made 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 thirty days to one year.

Federally Insured Student Loans (Special Application Required)

This loan is 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 or 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 Financial Aids Office for determination of need. Repayment starts between nine to twelve months after the borrower leaves school with a minimum monthly payment of \$30 with up to a maximum of 10 years of repayment. During repayment, the borrower will pay the interest. Repayment may generally be deferred if the student is continuing his 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 Financial Aids Office, beginning July 1, 1973 for the 1973-74 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.

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, Ext. 1943.

STUDENT EMPLOYMENT OFFICE

The Student Employment Office services UCSD students, alumni, and students' spouses for employment opportunities. Many categories of jobs are listed both on campus and in the neighboring communities, although 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 non-academic 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. Graduate 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 also made to assist students with handicaps or chronic conditions. It should be noted, however, that pre-existing illnesses are not covered by the Student Health insurance plan.

A comprehensive and economical insurance policy is available for purchase by students for the summer quarter. Registered students may purchase a similar policy for their dependents, renewable each quarter.

Medical history forms and physical examination forms are sent to students. Further information on insurance may be obtained at the Student Health Center after arrival on campus. Students should also obtain copies of the *Student Health Almanac*, which explains the operation of the Student Health Service and the insurance program in detail.

VETERANS AFFAIRS

(See *Office of Special Services*, above.)

MISCELLANEOUS SERVICES AND FACILITIES

Art Gallery

Humanities-Library Building, Revelle Campus, Extension 1998

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 p.m. to 10:00 p.m.

Automobile Parking Services

202 Matthews Campus, Extension 2626

No state funds are provided for parking on the UCSD campus, so the cost of construction, operation and maintenance of University parking lots must be assumed by the users. Parking permits are required on campus and may be purchased at the Central Cashier upon proof of vehicle ownership. Rates vary from \$3 to \$4 per month and must be paid in advance for one year.

Bookstore

201 Matthews Campus, Extension 1360

All required books for UCSD courses are available at the campus bookstore. In addition, the bookstore carries a full line of sundries and gifts including personal items, snacks, magazines and newspapers, clothing, posters, school supplies and books. Hours are 8:00 a.m. to 4:30 p.m., Monday through Friday, with special hours during rush periods at the first two weeks of every quarter.

Bus Service

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

A bus service is provided between Urey Hall and Cardiff via the Pacific Coast highway. Six round trips are made each day, with a charge to graduate students of 20 cents and to undergraduates of 10 cents per trip.

Campus Activities Office

Lobby, Urey Hall, Revelle Campus, Extension 1391

Composed of student representatives from each college, graduate students, and faculty and staff members, the Campus Activities Office, through its Program Board, tries to provide as wide a variety of entertainment at as low a cost to students as possible. Films, concerts, shows, and lectures are presented regularly during the academic year.

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, 8:30 am — 3:30 pm), the Bookstore, 201 Matthews Campus (Hours: Monday through Friday, 8:00 am — 4:30 pm), and the Notions Store, Blake Hall, Revelle Campus (Hours: Monday through Friday, 8:30 am — 5:00 pm).

Day-Care Center

Student Affairs Office, 214 Matthews Campus, Extension 2713

Campus facilities are available for full and half-day care for children of UCSD students. The UCSD Day-Care Center has facilities for 20 children with a planned expansion to 100 children in the near future. Mesa Married Student Apartments have facilities for 20 children in the morning and 20 in the afternoon, limited to children of Mesa residents. There is also a nursery school run by the International Center with facilities for 20 morning and 20 afternoon pre-schoolers. Students needing day-care information should contact the Student Affairs Office for off and on-campus referrals.

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, 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 Sciences Building, the Coffee Hut on Revelle Campus, Revelle Cafeteria, Muir Cafeteria and Coffee Shop, and the Matthews Campus Cafeteria offer a wide selection of meals and snacks. Check the *Triton Times* for operating hours.

Truck vending machines which dispense drinks, sandwiches, dairy products, pastries and candies are available on each of the campuses. The Bookstore and the Notions Store (Blake Hall, Revelle Campus) stock a limited selection of foodstuffs.

Housing

The University strongly encourages all freshman and transfer students to live on campus their first year.

Revelle, John Muir and Third 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 with a choice of either 19 or 14 meals per week. The 14-meal-per-week plan is for any 14 meals. The cost for room and board is approximately \$1,300.00 for the 1973-74 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 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, can also assist others

in finding suitable accommodations in the surrounding communities of Clairmont, Del Mar, La Jolla, Pacific Beach, and Solana Beach.

Lost and Found

501 Matthews Campus, Extension 1333

A Lost and Found service is provided by the campus police station. An article lost or found anywhere on campus should be reported or brought to Lost and Found.

Post Office

104 Argo Hall, Revelle Campus, Extension 1074

The Post Office is a branch of the U.S. Post Office, where stamps, money orders, and the like may be purchased, and parcels and letters mailed. It is open during the following hours:

Academic Year: 11:00 AM-1:00 PM, 2:00 PM-5:00 PM Mon.-Fri.

Summer: 11:00 AM-12:00 PM, 1:00 PM-3:30 PM Mon.-Fri.

Recreational Facilities

Department of Physical Education, Gymnasium, Extension 2275

All students are entitled to use at no charge the gymnasium, pool, tennis courts, playing fields, and recreational equipment (except for tennis balls, golf balls, squash racquets and handball gloves). The spouses and children of UCSD students are entitled to the privilege of using facilities at a small charge. Also available at a nominal fee is golf practice at the University driving range (next to the Mesa Apartments). For \$6.00 a year students may join the Nautical Association and thereby enjoy sailing privileges at the Santa Clara facility, which is open Friday, Saturday, and Sunday, from 10:00 AM to 4:00 PM.

An extensive intramural program is also available to students who wish to participate.

Student Information Center: EDNA

Urey Hall, Telephone: 453-EDNA (Open 9:00 AM-8:00 PM, Mon.-Fri., 11:00 AM-5:00 PM, Sat./Sun.)

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 functions 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. They will also sell tickets to both on-campus and off-campus activities.
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. They give out recipes and menu ideas upon request and information from the encyclopedia, almanac, and dictionary.

University Police

501 Matthews Campus, Extension 1333

The University Police are on duty twenty-four hours a day. As well as patrolling the campus, they provide such needed services as traffic control. Campus police will give first-aid when needed and provide transportation for the injured.





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.

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 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 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 indicates.

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, 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

Center for Energy Production Techniques and Energy Policy

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, psychoacoustics, information integration, social psychology, and cognitive functions. The Center participates in interdisciplinary work with the departments in the Institute for Information Systems. The work of the Center concentrates on research projects, postdoctoral studies, workshops, conferences, and discussions.

Center for Marine Affairs

The Center for Marine Affairs is a small, interdisciplinary unit at Scripps Institution of Oceanography dealing with problems at the interface of science and society. Studies for the Center are conducted by lawyers, political scientists, economists, and related specialists, working in collaboration with natural scientists. Prime concerns of the Center are the national and international implications of marine and related scientific activities for the nation's legal, economic, political, and social systems. The Center's first two projects were concerned with problems arising from the alleged restriction of oceanographic research near or in foreign waters, and the problem of communication between scientific researchers and policy makers in the field of ocean pollution. A current study involves the area of environmental modification.

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 Southwest, 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.

Project for Music Experiment

The Project for Music Experiment (PME) was initiated through a grant from the Rockefeller Foundation and is evolving as a continuous process based on four components:

Studio for Technical Research — Those engaged in this unit 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 Project, and providing public access to these materials through publication.

PME 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.

CAMPUS-WIDE RESEARCH FACILITIES

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, and the Spanish Civil War.

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 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 an older 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 in connection with instruction, research and administrative activities. Most students and research staff members do their 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 School of Medicine

The developing 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 sixth Freshman Class will be enrolled in September, 1973. The Basic Science Building, Administrative Wing, and Biomedical Library of the Medical School Complex on the La Jolla campus are completed, and the Veteran's Administration Hospital opened in February, 1972. The Clinical Sciences Building and Campus Clinical Center are being planned. As the building program and faculty acquisition approach "steady state", undergraduate student enrollment will increase to 96, 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 Aerospace and Mechanical Engineering Sciences, Biology, Chemistry, Economics, Mathematics, Physics, Psychology, Scripps Institution of Oceanography, and Sociology. They occupy School of Medicine space, teach in the medical curriculum, create special courses, and contribute to interdisciplinary teaching emphasizing areas of their disciplines most useful to medical students.

The main purpose of the curriculum is to develop critical, objective, and humane physicians equipped to meet change and to continue self-education. Students acquire understanding of basic medical sciences and clinical disciplines, and are encouraged to choose their own specialized areas of interest for eventual development into careers in the broadly diversified medical community. Individual student capabilities are enhanced through access to the best facilities and personalized counseling. Thus, the curriculum provides flexibility; form and content are adapted to individual needs of each student.

The curriculum is divided into two major components: the Core Curriculum and the Elective Programs. The two are pursued concurrently throughout the four years of schooling, the Core Curriculum predominating in the early years, and the Elective Program in the latter. The Core Curriculum includes those aspects of medical education deemed essential to every medical student regardless of background or ultimate career direction. In the first two years, this part of the work includes courses in Biomathematics, Cell Biology and Biochemistry, Organ Physiology and Pharmacology, Neurosciences, Pathology, Microbiology, and 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 is also studied.

Elective programs provide choices suited to each student's background, ability, and career objectives. Each student is expected to choose a "Concentration Area" suited to his 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 ensure 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 catalogue and information on the foregoing programs is 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.

The Scripps Institution of Oceanography

The Scripps Institution was originally an independent biological research laboratory. It became an integral part of the University of California in 1912 and at that time was given the Scripps name in recognition of the interest and financial support of Miss Ellen Browning Scripps and Mr. E. W. Scripps. The scientific scope of its research has grown to embrace physical, chemical, geological and geophysical studies of the oceans as well as biological studies. Continuing investigations are conducted of the topography and composition of the ocean bottom, of waves and currents, and of the flow and interchange of matter 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 seven research ships vary from local, limited-objective trips to round-the-world expeditions. For example, *R/V Melville* and *R/V Thomas Washington* each will be at sea nine months during 1973-74, the former in the Pacific, the latter in the Pacific and Indian Oceans. *R/V Alpha Helix* returns in November, 1973, from 22 months of studies in the Pacific, the Bering and Timor Seas, and off the Great Barrier Reef.

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 65 professors are complemented by an academic staff of more than a hundred research scientists, many of whom have a regularly scheduled part in the instructional program.

Investigations supported by contracts and grants funded from extra-University sources, primarily Federal, cover a wide latitude of marine research. The general research effort is conducted by three divisions, designated Marine Biology Research Division; Geological Research Division; and Ocean Research Division, including the Geochemical Ocean Sections Study (GEOSECS) and North Pacific Experiment (NORPAX) programs. The diversity of their work is extended by three special purpose laboratories: the Marine Physical Laboratory, the Physiological Research Laboratory, and the Visibility Laboratory, and by other specialized groups such as the 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 and proximity to Scripps, are the La Jolla Laboratory of the University of California's Institute of Geophysics and Planetary Physics and 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 45 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 175) 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
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
Atwater, Tanya M., Ph.D.	Assistant 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

Curry, 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
Eckart, Carl, Ph.D.	Professor Emeritus	SIO/Physics
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	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
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.	Professor	SIO
McGowan, John A., Ph.D.	Professor	SIO
Menard, H. William, Ph.D.	Professor	SIO
Mudie, John D., Ph.D.	Assistant 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
Winterer, Edward L., Ph.D.	Professor	SIO
ZoBell, Claude E., Ph.D.	Professor Emeritus	SIO

SYMBOLS AND NOTATIONS USED IN COURSE LISTINGS

Course Numbers

Lower Division

Courses numbered 1 through 99 are designed for freshmen and sophomores but may be taken by more advanced students.

Upper Division

Courses numbered 100 through 199 are designed for junior and senior students but are open to other students who have sufficient background and the consent of the instructor in charge. Prerequisites for courses should be carefully noted.

Graduate

Courses numbered 200 through 299 are designed for graduate students but are open to upper-division students with the instructor's signature.

Courses numbered 500 through 599 are for graduate students only.

Course Units

Undergraduate courses, unless designated differently, are 4-unit courses.

The number of units for graduate courses is specified directly after each course title by the number in parentheses.

Course Quarter

The F, W, or S notations following a course description stand for the Fall, Winter, and Spring academic quarters and indicate the quarter or quarters in which the course is normally offered. In cases where F, W, or S notations are not included, consult the appropriate department for this information.

Examples

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)

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. Prerequisite: general biology or general psychology. (W)

221. Cytogenetics (3) A review of the principles of transmission genetics, cytogenetics and chromosome structure. Discussion of current problems in these areas. Prerequisites: Biology 101A, 111B or equivalent. (S)

500. Apprentice Teaching (1-3) Apprentice teaching in undergraduate courses given or participated in by the Visual Arts Department.

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 123 or equivalent. (S)

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)

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 Professor:

Joyce E. Justus, Ph.D.

°On leave 1973-74

°°On leave Fall 1973 and Winter 1974

* * *

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 a three-quarter introductory sequence labeled Anthropology 22-23-24. This sequence is 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 ethnographic areas. The sequence meets the Muir College option in Social Sciences. In addition, courses in the sequence, whether taken as part of 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.

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 4 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 3 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

(This requirement does not apply to students who declared a major in anthropology prior to Fall Quarter, 1969. However, such students are urged to take this sequence if at all possible. 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 the 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.)

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 below: 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.
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 an 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 he has completed his Qualifying Exam (see below), the above-mentioned Departmental requirements, and his 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 time as he receives approval for his project under Plan B, as described below.

Plan A consists of one quarter of linguistics[°], one quarter of statistics^{°°}, and successful completion of examination at a prescribed level in a scholarly language. Every student must have the prior approval of his Departmental Committee for the language on which he 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 Departmental Committee in writing of an intellectual skill which he needs for his 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 he has or has not acquired the skill. This proposal, after approval by his Departmental Committee, will be presented to the faculty as a whole. If the faculty approves his 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.

^{°°}Consult the Graduate Adviser for approved courses to meet this requirement in any given year.

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 his 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 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 he will form his Departmental Committee somewhat later in the year. (See below: The Student's Committees.) Under the supervision of his 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 his Departmental Committee, the student will stand for an *Oral Qualifying Examination* before his Doctoral Committee, accompanied by other members of faculty attending optionally. (See below: The Student's Committees.) This examination will question the student over general areas of anthropology related to the specific issues raised by his 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 his research project the student will write a dissertation. He will then take his final *Dissertation Orals*. The examination may not be conducted earlier than three quarters from the date of his 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 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 1973-74.)

12. Chinese Society and Culture (4)

A description and interpretation of the major institutions and culture patterns of traditional China. (Not to be offered 1973-74.)

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 1973-74.)

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.*

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 will be on the analysis of Chinese folk religion. *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 or 24 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.*

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 1973-74.)*

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; a basic course in statistics (Math 80a, b); computer science (APIS 10).*

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.*

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.*

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. (Not to be offered 1973-74.)

118. Cognitive Anthropology (4)

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: Anthropology 20, 22, 23, or 24 or introductory anthropology at another university. (Not to be offered 1973-74.)*

119. Social and Cultural Change (4)

Theories of social evolution, diffusion, acculturation, pattern dynamics, innovation, revitalization and revolution, and modernization are examined, and illustrated with cross-cultural materials. *Prerequisites: Anthropology 22 or 23 and upper-division standing.*

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 1973-74.)*

125. Language and Culture (4)

This course explores language acquisition, idiolects, social dialects, levels of linguistic 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 1973-74.)

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 1973-74.)

131. Social Theory (4)

The course will deal with the social theories of some major figures in social science: Marx, Weber, Parets, Simmel, Durkheim, 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.*

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. *Prerequisites: Anthropology 135.*

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 will also be considered. *Prerequisite: Anthropology 20, 22, 23 or 24 or introductory anthropology at another university.*

135. Indian Society (4)

A study of the social structure of India, with particular reference to caste and political organization. *Prerequisite: upper-division standing. (Not to be offered 1973-74.)*

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.*

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: Anthropology 20, 22, 23, or 24 or introductory anthropology at another university; upper-division standing.*

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.*

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 1973-74.)

157. Culture, Deviance, and Psychopathology (4)

A consideration of variations in definitions of, responses towards, and variation in frequency and form of deviant behavior and psychopathology in various cultural contexts. *Prerequisite: Anthropology 7 or 20 or 22.* (Not to be offered 1973-74.)

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 1973-74.)

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.

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.

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 a part of the three-quarter sequence in methodology 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.

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 (e.g. Mathematics 80A-80B, APIS 10); or consent of instructor.*

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.

216. Theory and Methods in Urban Anthropology (3)

The course will survey relevant theory, methods and research opportunities and needs in the comparative, systemic, or problem related research in both Western and non-Western urban settlements. (Not to be offered 1973-74.)

218. Cognitive Anthropology (3)

This course will consider the relation between cultural behavior and cognitive processes. Selected topics from the fields of ethnoscience, semantic and grammatical analysis, decision making, and belief systems will be discussed. *Prerequisite: graduate standing in anthropology or psychology.* (Not to be offered 1973-74.)

220. Buddhism and Society (3)

Buddhism as an ideology and an institution in relationship to the society, culture, and personality in which it is found. *Prerequisite: graduate student in social science or humanities.*

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 upon contemporary studies of the social use of language. *Prerequisite: an introductory course in linguistics.*

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.

235. Caste and Stratification (3)

An examination of theories which purport to explain the Indian caste system; their relation to theories of stratification in other societies; caste, race and class.

241. Religion and Society (3)

A structural-functional analysis of religious belief and ritual, with special emphasis on modes of explanation. Readings will stress the anthropological classics. *Prerequisites: graduate standing, major in social sciences or humanities.*

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 1973-74.)

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 science.*

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.

258. Psychoanalytic Anthropology (3)

A critical survey of the psychoanalytic approach to selected topics in anthropology, such as totemism, religion, social character, and so on. Readings will consist of the anthropological works of Freud and of Freudian anthropologists. *Prerequisite: Graduate standing in anthropology.* (Not to be offered 1973-74.)

297. Research Practicum (1-4)

Supervised advanced research studies with individual topics to be selected according to the student's special interests.

298. Independent Study (1-12)

(Satisfactory/Unsatisfactory grades permitted.)

299. Thesis Research (1-12)

Prerequisite: Ph.D. candidate.

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 is required for the Ph.D. degree. The amount of teaching required is equivalent to the duties expected of a 0.25 teaching assistant for three academic quarters. Enrollment for 2 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.

H.W. Sorenson, Ph.D.

C.W. Van Atta, Ph.D.

* * *

F.H. Champagne, Ph.D., *Associate Research Engineer and Lecturer*

H.Y. Chen, Ph.D., *Assistant Research Bioengineer*

J.M. Covell, M.D., *Associate Professor of Medicine and Bioengineering*

D.L. Franklin, *Associate Professor of Medicine and Bioengineering in Residence*

C.A. Friehe, Ph.D., *Assistant Research Engineer and Lecturer*

K. Fronek, M.D., Ph.D., *Associate Research Bioengineer and Lecturer*

J. Kent, Ph.D., *Assistant Research Engineer*

S.S. Lin, Ph.D., *Assistant Research Engineer*

S. Nellis, Ph.D., *Assistant Research Engineer*

J.G. Pinto, Ph.D., *Assistant Research Engineer*

K.G.P. Sulzmann, Ph.D., *Research Engineer and Lecturer*

C.P. Wang, Ph.D., *Assistant Research Engineer and Lecturer*

J.B. West, M.D., Ph.D., *Professor of Medicine and Bioengineering*

M.R.-T. Yen, Ph.D., *Assistant Research Bioengineer*

°On leave Winter and Spring 1973-74

°°On leave Spring 1974

†On leave 1973-74

††On leave Fall 1973

* * *

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 aerospace, civil and mechanical engineering, systems engineering, and bioengineering. It is expected that a majority of AMES graduates will pursue further specialized studies in graduate school.

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.

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 AMES undergraduates are required to develop a basic competence in the use of a digital computer to solve scientific and technical problems in their upper-division courses. They may learn programming in any of the following ways: (a) a formal course, such as APIS 10, (b) a computer-center, non-credit programming course, (c) computational experience in connection with a laboratory project, or (d) 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 in consultation with the AMES faculty adviser. Students with superior records are encouraged to take courses beyond the minimum number, with special emphasis on the offerings of Applied Physics and Information Science, Biology, Chemistry, Mathematics and Physics.

A more flexible program can be arranged, but deviations from this rule require approval by the AMES faculty adviser. 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.

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

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 150A). In addition, a three-course sequence is required in applied mathematics (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

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

** 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 mechanics, 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, is also 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 APIS 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; where necessary, certain substitutions may be made.

The Premedical program is intended primarily to meet the minimum requirements for a student planning to enter medical school. The curriculum is also suitable for a student planning to enter graduate school in bioengineering, physiology, or neurosciences.

BIOENGINEERING: ENGINEERING MAJOR

FALL	WINTER	SPRING
Junior Year		
AMES 100	AMES 173	AMES 172
AMES 105A	AMES 105B	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	

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

**APIS 161A, 161B, and 161C should be taken in 1973-74.

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	

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

**Natural Science 2F, 2FL

***APIS 10 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, APIS 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 is also required. This requirement can be satisfied by the sequence AMES 100, 121A-121B or by APIS 161A-161B-161C. Other sequences may be substituted with the consent of the student's 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 (or APIS 161A)	AMES 121A (or APIS 161B)	AMES 121B (or APIS 161C)
AMES 105A	AMES 105B	AMES 105C
AMES 163A*	AMES 163B*	AMES 163C*
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

*The courses AMES 162A-162B-162C and AMES 163A-163B-163C are equivalent to APIS 162A-162B-162C and APIS 163A-163B-163C, respectively. Thus, the stated requirements for AMES 162A-162B-162C and AMES 163A-163B-163C are met by 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 is 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 the 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 Division: 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.

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 two extension courses (3 quarter-units each) 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 6 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 departmental examination, a graduate student in AMES must pass the formal Ph.D. qualifying examination administered by the student's doctoral committee (see *Graduate Division: 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 Division: Candidate in Philosophy Degree.*)

COURSES

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 (4)

Potential-flow theory with application to airfoils and wings; hydrostatics, atmospheric structure, and other aspects of geophysical fluid mechanics; equations for compressible flows and for viscous flows. Four hours lecture. *Prerequisites: AMES 105B, AMES 110 or co-registration.* Mr. Penner (F)

101B. Fluid Mechanics (4)

Compressible-flow theory, including generalized one-dimensional flow and wave phenomena; theory of inviscid reacting flows. Four hours lecture. *Prerequisite: AMES 101A.* Mr. Libby (W)

101C. Fluid Mechanics (4)

Continuation of 101B. Viscous-flow theory, including boundary-layer theory; transport phenomena; applications in biophysics and in combustion and propulsion theory. Four hours lecture. *Prerequisite: AMES 101B.* Mr. Libby (S)

105A-105B-105C. Introduction to Mathematical Physics (4-4-4)

Fourier series, elementary partial differential equations, calculus

of variations, 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. *Prerequisites: Mathematics 2D; Natural Science 1E or 2E.* 105A — Mr. Miles (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.* Mr. Miller (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.* Mr. Williams (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.* Mr. Nachbar (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 multi-degree-of-freedom systems, eigenvalue and eigenvector determination, forced oscillations, oscillations in continuous elastic systems. Four hours lecture. *Prerequisites: AMES 121A, APIS 105A or Mathematics 110A; Mathematics 2E recommended.* Mr. Nachbar (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. Mr. Hegemier (F)

130B. Solid Mechanics II (4)

Two-dimensional stress and strain. Transformation laws, field equations and constitutive relations. Exact solutions for simple beam problems. Polar coordinate problems. Extremum principles. St. Venant torsion theory. Three-dimensional stress and strain. Four hours lecture. *Prerequisite: AMES 130A.* Mr. Hegemier (4)

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.* Mr. Reissner (S)

132. Structural Analysis (4)

Principles of matrix analysis of elastic truss and frame structures, development of force and displacement methods, introductory treatment of finite element analysis of structures and use of computer programs. Four hours lecture. *Prerequisites: Mathematics 2E, AMES 130A, 130B.* (Not to be offered 1973-74.)

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.* Mr. Schneider (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.* Mr. Schneider (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.* Mr. Pawula (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: APIS 105A-105B-105C and APIS 10, or consent of instructor.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

142C. Computer Methods in Engineering 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.* (Not to be offered 1973-74.)

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 applications. *Prerequisites: Mathematics 2E, Mathematics 110.* 146A — Mr. Sorenson (F); 146B-Cadner (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; five courses in the material (physical and biological).* 149A—Mr. Schneider (S); 149B-C, 149B-C not offered 1973-74.

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 101B, AMES 120B, AMES 130B.* Mr. Nachbar (W)

150B. Topics in Applied Mechanics II (4)

Continuation of AMES 150A taking up additional examples. Four hours lecture. *Prerequisite: AMES 150A.* Mr. Libby (S)

156. Rigid Body Dynamics (4)

Three dimensional rigid body dynamics. Representation of rotations; angular velocity and kinematical differential equations, Euler dynamical equations. Special cases of classical and modern problems with application to spacecraft and gyroscopic devices. Four hours lecture. *Prerequisite: Consent of instructor.* Mr. Roberson. (Not to be offered 1973-74.)

160. Quantitative 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.* (Not to be offered 1973-74.)

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, mean-square 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; APIS 105A-105B-105C or Mathematics 110A-110B, 120 taken concurrently.* 163B-C — Mr. Schneider (F,W,S)

170. AMES Laboratory (4)

Introduction to basic laboratory procedures with emphasis on 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.* Mr. Ellis (F)

171. Advanced AMES Laboratory (4)

Principles of instrumentation. Mechanical, electrical, chemical and optical transducers. Analog and digital recording. On-line data processing. *Prerequisite: AMES 170 or consent of instructor.* Mr. Intaglietta (W)

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.* Mr. Fung (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.* Mr. Intaglietta (W)

180A. Principles of Bioengineering (4)

Principles of biomedical instrumentation. Electrical properties of smooth, skeletal, and cardiac muscle cells. Nervous control. In-vivo energy sources. Four hours lecture. *Prerequisites: upper-division standing, medical school student, or consent of instructor.* (Not to be offered 1973-74.)

180B. Principles of Bioengineering (4)

Production and properties of x-rays. Absorption of radiation. Radiation therapy. Diagnostic radiology. Radiological health, exposure limits, protection, survey and monitoring. Four hours lecture. *Prerequisites: upper-division standing, medical school student or consent of instructor.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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. Mr. Bradner (S)

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.* 210A-B — Mr. Ofte (F,W); 210Cler (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.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

220A. Physical Gas Dynamics (3)

Kinetic theory of neutral gases; transport properties; principles and applications of statistical mechanics. *Prerequisites: AMES 210A-210B-210C, Mathematics 110A-110B, 120, Physics 140, or consent of instructor.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

220C. Physical Gas Dynamics (3)

Shock waves and detonation waves; explosions and hypersonic flow; experimental methods in high-temperature gases; shock tubes; atomic and molecular beams; selected topics such as chemical reactions and relaxation processes in turbulent flow interaction of radiation with ionized gases and gas lasers. *Prerequisite: AMES 220B, or consent of instructor.* (Not to be offered 1973-74.)

221A. Opacity Calculations (3)

Basic laws for radiant-energy emission from gases, liquids, and solids; spectral absorption coefficients, line shapes, curves of growth; theoretical and experimental methods for estimating opacities of uniform and non-uniform gases. *Prerequisite: consent of instructor.* (Not to be offered 1973-74.)

221B. Radiative Transfer Theory (3)

Fundamental quantities and the equation of transfer; methods of

solving radiative transfer problems for gray and non-gray gases; nonstationary problems. *Prerequisite: AMES 221A, or consent of instructor.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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, Mathematics 110A-110B-110C, or consent of instructor.* 222A — Mr. Williams (F); 222Bler (W); 222Cfe (S).

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.* Mr. Lin (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.* Mr. Lin (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.* Mr. Lin (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.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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.* (F)

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.* (Not to be offered in 1973-74.)

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.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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.* Mr. Ellis (F)

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. *Prerequisite: AMES 231B, or consent of instructor.* Mr. Reissner (F,W)

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.* (Not to be offered 1973-74.)

237. Vibrations of Structures (3)

Free and forced vibration of structural elements; frequency analysis; aeroelasticity and flutter analysis of wings, panels, shells. *Prerequisites: AMES 210A and 233C, or consent of instructor.* (Not to be offered 1973-74.)

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 nonlinear elastic, anelastic and anisotropic wave propagation. *Prerequisites: AMES 231A-231B-231C, or consent of instructor.* Mr. Hegemier (S)

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.* (Not to be offered 1973-74.)

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. *Prerequisites: AMES 162, 163, or consent of instructor.* (Not to be offered 1973-74.)

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 120A or equivalent and consent of instructor.* Mr. Schneider. (Not to be offered 1973-74.)

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 141C, AMES 250A, or equivalent and consent of instructor.* Mr. Schneider. (Not to be offered 1973-74.)

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 141C or equivalent and consent of instructor.* Mr. Schneider. (Not to be offered 1973-74.)

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 140C, Mathematics 2E.* (Not to be offered 1973-74.)

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.* Mr. Roberson. (Not to be offered 1973-74.)

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.* Mr. Roberson. (Not to be offered 1973-74.)

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.* Mr. Roberson. (Not to be offered 1973-74.)

264A-264B. Filtering and Random Processes in Control (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.* Mr. Sorenson (W,S)

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.* Mr. Fronck (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.* Mr. Fronck (W)

271C. Respiration and Cardio-Pulmonary Reflexes (3)

General concepts and principles of morphology of lung and component structures, pulmonary gas exchange, cardio-pulmonary reflexes, and integrative action of nervous system on the pulmonary and respiratory system. *Prerequisite: consent of instructor.* Mr. West (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, neutrophils, 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.* Mr. Zweifach (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.* (Not to be offered 1973-74.)

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.* Mr. Intaglietta (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.* Mr. Zweifach (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, microcirculation, 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, Mathematics 110A-110B, 120.* Mr. Fung (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, Mathematics 110A-110B, 120.* (Not to be offered 1973-74.)

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.* Mr. Zweifach, Mr. Fronck (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. Mr. York (W)

294A. Methods in Applied Mechanics (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 process; narrow-band processes; linear systems; random walks, the Fokker-Planck-Kolmogorov equations and Brownian motion. *Prerequisites: Mathematics 110A-110B, 120, or consent of instructor.* Mr. Williams (F)

294B. Methods in Applied Mechanics (3)

Motion of discrete and continuous conservative systems; boundary-value problems of dynamics, eigenfunctions and eigenvalues; applications of integral transform methods, Green's functions, and calculus of variations. Stability of continuous systems. *Prerequisites: Mathematics 110A-110B, 120, or consent of instructor.* Mr. Miles (W)

294C. Methods in Applied Mechanics (3)

Continuation of 294B. Diffusion processes and transport phenomena (elliptic and parabolic equations, integral equations). Application of asymptotic expansions and singular perturbation techniques. *Prerequisite: AMES 294B, or consent of instructor.* Mr. Miles (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 Alfven, 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.

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.

Assistant Professors:

Walter J. Savitch, Ph.D.
Clark A. Crane, Ph.D. (Acting)

* * *

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. Douppnik, Ph.D.
 Ray Fitzgerald, M.S.
 Timothy H. Hankins, Ph.D.
 Adolf W. Lohman, Ph.D.
 D. Asoka Mendis, Ph.D.
 Barnaby J. Rickett, Ph.D.
 R. Viswanathan, Ph.D.

*On leave Winter, Spring 1973-74

**On leave 1973-74

* * *

Computer Science for Non-Majors

An early introduction to the structure, programming, and general use of the modern digital computer is provided in APIS 10, an elective designed primarily for freshmen in all fields. Those who wish to pursue the subject further may take APIS 11, Non-Numerical Systems, in the winter and APIS 12, Numerical Analysis Applications, in the spring.

Modern Physics for Non-Majors and Others

APIS 20A-20B-20C 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 Major Programs for Undergraduates

The major is intended to provide a basic education in physics and mathematics, combined with the opportunity to study in depth one or more of

those branches of applied physics and information science in which the department is particularly strong. The program is flexible so that students may concentrate on applied physics, on information science, or on a combination of both. The applied physics major corresponds roughly to what is called engineering physics in other universities; it prepares the student to apply the principles of classical and modern physics in industrial research and development or to pursue graduate study in those fields. The information science majors are similar to programs in many modern electrical engineering departments. They provide an entry to modern electronics, communications, optics, and acoustics.

The major necessitates taking basic courses in physics and mathematics in the lower division. Applied Physics majors in Muir College are required to take the Science 4A-4B-4C sequence, Science 4D or Natural Science 2C, and Natural Science 2D. Information Science majors in Muir College are required to take Science 4A-4B-4C and are advised to take Science 4F. Revelle College students may take Natural Science 2A-2B-2C-2D-2E. All APIS majors are required to take Mathematics 2D and Mathematics 2E. The freshman course APIS 10 is recommended for all students. All students intending to do experimental work after graduation, whether in industry or in graduate school, are advised to take the electronics sequence APIS 164 A-B-C. A grade of C or higher is required in all courses included in the major program.

Laboratory Facilities

The department possesses various laboratories and shops whose facilities may be used by qualified undergraduate and graduate students. Electronics, microwave, and optical equipment are available, including apparatus for making holograms. A materials laboratory contains vacuum and cryogenic equipment for low-temperature studies, a high-vacuum furnace, thin-film preparation equipment, and a clean box with controlled atmosphere. Analytical facilities include a high-power optical microscope, mechanical and electrical polishing and etching equipment, and an x-ray diffraction unit. A departmental computer facility includes a micro-programmable computer with 32,000 words of core, a disk and disk-operating system, magnetic tapes, analog-digital converters, a printer, a plotter, and two interactive graphics terminals. A digital-logic laboratory is available for designing interfaces and digital systems.

The Applied Physics Major

A student majoring in applied physics should find that the required courses listed below provide a sound education in physics, which will prove invaluable no matter what his future aims may be. The restricted electives listed involve intensive study of various specialized topics. A total of 18 courses must be passed in order to satisfy the requirements for the major; of these, the 14 in the table are required, and the remaining four must be chosen from the list of restricted electives. One complete sequence must be included from the restricted electives, together with at least one other course (e.g., APIS 164A-164B-164C and Physics 152). As there is no requirement for a student to take a minor subject in Muir College, Muir students may take an enriched program of courses in applied physics by choosing additional electives from the list of restricted electives. By making a careful choice of such courses, a Muir College 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 restricted electives be discussed with the student's adviser.

FALL	WINTER	SPRING
Junior Year		
AMES/APIS 105A	AMES/APIS 105B	AMES/APIS 105C
AMES 130A	AMES 121A	Elective
AMES/APIS 110	APIS 101A	APIS 101B
Elective	Elective	Elective
Senior Year		
PHYS 130A	PHYS 130B	AMES 111
AMES 101A	AMES 101B	APIS 130
Elective	Elective	Elective
Elective	Elective	Elective
Restricted Electives		
APIS 114A	APIS 114B	APIS 114C
APIS 119A	APIS 119B	APIS 119C
APIS 107	APIS 108	APIS 109
	APIS 120	
APIS 162A	APIS 162B	APIS 162C
APIS 163A	APIS 163B	APIS 163C
APIS 164A	APIS 164B	APIS 164C
	AMES 130B	AMES 130C
AMES 180A	AMES 180B	AMES 180C
AMES 120B		PHYS 152
		AMES 121B
		AMES 101C

The Information Science Major

The Department of Applied Physics and Information Science, recognizing the varied interests of students majoring in information science, invites each student to design his own program in accordance with his own vocational plans. As early as possible, and preferably before the beginning of the junior year, each student must discuss his curriculum with the information-science faculty adviser, who has great latitude in approving major programs in information science. In general, any program with an information-science theme and an adequate educational and intellectual level will be approved.

The basic courses in information science are

APIS 105A-105B-105C Introduction to Mathematical Physics

APIS 161B-161C Introduction to Computer Science

APIS 163A-163B Linear Systems and Circuits

APIS 162A-162B Statistical Communication Theory

The first three are ordinarily taken in the junior year, the fourth in the senior year.

A total of 18 upper-division courses in APIS and related fields must be passed in order to satisfy the requirement for the major.

Systems Theory

In cooperation with the Department of Applied Mechanics and Engineering Sciences, the Department offers a program in systems theory, which will provide a good foundation in the modelling, analyzing, designing, and controlling of systems of all kinds. For this program students should take APIS or AMES 163A-163B-163C, APIS or AMES 162A-162B-162C, and AMES 141A-141B-141C. In addition, as technical electives the courses AMES 142A-142B-142C and AMES 146A-146B-146C are recommended.

Electronics and Communications

For electronics an introduction is provided through APIS 163A-163B-163C and APIS 164A-164B-164C, and APIS 150A should be considered as a source of additional laboratory experience. Students interested in communications should take the entire sequences, APIS 162A-162B-162C and APIS 168A-168B-168C.

Acoustic Signal Processing

The study of acoustics at UCSD blends physics and information science, reflecting a strong local interest in using sound waves for oceanographic investigations. The sequence, APIS 163A-163B-163C, 162A-162B-162C, and 119A-119B-119C and AMES 101A-101B, are recommended for this program.

Optical Information Processing

Optics at UCSD is largely concerned with transmitting, storing, and processing information by optical means. Students who wish to study in this field should take APIS 114A-114B-114C (optics) in the senior year. APIS 101A-101B (electromagnetism) is an important prerequisite for optics and should be taken in the junior year. Students whose interests are primarily in experimental optics should take APIS 164A-164B-164C; those interested mainly in the theory should take APIS 162A-162B-162C.

Computer Science

The basic information science courses may be supplemented by APIS 161A, APIS 165, APIS 167, and APIS 150A-150B. Credit for APIS 150C may be obtained by undertaking a special project in one of the laboratories in this or other departments where computers play an important role. Courses that will attract those interested in computer science are also offered in other departments such as AMES, Biology, Economics, Mathematics, Psychology, and Visual Arts. Several of these courses may, with approval, be included in the Information Science major.

The Graduate Program

There are three 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. Information Science

This division is concerned with the study of information-bearing symbols and their encoding, communication, and transformations; automata theory and the theory of computation; and acoustical, electronic, and optical signal processing.

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. Applications are made to such fields as communications, radar, sonar, oceanography, holography, image processing,

and visibility in air and water. Information processing is carried out by electronic, acoustic, and optical filtering, photographically, and by digital computers. Both theoretical and practical aspects of information processing are studied.

3. 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. In special circumstances alternative undergraduate preparation will be accepted, such as that of a biology major who is interested in the application of information science to biological problems. 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 Division* 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

212A-212B-212C, APIS 260A-260B-260C, and APIS 262A-262B-262C.

- b. Applied Physics: AMES 294A-294B-294C, Physics 203A, APIS 208, Physics 203B, Physics 212A-212B, and APIS 206.

- c. Computer Science: APIS 264A-264B-264C, 265A-265B-265C, and Mathematics 212A-212B-212C, 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 committee of three faculty members. 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 departmental 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 \$300 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*.)

10. Introduction to Computer Science: The Digital Computer (4)

Introduction to digital computers for humanities and science freshmen. Lectures on computer organization and operation, algorithms, flow charts, ALGOL programming. Recitations review special problems and assigned ALGOL programs. (Upper-division students must have consent of instructor.) (F,W,S)

11. 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. *Prerequisite: APIS 10 or consent of instructor. (Upper-division students must have consent of instructor.)* (W)

12. Digital Computers: Numerical Analysis Applications (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. *Prerequisite: APIS 10 or knowledge of ALGOL. (Upper-division students must have consent of instructor.)* (S)

20A. The Physics of Motion from Aristotle to Einstein (4)

Studies leading to the laws of motion as they emerged historically starting 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. (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. Interchangeable with APIS 20BS. *Prerequisites: APIS 20A or consent of instructor.* (W)

20BS. 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. Interchangeable with APIS 20B. *Prerequisites: APIS 20A or consent of instructor.* (W)

20C. The Nature of the Universe (4)

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. *Prerequisites: APIS 20B or APIS 20BS or consent of instructor.*

21. Space-Time Physics (4)

An introduction to the scientific viewpoint through study of Newton's laws of motion, gravity, orbits, inertial reference frames, the principle of relativity, conservation of energy and momentum, Galilean and Lorentz transformation, with applications to astronomy and space travel. *Prerequisite: Mathematics 1A or 2A.*

UPPER DIVISION

101A. Electromagnetism (static fields) (4)

Scalar and vector fields. Electrostatics, potential theory. Polarization, dielectric media. Capacitors. Steady currents, Ohm's Law, circuits. Magnetic fields: Biot-Savart law, vector and scalar potentials. Magnetic materials, hysteresis. Forces on charges and currents. Energy of electromagnetic fields. *Prerequisites: Science 4E (or Natural Science 2E) and Mathematics 2E.* (W)

101B. Electromagnetism (time dependent fields) (4)

Faraday's Law, inductance; applications to motors, generators, transformers. A.C. circuits. Transmission lines. Displacement current. Maxwell's equations. Plane waves, polarization, Poynting vector. Waves in conducting and dielectric media. Reflection and refraction of waves; Snell's law, Fresnel equations. *Prerequisite: APIS 101A.* (S)

105A-105B-105C. Introduction to Mathematical Physics (4)

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. *Prerequisites: Science 4A-4B-4C or equivalent and Mathematics 2D or equivalent.* (F,W,S)

107. Introduction to Plasma Dynamics (4)

Cold plasmas, magnetoionic theory. Two-fluid equations; CMA diagram. Motion of a particle in electromagnetic fields, adiabatic invariants. Vlasov equation, Landau damping. *Prerequisites: APIS 101B and APIS 105A.* (F)

108. Electromagnetic Waves (4)

Waveguides, resonant cavities. Scattering and diffraction of plane waves. Antennae. Wave propagation in non-uniform and dispersive media. Geometrical optics. *Prerequisites: APIS 101B and 105A.* (W)

109. Magnetohydrodynamics (4)

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. *Prerequisites: APIS 101B and 105A.* (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. *Prerequisites: Science 4 sequence and Mathematics 2D or consent of instructor.* (F)

114A. Optics I: Waves (4)

Wave equation. Fresnel diffraction. Fraunhofer diffraction. Coherent image formation with lenses and holograms. *Prerequisite: APIS 105C or consent of instructor.* (F)

114B. Optics II: Image Formation (4)

Linear filter theory of coherent systems. Interference. Partial coherence. Holographic interferometry. Incoherent image formation as a linear filtering process. *Prerequisite: APIS 114A.* (W)

114C. Optics III: Signal Processing (4)

The space-bandwidth product. Information theory in optics. Superresolution. Spatial filtering. Optical analog computers. Hologram generation by computer. *Prerequisite: APIS 114B.* (S)

119A. Acoustics I (4)

Theory of vibrating systems: strings, bars, membranes. *Prerequisites: Science 4 sequence and Mathematics 2D or consent of instructor.* (Concurrent registration in APIS 119AL recommended.) Offered in alternate years only. (F)

119B. Acoustics II (4)

Transmission of sound waves in fluids, radiation, absorption, scattering. *Prerequisite: APIS 119A or consent of instructor.* (Concurrent registration in APIS 119BL recommended.) Offered in alternate years only. (W)

119C. Acoustics III (4)

Applications of acoustics. Architectural acoustics, speech and hearing, underwater sound. *Prerequisite: APIS 119B or consent of instructor.* (Concurrent registration in APIS 119CL recommended.) Offered in alternate years only. (S)

119AL-119BL-119CL. Acoustics Laboratory (4-4-4)

Experiments in acoustics complementing the APIS 119A-119B-119C lecture series. *Prerequisite: concurrent registration in APIS 119A-119B-119C or consent of instructor.* Offered in alternate years only. (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. *Prerequisite: consent of instructor.* (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. *Prerequisite: consent of instructor.* (S)

150A. Digital Electronics Laboratory (2)

Design of digital hardware using integrated circuits. Special purpose hardware, analog/digital conversion, and computer interface design. The course is intended to be taken concurrently with APIS 161A. *Prerequisite: consent of instructor.* (F)

150B. Computer Laboratory (2)

Direct manipulation of a small computer in a laboratory environment. Assembly language programming, design of firmware and software for real-time operation. Should be taken concurrently with APIS 161B. *Prerequisite: consent of instructor.* (W)

150C. Computer Laboratory Project (2 or 4)

Computer-related hardware and/or software design projects will be undertaken by individual students. Students must supply a project proposal and obtain a supervisor prior to enrolling. *Prerequisites: APIS 150A-150B, and approval of instructor.* (S)

161A. Introduction to Computer Science (4)

Boolean Algebra, combinational and sequential networks, digital machine design using MSI and LSI, microprogramming, small computer architecture. *Prerequisite: APIS 10 or consent of instructor.* (Concurrent registration in APIS 150A is recommended.) (F)

161B. Introduction to Computer Science (4)

Turing machines, machine and assembly language, address modification, writing of assemblers, macro assemblers, input/output operations, data structures, sorting and searching. *Prerequisite:*

APIS 10 or consent of instructor. (Concurrent registration in APIS 150B is recommended.) (W)

161C. Introduction to Computer Science (4)

String processing language, use of recursive functions, BN notation, ALGOL, parsing, and the writing of translators. *Prerequisite: APIS 10 or consent of instructor.* (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. *Prerequisite: APIS 163C.* (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. *Prerequisites: Mathematics 2D and 2E; APIS 105A-105B-105C or Mathematics 110A-110B, 120 taken concurrently.* (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. *Prerequisites: Science 4D, APIS 163C or Physics 101B or consent of instructor.* (Concurrent registration in APIS 150A is recommended.) (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. *Prerequisite: APIS 164A or consent of instructor.* (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. *Prerequisite: APIS 164B or consent of instructor.* (S)

165. Artificial Intelligence (4)

Steps toward intelligent machine behavior: game-playing programs, heuristic and algorithmic methods, tree-searching; theorem-proving and problem-solving programs, pattern recognition, characteristic vectors and decision functions, training strategies, hierarchical structure. Appropriate programming languages. *Prerequisite: APIS 10.* (W)

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. *Prerequisite: APIS 161C.*

167. Algorithms, Automata and Artificial Languages (4)

Intuitive notions of algorithms, register machines, Turing machines, recursive functions, Markov algorithms, finite-state machines, minimalization and decomposition, regular expressions, context-free languages and push-down automata. *Prerequisite: APIS 10 or consent of instructor.* (F)

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. *Prerequisite: APIS 162A-162B-163C taken concurrently.* (F,W,S)

181A-181B-181C. (F) Topics In Technology and Modern Social Problems (4-4-4)

The social impact of several technologies is explored. Social-problem solving and the science-society interface are discussed. Emphasis is on power use in modern society; traffic-control problems; social applications of remote probing methods; and automation in education. *Prerequisites: Science 4A-4B-4C and APIS 10 or their equivalent and consent of instructor.* (F,W,S)

195. Teaching (4)

Teaching and tutorial activities associated with courses and seminars. Not more than 4 units of APIS 195 may be used for satisfying graduation requirements. *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. *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. *Prerequisite: consent of instructor.* (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 119A-119B-119C.* (Concurrent registration in 204AL recommended.) Offered in alternate years only. (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. (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. (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: Waves (3)

Wave equation. Fresnel diffraction. Fraunhofer diffraction. Coherent image formation with lenses and holograms. Term paper required. *Prerequisite: APIS 105C or consent of instructor.* (F)

205B. Optics II: Image Formation (3)

Linear filter theory of coherent systems. Interference. Partial coherence. Holographic interferometry. Incoherent image formation as a linear filtering process. *Prerequisite: APIS 205A.* (W)

205C. Optics III: Signal Processing (3)

The space-bandwidth product. Information theory in optics. Superresolution. Spatial filtering. Optical analog computers. Hologram generation by computer. *Prerequisite: APIS 205B.* (S)

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.* (S)

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.* (F)

208. Electromagnetic Waves (3)

Waveguides, resonant cavities. Scattering and diffraction of plane waves. Antennae. Wave propagation in non-uniform and dispersive media. Geometrical optics. Term paper required. *Prerequisites: APIS 101B and 105A.* (W)

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.* (S)

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 instabilities. *Prerequisite: consent of instructor.* (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.*

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.*

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 108.* (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. *Prerequisite: consent of instructor.* (F)

225. Signal Processing in Observational Physics (3)

Spectral analysis and applications of Fourier transforms. Digital filtering. Mean-square filtering and signal detection. Antenna aperture and radar pulse synthesis. Applications to radio astronomy. *Prerequisite: consent of instructor.* (APIS 162 and 224 desirable).

226. Wave Propagation through Random Media (3)

Scattering of waves by a randomly varying medium. Applications

to analysis of ground based measurements of radio wave scintillations to determine source size and structure, solar wind characteristics, ionospheric drift, and to probe the interplanetary and interstellar media. *Prerequisite: consent of instructor.*

227. Instrumentation in Applied Physics (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.*

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. (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. *Prerequisite: consent of instructor.* (W)

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.* (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; resolution of signals; detection and estimation of stochastic signals; applications to radar, communications, and optics. *Prerequisite: APIS 162C.* (F,W,S)

263A-263B-263C. Information Theory (3-3-3)

Principles of optimum communication: analog and digital modulation, mutual information and entropy, channel capacity, error exponents and the coding theorem, algebraic and sequential coding and decoding, use of feedback, multipath and diversity channels, source coding with a fidelity criterion. *Prerequisites: APIS 162C and APIS 163C.* (F,W,S)

264A-264B-264C. Information Systems (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. *Prerequisite: APIS 161C or consent of instructor.* (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.* (F,W,S)

266. Applications of Graph Theory (3)

Applications of the theory of graphs to information theory, game theory, and computers. Also source encoding, graph theoretic error correcting codes, communication networks, two-person zero-sum games, information retrieval and other topics. *Prerequisite: consent of instructor.*

267. Game Theory (3)

Two-person zero-sum games, linear programming, utility theory,

two-person general-sum games, n-person games, and applications to information theory and coding. *Prerequisites: APIS 162 and APIS 266.*

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.) (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. *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. (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. (Satisfactory/Unsatisfactory grades only.) (F,W,S)

294. Graduate Seminar in Applied Solid-State Physics

Research topics in 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. (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

The Undergraduate Program

The departments of Biology and Chemistry both offer undergraduate courses in Biochemistry. The Chemistry Department offers a major in Chemistry with a concentration in Biochemistry described below. The following 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 C MAJOR PROGRAM IN CHEMISTRY FOR PREMEDICAL * AND BIOCHEMISTRY CONCENTRATORS

FALL	WINTER	SPRING
Junior Year		
(Org) Chem 141A	(Org) Chem 141B	(Org) Chem 141C
(Phy) Chem 130	(Phy) Chem 131	-
-	(Biochem) Chem 114	(Biochem) Bio 106
(Org Lab) Chem 143A	(Org Lab)	(Org Lab)
-	Chem 143B	Chem 143C**.
	(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.

** (Mol Biochem Lab) Chemistry 112, (Biochem Lab) Biology 115A or (Biochem Lab) Biology 102 may be taken instead of (Organic Chem Lab) Chemistry 143C.

† (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, including (Research) Chemistry 199.

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 who are 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 an integral part 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 Biology 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.

The participating faculty are:

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*)
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*)
 Jerrold Meinwald, Ph.D. (*Chemistry*)
 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*)
 Nathan Gochman, Ph.D. (*Chemistry*)
 Melvin H. Green, Ph.D. (*Biology*)
 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*)
 David J. 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*)
 Raymond C. Valentine, Ph.D. (*Chemistry*)

* * *

Melvin Cohn, Ph.D., *Adjunct Professor of Biology*

Walter Eckhart, Ph.D., *Associate Adjunct Professor*

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*

* * *

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)

The metabolism of organisms with respect to energetics, biosynthesis and nutrition. *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 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, Biology 106, 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: elementary physical chemistry, organic chemistry and biochemistry.* (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)

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)

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 primarily deal 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)

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)

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: 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)

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 primarily deal with the molecular basis of human disorders. *Prerequisite: Chemistry 211 or equivalent.* (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. (*Dean, School of Medicine*)

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:

Melvin H. Green, Ph.D.

Masaki Hayashi, Ph.D.

Percy J. Russell, Ph.D.

Melvin I. Simon, Ph.D.

Christopher Wills, Ph.D.

Nguyen-Huu Xuong, Ph.D.

Juan Yguerabide, Ph.D.

Assistant Professors:

Stuart Brody, Ph.D.

Willie C. Brown, Ph.D.

Maarten J. Chrispeels, Ph.D.

John Elovson, Ph.D.

Richard A. Firtel

Peter A.G. Fortes, Ph.D.

Hannah Friedman, Ph.D.

Daniel K. Hartline, Ph.D.

Stephen H. Howell, Ph.D.

William F. Loomis, Jr., 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.

Michael Soule, Ph.D.

Nicholas Spitzer, Ph.D.

* * *

Yasuo Hotta, Ph.D., *Associate Research Biologist*
Kiyoteru Tokuyasu, Ph.D., *Associate Research Biologist*

Deborah J. Delmer, Ph.D., *Assistant Research Biologist*

Ruth Grobstein, Ph.D., *Lecturer*

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

The undergraduate programs leading to a Bachelor of Arts in biology are aimed toward understanding the whole of the biological world in terms of the common principles which control living things. They are so designed to provide for the development of professional careers in the fields of biology and medicine. Although all the major programs reflect the striking advances made in biology in recent years and therefore require a substantial preparation in mathematics and the physical sciences, each of the programs is structured to meet the distinctive aims of its host college. Each major in Muir or Revelle College requires a minimum of 12 upper-division courses for the major.

The Revelle major in biology is intended for those who have a very strong interest in cellular and molecular biology. In order to fulfill this objective biology majors are required to take a substantial part of the course work which is required for chemistry majors. In general, the program is tightly knit and intended for those students who wish to train for this area of biology. The program is suitable for pre-medical students and with few exceptions is highly desirable for a variety of careers in biology.

The Muir biology major has a somewhat different structure from that of Revelle. Students selecting the Muir biology major get their basic chemistry preparation including organic chemistry during the lower-division years. In the upper-division years, the core program involves four subjects: biochemistry, genetics, molecular biology and cell biology. Students are required to take one laboratory course in some area of biology. Biochemistry (Bio 115A) is recommended but other courses can also satisfy their requirement (e.g., Biology 119, 115B and 112).

The Third College Health Science Major program is designed primarily for students intending to enter medical or dental schools or careers in the allied health professions. Students will receive most of their basic chemistry, physics and mathematics preparation during the lower-division years. The upper division will involve a nine-quarter sequence of biology courses as well as two quarters of organic chemistry and one quarter of organic chemistry laboratory. The remainder of the program consists of three elective courses to be chosen in related areas, e.g., histology, embryology, sensory physiology, microbiology, etc. In addition, a one-quarter course involving field work is strongly recommended.

REVELLE COLLEGE

Major Program in Biology

(Recommended Schedule)

FALL	WINTER	SPRING
Junior Year		
Genetics 101	Pop. Bio. 173	Biochemistry 106
Organic Chem. 140A	Org. Chem. 140B	Physical Chem. 132
Org. Chem. Lab. 143A (1/2 course)	Phys. Chem. 131	Biochem. Lab. 102
		Phys. Chem. Lab. 105A (1/2 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.

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.) In the senior year, Muir biology majors may choose any combination of upper-division courses appropriate to their educational and career goals.

THIRD COLLEGE

Major Program in Health Sciences

(Recommended Schedule)*

FALL	WINTER	SPRING
Junior Year		
Biology 134	Biology 141	Biology 144
Biology 132	Org Chemistry	Biology 144L
Organic Chemistry	Org Chem Lab	Biology 146
Senior Year		
Biology 138	Cytology-Genetics Laboratory	

*Prerequisites: Chemistry 2A-2B-2C, Mathematics (including calculus) and one quarter of human genetics.

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.

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.

Graduate Program in Biochemistry

Please refer to the entry 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 instructors 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. Man and His Environment (4)

Human evolution, the human body, the human population, the effect of modern society on the human body, human diseases, nutrition. 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 hours lecture. (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. Ten 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: elementary physical chemistry, organic chemistry, and biochemistry.* (S)

114. Cell Biology (4)

(Formerly Biology 111B)

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. *Prerequisites: elementary physical chemistry, organic chemistry, and biochemistry.* (F)

119. Genetics Laboratory (4)

(Formerly Biology 103)

This course will emphasize the principals of Mendelian inheritance and will require the student to learn to apply the principles of cytology and genetics to problems of transmission genetics. *Prerequisites: Natural Science 1C, 2E or equivalent; 101 (may be taken concurrently).* (Not to be offered 1973-74.) (F)

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. *Prerequisite: general biology or general psychology.* (W)

123. Analysis of Development (4)

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

125. Cytogenetics (4)

A review of the principals of chromosome structure and behavior. The topics covered change yearly over a three-year cycle. (a) chromosome structure and function, (b) chromosome pairing and segregation, and (c) chromosome recombination. *Prerequisite: Biology 101 or equivalent.* (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 endothelium, 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. *Prerequisites: Science/Tech 1A, 1B, 1C; Introduction to Human Genetics (21) Chem. 2A, B; Physics 5A, B, C.* (F)

133. Computer Programming in Biology (4)

Limited enrollment for senior students, majoring in biology. Students will be instructed in the use of computer programming the collection and analysis of data from biological systems. Each student will be assigned an independent project. *Prerequisite: knowledge of Fortran or Ditrans programming.* (F)

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)

138. Biophysical Physiology (4)

Review of the application of major biophysical principles to cardiovascular, respiratory and renal physiology. *Prerequisites: Physics 5A,B,C, or equivalent; Organic Chemistry 140A and B or equivalent; Biology 132 or equivalent; Biology 134 or equivalent.* (F)

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.* (S)

143L. Laboratory in Neurobiology (4)

Current electrophysiological techniques used to study nervous systems will be taught through exercises and individual projects. One hour lecture, six hours laboratory. *Students must be interviewed by instructors before registering 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.* (Not to be offered 1973-74.)

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 Health Science or 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)

157. General Microbiology (4)

A discussion of the structure, growth and physiology of microorganisms with emphasis on their diverse activities and on their interaction with their environment. *Prerequisite: junior core sequence in Muir or Revelle.* (S)

165. Immunochemistry (4)

Discussion of antibodies, antigens complement and their interactions. Three hours lecture. *Prerequisite: Biology 110A.* (Not to be offered 1973-74.) (F)

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)

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 hours 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.* (Not to be offered 1973-74.)

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 their 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. *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)

M211. Introductory Biochemistry (5)

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. *Prerequisites: physical and organic chemistry.* (Satisfactory/Unsatisfactory grades permitted.) (F)

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 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.) (W)

216. Chemistry of Enzyme Catalyzed Reactions (3)

A discussion of the chemistry of representative enzyme catalyzed reactions is presented. Enzyme reaction mechanisms and coenzyme chemistry are emphasized. *Prerequisite: organic chemistry.* (Satisfactory/Unsatisfactory grades permitted.) (W)

217. Human Biochemistry (2)

An advanced course in biochemistry which will primarily deal with the molecular basis of human disorders. *Prerequisite: 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. Seminar in Genetics (1)

Seminars presented by graduate students which will explore topics in specialized areas of genetics and provide opportunities for students to gain experience on the organization, critical evaluation and oral presentation of information from the literature. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

221. Cytogenetics (3)

A review of the principles of transmission genetics, cytogenetics and chromosome structure. Discussion of current problems in these areas. *Prerequisites: Biology 101; 114 or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (S)

222. Microbial Genetics (3)

Description of bacterial and viral genetic systems, including the nature of the process involved in gene duplication, recombination and lysogeny. *Prerequisites: Biology 101; 111 or equivalent.* (Satisfactory/Unsatisfactory grades permitted.) (W)

223. Molecular Genetics (3)

Discussion of the molecular mechanisms involved in the transcription, translation and integration of genetic information. *Prerequisites: Biology 101; 111 or equivalent.* (Satisfactory/Unsatisfactory grades only.) (F)

224. Biochemical Genetics (3)

Gene-enzyme relationships; the effects of mutations on enzyme structure, interactions, affinities and localization. Discussion of biochemical basis of conditional mutations, dominant and pleiotropic mutations. *Prerequisites: courses in Genetics and Biochemistry.* (Will not be offered Winter 1974.) (Satisfactory/Unsatisfactory grades permitted.) (W)

228. Virology (3)

Molecular aspects of viral structure and development. Three hours lecture. *Prerequisite: Biology 111.* (Satisfactory/Unsatisfactory grades permitted.) (F)

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 from 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)

237. Human Genetics (3)

The structure of the human genome at the molecular and microscopic levels; human chromosome behavior; selected topics in human developmental, biochemical and population genetics. *Prerequisites: background in genetics equivalent to Biology 101, or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (W)

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 interreactions, immune response, immunological unresponsiveness, *in vivo* and *in vitro* consequences of antigen-antibody interreactions, delayed hypersensitivity, control of the immune response and transplantation immunities. *Prerequisite: Biology 106.* (Not to be offered 1973-74.)

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. *Prerequisites: 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.) (W)

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 speciality 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 interactions, cellular events in the humoral and cellular immune response, transplantation immunology. *Prerequisites: students must have already completed all undergraduate requirements as Biology majors, and must obtain consent of instructor.* (Satisfactory/Unsatisfactory grades only.) (F)

256. Membrane Biology (3)

Examines biogenic and functional aspects of biological membranes in procaryotic 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 permitted.) (F)

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 Physics-Chemistry Building
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. A student interested in working toward a graduate degree in one of the areas of biophysics receives at present his degree from the department to which his thesis supervisor belongs.

It is contemplated to provide an interdisciplinary graduate degree in biophysics in the near future.

Physics Major with Specialization in Biophysics

The upper-division program is essentially the same as the standard physics major with some modification to provide the education in biology and chemistry needed for advanced work in biophysics. Students entering the program with deficient backgrounds in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics:

(a) Lower-division preparation required:

Natural Science 2A-2B-2C-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 deficient backgrounds in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics-premedical:

(a) Lower-division preparation required:

Natural Science 2A-2B-2C-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 Elect.	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 Physics-Chemistry Building

Professors:

James R. Arnold, Ph.D.

Russell F. Doolittle, Ph.D.

Murray Goodman, Ph.D. (*Acting Provost, Revelle College*)

Martin D. Kamen, Ph.D.

Nathan O. Kaplan, Ph.D.

Joseph Kraut, Ph.D. (*Acting Chairman of the Department 1972-73*)

Joseph E. Mayer, Ph.D.
 Stanley L. Miller, Ph.D.
 G. N. Schrauzer, Ph.D.
 Kurt E. Shuler, Ph.D.
 Hans E. Suess, Ph.D.
 Teddy G. Traylor, Ph.D.
 Harold C. Urey, Ph.D. (*University Professor,
 Emeritus*)
 Bruno H. Zimm, Ph.D.

Associate Professors:

John Abelson, Ph.D.
 William S. Allison, Ph.D.
 F. Thomas Bond, Ph.D.
 Leigh B. Clark, Ph.D.
 Marlene A. DeLuca, Ph.D.
 Robert C. Fahey, Ph.D.
 Nathan Gochman, Ph.D.
 Robert G. Linck, Ph.D.
 Trevor 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.
 Susan S. Taylor, Ph.D.
 Raymond C. Valentine, Ph.D.
 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*
 Stuart Levison, Ph.D., *Assistant Adjunct Professor*
 Robert G. Bartsch, Ph.D., *Associate Research
 Chemist, Lecturer*

* * *

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 2DA, 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. 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.

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		
(Org) Chem 141A	(Org) Chem 141B	(Org) Chem 141C
(Phy) Chem 130	(Phy) Chem 131	-
-	(Biochemistry)	(Biochemistry)
-	Chem. 114	Bio. 106
(Org Lab) Chem 143A	(Org Lab)	(Org Lab)
-	Chem 143B	Chem 143C ^{°°}
-	(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 Fall of the junior year and either (Developmental Physiology) Biology 117 in the Spring of the senior year or (Cell Biology) Biology 114 Winter of the senior year.

°°(Mol Biochem Lab) Chemistry 112, (Biochem Lab) Biology 115A or (Biochem Lab) Biology 102 may be taken instead of (Organic Chem Lab) Chemistry 143C.

†(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 including (Research) Chemistry 199.

Chemical Physics

Prerequisites for this curriculum include Natural Science 2D and Mathematics 2E (may be taken in the junior year). Chemistry 141C and 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.

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.

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 undergraduate preparation must be remedied during the first year of graduate study. Physical chemists will be expected to present the equivalent of two years of physics, and mathematics at least through integral calculus. The appropriate background courses in biology or geology are highly desirable for students interested in biochemistry and geochemistry, respectively, but will sometimes be taken after arrival.

In the first year the student will usually take several of the graduate courses listed below. He may also take upper-division undergraduate 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.

In special circumstances the doctoral committee may modify the examination at its discretion. For University requirements, see *Graduate Section*. 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, conducted by the student's doctoral committee, is given 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 Institute for Pure and Applied Physical Sciences. Opportunities and facilities are thus available to the graduate student for study and research in a wide variety of interdisciplinary fields. A high-speed computer is available for use by graduate students.

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

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. *Prerequisites: Chemistry 130; 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 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 130; 131; 141A-141B.* (S)

107. Natural and Synthetic Macromolecules (4)

The physical chemistry of high polymers, proteins, and nucleic acids with emphasis on structure, characterization and properties. *Prerequisites: Chemistry 131, 141B.* (S)

112. Molecular Biochemistry Laboratory (4)

The application of techniques including electrophoresis, peptide mapping and sequencing, affinity chromatography, amino acid analysis, gas-liquid chromatography, and enzyme kinetics to the study of the chemistry of protein structure and function and the chemistry of lipids, carbohydrates, and nucleic acids. *Prerequisites: Chemistry 141A, 141B, 141C, 130, 131, 143A, 143B, 105, 114, and Biology 106. (Some of these courses may be taken concurrently.)* (S)

113. Chemistry of Biological Macromolecules (4)

A quantitative discussion of the structure of biologically important macromolecules and the techniques used in their study. *Prerequisites: elementary physical chemistry, organic chemistry and biochemistry.* (3)

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)

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.* (S)

117. Biochemistry of Human Disease (4)

An advanced course in biochemistry which will primarily deal with the molecular basis of human disorders. *Prerequisite: elementary biochemistry.* (F)

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. *Prerequisites: Chemistry 130 and 141A, or consent of instructor.* (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,W)

131. Physical Chemistry (4)

Thermodynamics. Chemical equilibrium, phase equilibrium, chemistry of solutions. *Prerequisites: Natural Science 2D, Mathematics 2C, or consent of instructor.* (W,S)

132. Physical Chemistry (4)

Chemical statistics, kinetic theory, reaction kinetics. *Prerequisites: Natural Science 2D, Mathematics 2C, 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)

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. Three lectures. *Prerequisites: Chemistry 131, 141B.* (F)

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; stereochemistry; reactive intermediates; rapid reactions. Three lectures. *Prerequisite: Chemistry 141C.* (W)

147. Mechanisms of Organic Reactions (4)

A detailed study of the mechanisms of various organic reactions; carbonium ion reactions (substitutions, displacements, eliminations, additions, hydrolyses); carbanion reactions (eliminations, substitutions, hydrolyses, condensations); carbene reactions; rearrangements; multicenter reactions; free radical processes. The topics emphasized will vary from year to year. Three lectures. *Prerequisite: Chemistry 141C.* (S)

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. Three lectures. *Prerequisite: Natural Science Sequence or equivalent, physical chemistry desirable.* (W)

171. Radiochemistry (4)

Nuclear chemistry, radioactive decay, stability systematics, neutron activation, radiochemistry, Scillard-Chalmers reactions, hot atom chemistry, radiation chemistry, effects from ionizing radiation. Three lectures. *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; advanced standing, 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. *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 preparation 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. *Prerequisites: 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 resonance. Same as Physics 206. *Prerequisite: consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.)

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 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 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.* (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)

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. (F)

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. (W)

247. Mechanisms of Organic Reactions (3)

A detailed study of the mechanisms of various organic reactions: carbonium ion reactions (substitutions, displacements, eliminations, additions, hydrolyses); carbanion reactions (eliminations, substitutions, hydrolyses, condensations); carbene reactions; rearrangements, multicenter reactions; free radical processes. (S)

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.) (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: 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)

(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% 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)

CHINESE STUDIES

OFFICE: Building 410, Matthews Campus

Associate Professors:

David K. Jordan, Ph.D. (*Anthropology*)

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*) (*Program Chairman*)

* * *

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 his 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. 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	History		Ling	Lit	Socio	Third World Studies
		Anthro	(Modern) (pre-mod)				
Chinese Studies Requirements							
Language		3	3	3	3	3	3
	Modern						
	Classical	0	0	3	0	3	0
Chinese Focus		3	4	4	2	3	2
Chinese Spectrum		3	2	2	4	2	3
Non-Chinese discipline Seminar/199		3	3	3	4	3	3
		2	2	2	2	2	2
Total number of upper-division courses		14	14	17	15	16	14
Lower-division Chinese language prerequisite		3	3	3	3	3	3

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
- Elementary Cantonese
- Lang/Ch 52 — Elementary Cantonese
- Elementary Cantonese
- Lang/Ch 53 — Elementary Cantonese
- Elementary Cantonese
- Lang/Ch 61 — Elementary Mandarin
- Lang/Ch 62 — Elementary Mandarin
- Lang/Ch 63 — Elementary Mandarin

Language — Upper Division

- Chinese Studies 154 — Intermediate Cantonese
- Chinese Studies 159 — Mandarin for Cantonese Speakers
- 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
- 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 5A-5B-5C — Tradition and Modernity in Europe and China
- History 180A-180B-180C — The History of Imperial China
- History 183A-183B — Modern Chinese History
- History 194 — Senior Standing
- 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
- Visual Art 114C — Introduction to Japanese Art
- Visual Art 114D — Introduction to Eastern Art

COURSES

UPPER DIVISION*

M116. Scientific Development in Traditional China (4)

An integrated series of lectures and readings covering various 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; Chinese Studies 159 may be taken concurrently.*

176. Readings in Contemporary Chinese II (4)

Continuation of Chinese Studies 175. Introduction to simplified characters used in the Republic of China. Half of the selections to be used in class will be drawn from literature written in simplified characters. *Prerequisite: Chinese Studies 175.*

179. Introduction to Chinese History (4)

A survey of the major trends in the historical development of Chinese civilization from 2000 B.C. to the present. The course assumes some knowledge of the history of Western civilization for the purpose of comparison.

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 154 or 164, 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, M.A. (*Acting: 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 intellectual activity and the social and political environment in which it took place. *Prerequisite: sophomore standing.*

History 104A-104B. Greece in the Classical Age (4-4)

History 105A-105B. The Roman Republic and Empire (4-4)

(Not to be offered 1973-74.)

History 107. The Ancient Near East (4)

(Not to be offered 1973-74.)

History 108. 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, 1973: The Roman Revolution.

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 120. 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 Fall 1973: Women in Antiquity. Topic for Spring 1974: Homer.

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 108. 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 206A-206B. 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/Ci 210. Classical Studies (4)

Prerequisite: working knowledge of either Greek or Latin

Lit/Ci 297. Directed Studies in Greek or Latin Literature (1-12)

Lit/Ci 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 (1-12)

COMMUNICATIONS

OFFICE: Building 411, Matthews Campus

Professor:

*Herbert I. Schiller, Ph.D.

Assistant Professors:

Michael R. Real, Ph.D. (*Coordinator of Communications*)

Will H. Wright, Ph.D.

* * *

°Jeffrey F. Raskin, M.A., *Assistant Professor of Visual Arts*

Benjamin K. Tsou, Ph.D., *Assistant Professor of Linguistics*

Anthony G. Wilden, Ph.D., *Assistant Professor of French Literature*

°On leave to Mathematics Department 1973-1974

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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.

The Communications major and courses provide a focus for inquiry into the institutions, media, and theories of human communication with special reference to the development of individual and group consciousness. At the same time, the Program affords students the opportunity to develop their ability to understand and utilize cultural art forms and communicative media.

The Communications requirement for all Third College students, and a prerequisite for Communications majors, consists of a two-quarter sequence (Communications IA-IB) which is offered in the winter and spring quarters.

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: Theory, Analysis, and Media.

Theory Courses: Pragmatics of Human Communications, Syntactics of Communication, Semantics of Human Communication, Myths and Symbols in Society, Sociology of Culture, Popular Communications, Communications Research and Analysis.

Analysis Courses (Communications Institutions and Behavior): Political Economy of Mass Communications, Political Economy of International Communications, Mass Communications and Public Opinion, Cinema of Dissent, The Film Industry, Communications and National Development, Media Analysis, Cable Television.

Media Courses: Television Production and Analysis, Television Documentary, Television as a Social Force, Writing of Dramatic Materials for Television Production, 8mm Film Workshop, 16mm Film Workshop, Computer Media, Photography; also selected courses in Visual Arts, Music, Drama and Literature.

Following is a partial list of those communications-related upper-division courses acceptable toward the Communications Major. Many of these upper-division courses 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.

APIS — 161C; 162A,B,C; 163A,B,C; 166; 167; 168.

ANTHROPOLOGY — 105; 106; 108; 109; 111; 113; 119; 122; 125; 127; 134.

DRAMA — 101A,B,C; 122A,B,C; 132.

ECONOMICS — 107; 116; 130A,B,C; 161; 166.

HISTORY — 191.

LINGUISTICS — 100; 174.

LITERATURE — 111 through 116; 153; 161.

MUSIC — 100A,B,C; 101A,B,C; 102A,B,C; 111.

PHILOSOPHY — 110; 112A,B; 120A,B; 172.

POLITICAL SCIENCE — 100; 101; 102; 131; 150.

PSYCHOLOGY — 132; 133; 134; 135; 137; 144; 145; 146; 147.

SOCIOLOGY — 104; 105; 106; 130; 131; 132; 133; 134; 135; 136; 137; 142; 143; 153.

URBAN AND RURAL STUDIES — 101; 102; 110; 131; 141; 143; 146; 150.

VISUAL ARTS — 110; 113; 118; 121; 170; 171; 172; 187; 188; 189; 190; 191.

COURSES

LOWER DIVISION

1A-1B. Communications (4-4)

This sequence is designed to create an awareness of the social institutions and processes that shape individual and group consciousness. It will familiarize the student with the process of communications in its social context. Message transmission in its many forms will be analysed, always relating to the social environment.

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.

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 a great deal, develop film and produce mainly slides to examine the individual image or image sequences. There will be a brief introduction to printing.

UPPER DIVISION

100A-100B-100C. Introduction to Communications (4-4-4)

This sequence is designed to create an awareness of the social institutions and processes that shape individual and group consciousness. It will familiarize the student with the process of communications in its social context. Message transmission in its many forms will be analysed, always relating to the social environment. Research paper required.

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)

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 videotaped 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)

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, 1/2-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.*

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.*

114. 16 mm Film Workshop (4)

An introduction to the practical and social aspects of 16 mm 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.

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.

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. *Prerequisites: Sociology 1A and 1B.*

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.*

170. Computer Media I (4)

Requiring no mathematical or scientific training, this is an introduction to programming in a higher level language. Exercises dealing with specific problems of the arts are emphasized.

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)

182. Pragmatics of Human Communications (4)

This course analyzes human, social and psychological behavior with a view to providing the student with the tools to analyze and comprehend his own status in the world of communication. It is preferred that the student take both quarters for credit and continuity. *Prerequisites: Communications 1A-1B, advanced standing, or consent of instructor.* (F)

183. Syntactics of Communication (4)

Deals with the formal and theoretical aspects of human and biological communication systems. Reviews the literature of semiotics, communication theory, structuralism, and linguistics in respect to the *syntactics* (the *articulation* of codes and messages) of goal-seeking open systems. *Prerequisites: Communications 1A-1B, or Third College advanced standing, or permission of instructor.* (S)

184. Semantics of Human Communication (4)

Deals with the environmental relationships and intentions characteristic of human and biological communication systems. Reviews the literature of semiotics, communication theory, structuralism, and linguistics in respect to the *semantics* ("goals", "purposes") or the relation between "organism" and "environment". *Prerequisites: Communications 1A-1B, Third College advanced standing, or permission of instructor.*

185. Mass Communications and Public Opinion (4)

Considers the concept of public opinion, its measurement and impact, the possibilities of manipulation and control, polling and the differing role of public opinion in differing social systems. (F)

186. The Film Industry (4)

A study of the social organization of the film industry throughout its history addressing such questions as who makes films, by what criteria and for what audience. The changing relationships between studios, producers, directors, writers, actors, editors, censors, distributors, audience and subject matter of the films will be explored.

187. Cinema of Dissent (4)

A study of the cinema as a method of dissent and as a medium for the analysis of race and class relationships. Included will be films which reveal and challenge accepted attitudes toward minority groups and social classes and describe lives and social relationships in Third World communities. Films will be shown, with discussion, and readings will be required.

188. Popular Communications (4)

An investigation of the relationship between mass communications and popular culture. Historical, esthetic, and political consideration of the evolution of popular expressions of culture, of the interaction between media and society, of the characteristic products of mass culture in America and among minorities and

non-western peoples, and of the possibilities of a radically humanistic popular culture. (W)

189. The Sociology of Culture (4)

The study of the concept of culture, its origins, and its application to modern societies. Included will be discussions of the role in society of various symbolic systems such as art, science, myths, history, and language. (W)

190. Communications Analysis and Research (4)

Introduction to finding and analyzing information about the communications functions of private, public, and mixed structures and institutions on the local, 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 1A-1B, 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 Intrapersonal Communications (4)

Searches the internal communication processes and orientation of ancient, tribal, non-white peoples, to appreciate the "man of knowledge" from the inside. Investigates internal and external communicative prerequisites for seeking personal and cultural identity on a genuinely human, non-exploitive plane. *Prerequisite: Communications 1A.*

195. Undergraduate Teaching (4)

This course is offered to students with senior standing who wish to receive course credit for undergraduate instructional assistance. *Prerequisite: senior standing.*

198. Independent Group Study (4)

Directed group study on regional/local mass communications projects involving research and analysis of media activities and services. (W)

199. Independent Study (4)

The communications program will include: the study of communicators' behavior, the analysis of the character of messages, and the examination of the social institutions involved in the communications process. Also, an overview of the structures of mass communication, the role the media have and continue to perform in shaping individual and societal values and objectives, and the possibilities for utilizing the media for social change. The efforts of the visual, literary, auditory, and plastic arts along with the analytic and empirical social sciences will be utilized. *Prerequisite: consent of instructor.* (F,W,S)

CONTEMPORARY ISSUES

OFFICE: 2105 Humanities and Social Sciences Building

Lola Romanucci Ross, Ph.D., Director

* * *

COURSES

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 workshop 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 discussions, 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 the 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)

Theories and societal assumptions about the teaching-learning process will be examined both from an interdisciplinary and cross-cultural perspective. Field observation techniques will be an adjunct to the lectures. (W)

195. Discussion Leading (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 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 is 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)*

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 Professor:

Daniel Dryden, M.F.A.

* * *

The Undergraduate Program

The curriculum in the Department of Drama has been developed to provide: 1) elective courses for the general student desiring experiences in the dramatic arts; 2) a sequence of courses to fulfill the fine arts requirement for Muir and Revelle Colleges; 3) a series of courses for Revelle students desiring a non-contiguous minor in Drama; and 4) an integrated and meaningful program for those students desiring a Drama major.

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 study of selected plays from different periods in terms of their realization in the theatre, including terminology and technical aspects viewed against historical backgrounds.

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. Portion of labs will be work on productions in the UCSD Theatre in construction and running crews.

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.*

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.

40A-40B. 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. 40A. Greeks through Elizabethans. 40B. Renaissance through Modern.

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 over-reacher, 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 pag-eants reveal human collisions with man and society.

50A-50B. Elements of Production (4-4)

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.*

111. Indonesian Music, Shadow Play and Dance (4)

Music, shadow play, and dance of Indonesia and Bali. A lecture, performance, and workshop presentation will be made. Students will be required to participate in performance groups. *Prerequisite: departmental approval.*

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.*

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.*

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.*

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 (2 or 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 (2 or 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 elect to enter the Department of Chemistry, Mathematics, or Physics and for the first two years will take the Revelle core curriculum. 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 (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

Prerequisite for all 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 course listings: SIO

ECONOMICS

OFFICE: 3412 Humanities-Library Building

Professors:

John W. Hooper, Ph.D.

Daniel Orr, Ph.D.

Associate Professors:

Richard E. Attiyeh, Ph.D. (*Chairman*)

Donald V.T. Bear, Ph.D.

John Conlisk, Ph.D.

Ramachandra Ramanathan, Ph.D.

R. Robert Russell, Ph.D.

Assistant Professors:

Richard Emmerson, Ph.D.

Wolfhard Ramm, Ph.D.

Richard Schmaiensee, Ph.D. (*Director of Undergraduate Studies*)

Dennis Smallwood, 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 120B or 129, or Mathematics 181B. These courses introduce the major to basic tools and concepts which have applicability to a wide variety of real-world problems. 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. Those without this background may take Economics 3 in place of or in addition to Economics 1C to prepare themselves for upper-division work.

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. 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 four or five quarter course sequences in each of the areas. 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.*

10. Principles of Economics (4)

A relatively intensive though, for the most part, non-mathematical 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.*

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.

UPPER DIVISION

100A-100B. Microeconomics (4-4)

Household and firm behavior as the foundations of demand and supply. Market structure and performance, income distribution, and welfare economics. *Prerequisites: Economics 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.*

109A-109B. Introduction to Business Management (4-4)

Decision-making in the firm; application of microeconomic tools and concepts to business problems; elements of accounting, marketing, finance, and production. *Prerequisite: Economics 100A.*

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.*

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.*

118A-118B. 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.*

121. Games, Decisions and Programming (4)

An introduction to activity analysis, the theory of games, statistical decision theory, and linear programming. Utility theory, expected utility maximization, and other decision criteria. The Duality and min-max theorems. The simplex method. Leontief systems. *Prerequisites: Economics 100A-100B.*

- 122. Management Science (4)**
Application of formal modeling techniques to allocation problems in business and government. *Prerequisite: Economics 121.*
- 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 determinants 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 the 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. *Prerequisites: 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.*
- 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.*
- 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 121.*
- 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.*
- 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. Price and Allocation Theory (3-3-3)**
The role of theory in economics; demand analysis; the traditional theory of the firm; market structure and welfare; activity analysis and linear programming; dynamic models of the firm; market stability under uncertainty; capital theory and asset management.
- 201A-201B. International Trade (3-3)**
Theory of international trade, finance, and monetary relations. Growth, disturbances, and balance of payments adjustment. International economic policy and welfare.
- 205. Industrial Structure and Performance (3)**
Problems of monopoly and their effect on resource allocation. Measurement of monopoly power. The extent of and changes in monopoly behavior over time. *Prerequisites: Economics 200A-200B.*
- 209. Applied Microeconomics (3)**
Intensive examination of selected empirical studies in microeconomics. An empirical research project is usually required of each student. *Prerequisites: Economics 200A-200B-200C, 220A-220B-220C, 220D.*
- 210A-210B-210C. Aggregate Economic Analysis (3-3-3)**
The theory of income determination; consumption and investment; money, the general price level and the rate of interest; fluctuations in income and employment.
- 211. Monetary Theory and Policy (3)**
The theory of money and economic activity. Factors determining money supply and demand. Monetary institutions, monetary reform, and the efficiency and rationality of monetary policy.

212. Optimal Economic Growth (3)

The concepts of efficiency and optimality in dynamic models, interpretation and application of dynamic programming, calculus of variations, and control theory in problems of economic growth; the performance of markets in intertemporal resource allocation. *Prerequisites: Economics 200A-200B, 210A-210B-210C or equivalent.*

213A-213B. Topics in Economic Theory (3-3)

An intensive examination of the literature on selected topics of current importance in economic theory. *Prerequisites: 200 and 210 or consent of instructor.*

214. Monetary Theory (3)

Macroeconomic theory related to supply and demand for money. Relationship of money to prices, interest rates and output. Models of monetary and financial structure. Monetary dynamics of inflation, business fluctuation, and economic growth. *Prerequisite: Economics 210A or consent of instructor.*

216A-216B. Economic Development and National Planning (3-3)

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.*

219. Applied Macroeconomics (3)

Intensive examination of selected empirical studies in macroeconomics. An empirical research project is usually required of each student. *Prerequisites: Economics 210A-210B-210C, 220A-220B-220C-220D.*

220A-220B-220C-220D. Econometrics (3-3-3-3)

The construction and application of stochastic models in economics. This includes both single and simultaneous equations models. Matrix algebra and basic statistics are covered.

221. Special Topics in Econometrics (3)

Advanced exploration in econometric theory, with emphasis on thorough coverage of an important research technique. *Prerequisite: Economics 220C.*

250A-250B. Public Finance (3-3)

Analysis of the impact of the government budget upon resource allocation and income distribution; social choice and political processes; tax and transfer policies and inter-temporal income distribution; the problem of public goods in a private market economy.

269. Seminar in Economics (3)

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 (3-3-3)

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.)

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.) For the 1973-74 academic year, courses in modern medical advancements in implants and transplants, the development of science in traditional China, and the nuclear arms race are planned along with new offerings of current interest. However, others in the sequence will be scheduled as new professors are added to the faculty.

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. Arms and Arms Control (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)

108. Biochemical Anthropology and Individuality (4)

Reconstruction of migrations of different ethnic groups will be discussed with respect to various biochemical tests. Biochemical variations due to genetic differences in human populations will also be discussed from the point of view of both disease and a changing environment. The evolutionary factors which influence biochemical changes in man will be compared to that of other species. A summary will be made of the concepts of biochemical individuality as related to our society as well as its impact on the practice of medicine. (S)

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. *Prerequisite: Revelle lower-division science sequence or equivalent.*

114. Frontiers and Fringes of Modern Physics (4)

Modern physics has developed in many different ways. The spectrum covers many aspects from pure propaganda to everyday life. Subjects relevant to our existence reach all the way to profound questions concerning the origins of the universe. The aspects will be covered involving student participation. *Prerequisite: Revelle lower-division science sequence or equivalent.*

116. Scientific Development in Traditional China (4)

An integrated series of lectures and readings covering various 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.

117. Synthetic Man: Artificial Heart, Lung, Kidneys — Implants and Transplants (4)

A course describing the scientific, technical, and medical aspects of improving the future of impaired organs. Chemists, immunologists, and surgeons present details of their activities in this emerging biomedical area. (W)

118. Metaphysics (4)

Metaphysics will deal with phenomena relating to, and sometimes transcending, matters of natural science. (F)

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 E. Ruiz, Ph.D. (*Chairman*)

Harry N. Scheiber, Ph.D.

Associate Professors:

Stanley Chodorow, Ph.D.

°°Michael Parrish, Ph.D.

Assistant Professors:

Robert Edelman, Ph.D.

David Luft, Ph.D.

°°Thomas A. Metzger, Ph.D.

Michael T. Monteon, Ph.D.

Alden Mosshammer, Ph.D.

Franz G. Nauen, Ph.D.

Peter S. Onuf, Ph.D. (*Visiting*)

Edward Reynolds, Ph.D.

°°Robert C. Ritchie, Ph.D.

Emory Tolbert, Ph.D.

Acting Assistant Professors:

Susan Kleinberg, M.A.

‡Richard Romo, M.A.

°Leave of absence, Fall Quarter, 1973

°°Leave of absence, 1973-74

‡Leave of absence, Fall and Winter Quarters 1973-74

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THE MAJOR PROGRAM

Students majoring in the Department of History are required to take (1) a three-quarter lower-division course 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)

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. (At present, the Department will permit students to fulfill this part of the requirement only in the fields of Western Hemisphere and European History).
2. Three quarter courses in a field other than the primary one.
3. Two quarter courses in the remaining fields.

Each year the Department will cross-list courses given by other departments, making it possible for history majors to use those courses in fulfillment of the requirements for the major. In no case, however, will students be able to use more than two cross-listed courses in fulfilling the Department's program.

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 or 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 or 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

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 also be supported 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 to the proposed area of concentration as early as possible in their academic career. 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 politics of the 11th-13th 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 Education 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 (4 units per quarter), one-quarter colloquia (4 units per quarter), and directed reading. A full-time program consists of a minimum of 12 units per quarter, of which a maximum of 4 units may be in apprentice teaching. Students are expected to complete the following minimal program of formal courses: 2 two-quarter research seminars, 5 quarters of colloquia in the major and first minor, and 3 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.

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 as constituted by the Office of Graduate Studies and Research. The Preliminary Examination

consists of a final written examination in the first minor, a preliminary written examination in the major, and an oral examination in both fields. The Qualifying Examination consists of a final written examination in the second minor, a final written examination in the major, and a comprehensive oral examination. Students are expected to take the Preliminary Examination in November of the second year of residence and the Qualifying Examination in November of the third year of residence. Permission either to accelerate or to prolong the examination process may be granted only upon petition to the Graduate Committee. Examinations are administered only in November and May of each year. Failure on either examination constitutes grounds for dismissal from the program. Students may, however, petition the Graduate Committee for permission to stand for the examination again at the next scheduled administration. A second failure results automatically in dismissal from the program.

In addition to the formal examination procedure, each student's progress is reviewed at the end of the first year of residence. Students are advised of the results of this review by the Graduate Committee.

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.

COURSES

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.

30A-30B-30C. United States History (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. Satisfies the American History and Institutions requirement.

UPPER DIVISION

104A-104B. 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.

105A-105B. 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. Three hours lecture and discussion. (Not to be offered 1973-74.)

107. The Ancient Near East (4)

The development of Egyptian, Mesopotamian and Anatolian civilization to the time of Alexander the Great. *Prerequisite: upper-division standing or permission of instructor.* (Not to be offered 1973-74.)

108. 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. Note: topic for Fall 1973: Roman Revolution. *Prerequisite: one upper-division course in ancient history.*

109A-109B-109C. Intellectual History of 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 intellectual activity and the social and political environment in which it took place. *Prerequisite: sophomore standing.* (NOTE: Cross-listed as Literature 109A-109B-109C and Philosophy 109A-109B-109C.) (See *Classical Studies*.)

110. Medieval Legal History (4)

Study of the legal system of early Germanic communities and the medieval kingdoms. Focus will be on the confluence of Roman, canon, and customary law in the formation of the modern legal system. *Prerequisites: upper-division standing, History 111A-111B, or permission of instructor.*

111A-111B. The Rise of Europe (4)

The development of European society from the decline of the Roman Empire to 1250. Three hours lecture. *Prerequisite: humanities sequence or its equivalent.*

112. Church and State in the Middle Ages (4)

Course will cover the progress of disputes between secular and ecclesiastical authority during the Middle Ages. The political literature produced by these disputes and their effects on governmental practice and theory will be of central concern. *Prerequisites: 111A-111B or consent of instructor.*

113. Renaissance Europe, 1348-1517 (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. *Prerequisite: completion of the humanities sequence or its equivalent.*

121A-121B. 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.*

122. The Expansion of Europe, 15th-17th Centuries

The techniques, economic organization and institutional evolution of European colonization in Africa, the Far East and the Americas. The great geographical discoveries and the beginnings of world trade. With emphasis on comparative aspects.

123A-123B. 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. (123A covers 1750-1814; 123B covers 1815-1870.) *Prerequisite: humanities sequence or equivalent.*

124. 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.*

125. European Revolutions (4)

Why it happens: how it happens. A comparative treatment of the English, French, and Russian revolutions. Stress will be placed on the historiographical, theoretical, and philosophical implications of these events.

127. Modern German History (4)

A lecture-discussion course on the political and social history of Germany during the 19th and 20th centuries. *Prerequisite: upper-division standing or permission of instructor.*

128. The Austrian Empire: 1809-1918 (4)

The political, social, and cultural history of the Hapsburg Empire in the 19th century, with special emphasis on the distinctive achievements of the multinational state after 1867. *Prerequisite: upper-division standing or permission of instructor.*

130A. Survey of Russian History: Origins (9th Century) to 1855 (4)

Treated topically. *Prerequisite: upper-division standing.*

130B. Survey of Russian History: 1855-Present (4)

Treated topically. *Prerequisite: upper-division standing.*

133. The Soviet Union in the 1920s (4)

A lecture-discussion course on the social, economic, and political history of the Soviet Union after the Bolshevik Revolution with emphasis upon social and political structure, the New Economic

Policy, and the rise of Stalinism. *Prerequisite: upper-division standing.*

135. 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 instructor.*

137. Modern French History (4)

A lecture-discussion course on the political and social history of France during the 19th and 20th centuries. *Prerequisite: upper-division standing; permission of instructor.*

139A-139B. The Expansion of Europe (4-4)

A lecture-discussion course on the origins and evolution of European trade and colonization of Africa, Asia, and the Americas with emphasis on economic and comparative aspects. The first quarter will deal with expansion until 1650. The second quarter will cover colonial expansion and conflicts centered on the period 1740-1815. Mainly economic history. *Prerequisite: upper-division standing or permission of instructor.*

140A-140B-140C. History of Latin America (4-4-4)

A survey of the evolution of Latin America, covering aboriginal civilizations, Iberian colonizations and development of the modern nations, from prehistory to the present. With emphasis on demographic, economic and social problems. *Prerequisite: completion of humanities sequence or its equivalent.*

141. 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. 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 to 1620. Demographic and urban history, social structures, social stratification, interracial relations, and miscegenation. *Prerequisite: upper-division standing or permission of the instructor.*

143A-143B. A History of Mexico (4-4)

From the Conquest through the Reforma, with special emphasis on social and cultural events. The second quarter covers the period since 1876. *Prerequisite: upper-division standing or permission of instructor.*

144. 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 instructor.*

145. 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 instructor.*

146A-146B. Social History of South America, 1850-1970 (4-4)

A lecture-discussion course focusing on Argentina, Chile, Brazil, and Peru with major emphasis on immigration, labor, European influence, and the incorporation of Spanish-American society into the European capitalist economy. The second quarter begins in 1919, draws more freely on comparison with other South American countries, traces the growth of American influence, and the impact of the Great Depression on Spanish-American societies. *Prerequisite: upper-division standing or permission of instructor.*

147. The City in South America, 1880-1970 (4)

A lecture-discussion course tracing the development of South American cities, with special emphasis on Lima, Santiago, Buenos Aires, Montevideo, and Sao Paulo. The lectures will examine the impact of these cities on their country's economic and social

progress. Students are encouraged to do research on a particular South American city of their choice. *Prerequisite: upper division standing or permission of instructor.*

148. 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 instructor.*

149A-149B. Tradition and Modernity in Europe and China (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 the transformation of these patterns in modern times. *Prerequisite: upper-division standing or permission of instructor.*

153. Social History of the Far West (4)

The course will discuss the various ethnic migrations and the establishment of a new society in the Far West, emphasizing ethnic and cultural diversity. It will also deal with the idea of the West, both as land and as an arena of new opportunity. *Prerequisites: upper-division standing or permission of instructor.*

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.

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 instructor.*

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 instructor.*

159A-159B. Afro-American History (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 instructor.*

160. United States: Colonial Period to 1763 (4)

Political and social history of the thirteen colonies; European background, settlement and expansion, beginnings of culture and the Imperial context. *Prerequisite: upper-division standing.*

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 socioeconomic groups from pre-industrial times to the present. Emphasis is on the relationship of economic systems to women's social, work and family roles.

164. American Intellectual History to 1860 (4)

From colonial times through the pre-Civil War period; European origins and the development of political, social, economic, and religious thought in the American context. Emphasis on principal thinkers and ideas, with some reference to the general historical

background and values. Three hours discussion. *Prerequisite: humanities sequence or its equivalent.* Satisfies American History and Institutions requirement.

165. American Intellectual History from 1860 (4)

American thought in the post-Civil War period, and some major trends in social, economic, political, and religious thought in the twentieth century. Developments in American philosophy, the social sciences, and literature. Three hours discussion. *Prerequisite: humanities sequence or its equivalent.* Satisfies American History and Institutions requirement.

167A-167B. United States in the Twentieth Century (4-4)

A lecture-discussion course on American society from 1890 to the present. Emphasis will be placed upon the domestic sources of public policy including 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 Negro revolution. *Prerequisite: upper-division standing.* Satisfies American History and Institutions requirement.

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 instructor.* Satisfies American History and Institutions requirement.

177. History of Africa to 1880 (4)

A survey of pre-Colonial Africa, concentrating on the role of Islam in African history and the organization of early trade between Africans and Europeans (including the slave trade). *Prerequisite: upper-division standing.*

178. Modern African History (4)

A survey of sub-Saharan Africa dealing with the European "scramble for Africa" in the 1880's, primary resistance movements, economic development, and modern nationalist movements. *Prerequisite: upper-division standing.*

179A. History of Africa (Ancient Africa to 1807) (4)

This course deals with Ancient Africa, the Medieval States of the West African Sudan, East Africa and 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 instructor.*

179B. History of Africa (19th 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 African response thereto. *Prerequisite: upper-division standing or permission of instructor.*

179C. 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 instructor.*

180A. History of Ancient China (5000-206 B.C.) (4)

Course covers Chinese history from earliest times through the Chou period and focuses on Chou thought. *Prerequisite: upper-division standing or permission of instructor.*

180B. History of Imperial China from the Han through the Sung Periods (206 B.C.-1279 A.D.) (4)

Course focuses on Han thought and political structure, the rise of Buddhism, and societal changes during Tang and Sung times. *Prerequisite: upper-division standing or permission of instructor.*

180C. History of Imperial China in Ming and Ch'ing Times (4)

Course focuses on developments in the local society, the problem of capitalism, social mobility, the political structure, intellectual history, and foreign relations. *Prerequisite: upper-division standing or permission of instructor.*

183A. History of Modern China (1800-1937) (4)

Course deals with the advent of Western imperialism, the breakdown of the traditional order, the coming of revolution, and problems of modernization. *Prerequisite: upper-division standing or permission of instructor.*

183B. History of China in Recent Decades (4)

Course deals with the rise of Chinese Communism, the political structure of the Chinese People's Republic, the CPR's reorganization of both urban and rural life and the CPR's foreign relations, as well as developments on Taiwan. *Prerequisite: upper-division standing or permission of instructor.*

186. Social and Cultural History of India (4)

Mahatma Gandhi: Six Faces. The role of the charismatic individual has been a central concern of historical study. This course will investigate how scholars of six different disciplines have focused on the life of Mahatma Gandhi and reached conclusions regarding the meaning of his life and times. Of particular interest will be the importance of these different studies — history, philosophy, psychology, religion, political science, and sociology — for understanding the changes in Indian society during the early twentieth century. *Prerequisite: upper-division standing or permission of instructor.*

187A. History of India: 1500-1765 (4)

The political, economic, and cultural history of the Moghul Empire, the challenge of European traders, and the collapse of central authority in the eighteenth century. *Prerequisite: upper-division standing or permission of instructor.*

187B. History of India: 1765-1905 (4)

The establishment of British hegemony, the transformation of Indian society and culture, and the rise of resistance movements to colonial rule. *Prerequisite: upper-division standing or permission of instructor.*

187C. History of India: 1905-Present (4)

An introductory course emphasizing the historical roots and social bases of contemporary politics in India, Pakistan, and Bangla Desh. (Cross-listed as Political Science 187.) *Prerequisite: upper-division standing or permission of instructor.*

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.*

191. Early Technics and Society, East and West (4)

A survey of the history of technics down to the seventeenth century, with attention to the interplay between the social milieu and the more specific achievements of the inventor and the engineer. *Prerequisite: upper-division standing or permission of instructor.*

192. 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. *Prerequisite: upper-division standing or permission of instructor.*

193. Tudor-Stuart England, 1485-1642 (4)

A one-quarter course on English history from Henry VII to the

outbreak of the Civil War. Emphasis will be placed on the economic, social, religious, and political changes which made England a dynamic, complex modern state on the verge of Empire. *Prerequisite: upper-division standing.*

194. Senior Seminar (4)

A critical analysis of historical literature in a field of restricted scope. Several sections, focusing upon European, Western Hemisphere, and non-Western history, are offered each year. Students should consult their advisers each quarter about the seminars to be offered. *Prerequisites: senior and history major; permission of instructor.*

196. Special Topics in the Various Fields of History (4)

Readings and discussions on a particular topic in any field of history of special interest to a member of the faculty. Offered occasionally. *Prerequisites: upper-division standing and permission of instructor.*

199. Independent Study (4)

Program 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.*

GRADUATE

204. Literature of Greece (4)**205. Topics in Roman History (4)****206A-206B. Greece (4-4)**

The course is designed to train students in research and writing historical papers. The first quarter is devoted to developing research techniques and to gathering material; the second quarter to composing the paper.

207A-207B. Rome (4-4)

The course is designed to train students in research and writing historical papers. The first quarter is devoted to developing research techniques and to gathering material; the second quarter to composing the paper.

210. Topics in Medieval History (4)

Class will study the Investiture Contest concentrating on the personalities involved in the ideas developed on both sides of the dispute.

220A-220B. Topics in Modern European History (4-4)

Topic for 1973-74: Social Elites in Western Europe after 1870. *Prerequisite: graduate standing or permission of instructor.*

221. Aspects of European Thought, 1660-1715 (4)

Topics dealt with will include political and theological thought and the new natural philosophies of Descartes and Newton as they relate to political and theological questions.

222. The Historical Literature of Western Europe Since 1870 (4)

Readings in the historical literature of Western Europe since 1870.

229A-229B. Western Europe, 1815-Present (4-4)

Prerequisite: graduate standing.

230. Readings in Russian History, 1700-1861 (4)

Prerequisite: graduate standing or permission of instructor.

231. Russian and Eastern Europe since 1613 (4)

Prerequisite: graduate standing or permission of instructor.

232. Jewish Intellectual History of the Eighteenth Century (4)

Isaac DePinto and Moses Mendelsson. (Cross-listed as Philosophy 270.)

235. Topics in Twentieth Century European Social Thought (4)

A study of twentieth century European intellectuals and their social, political, historical, and cultural theories. Topics to change from year to year. *Prerequisites: graduate standing or permission of the instructor.*

240. The Literature of Latin America: Pre-Colonial (4)

Readings and discussion in the monographic literature and in the sources of selected topics. Emphasis on analysis of the historiography of the periods. Several papers will be required.

241A-241B. Latin America: Pre-Colonial (4-4)**243A-243B. Topics in Latin American History (4-4)****245. Spain Since 1808 (4)**

Study of major Spanish historians of the nineteenth and twentieth centuries.

247. Literature of the Spanish Civil War (4)

Analysis of domestic and international issues raised by the Spanish Civil War and of their interpretations, 1930's to the present. The Southworth Collection will be used extensively. *Prerequisite: graduate standing; reading knowledge of Spanish required, French desirable.*

248A-248B. 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.

250A-250B-250C. The Literature of American History (4-4-4)

A three-quarter sequence of readings and discussion 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.

251. Readings in American History (4)

Reading and discussion in selected areas of American history for advanced graduate students.

252A-252B. America in the 20th 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 the writing of individual research papers.

258A-258B. American Economic History (4-4)

Examination of some of the major interpretive problems in American economic history. Case studies of public economic policies and their impact, and individual research papers.

261A-261B. United States: Colonial Period (4-4)**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.

270. History of Africa (4)

Readings in principal themes of African history during the nineteenth and twentieth centuries.

271A-271B. Topics 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 will be devoted to the writing of individual research papers.

276. Readings in the Expansion of Europe (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.

287. Readings in Indian Political History (4)

This seminar will examine some major themes of Indian politics in the nineteenth and twentieth centuries. Aspects of political modernization will generally deal with the role of government and the political processes associated with governing. In addition

to surveying historiographic trends, a basic approach will be to apply the insights of social science to historical phenomena by analyzing methodologies. Readings will include studies from other social sciences as well as standard historical works.

290. Readings in the History of Technology to 1830 (4)

A survey of the growing literature in this field, with selected readings that focus on the relation between technics, social organization, and social change.

294. Selected Seminar Topics (4)

Colloquia offering a critical analysis of historical literature in a field of restricted scope. Several sections, focusing on European, Western Hemisphere, and non-Western history, are offered each year. Students should consult their advisers each quarter about the seminar to be offered.

295. History of Law in Philosophical Perspective (4)

Course will study the way in which the historical development of the Western legal system reflects issues raised in the literature of legal philosophy. Students will read works of legal philosophy in conjunction with studies of the history of legal doctrines and institutions. *Prerequisite: graduate standing or permission of instructor.* (Multiple listed with Philosophy 267.)

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 the Western cultural tradition. He will learn to interpret major literary, historical and philosophical 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.

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

1. The Present Age

Analysis of some major twentieth-century books and cultural trends. Two lectures, one discussion, regular assignments in expository writing. (S)

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)

INTERDISCIPLINARY

OFFICE: Provost, Revelle College

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COURSES

1. The Oceans

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. (F)

10. Interpersonal Behavior, Group Development and Leadership Styles

As a means of exploring the dynamics of human interaction, each student will become a member of a small unstructured group. Readings will focus on contemporary theories of human development and concepts of humanistic education. The student will be asked to relate readings to his class experience. (Formerly Social Science 10 or 100.) (F,W,S)

11. The Clinical Perspective

A comprehensive view of the relationship between personality theory, therapeutic intervention, and expected outcomes. Three approaches to personal change will be presented and related to the basic assumptions of personal/human development embedded in the underlying theory. Readings will be drawn from both the experimental personality and applied therapeutic areas. Extensive use will be made of audio-visual techniques and of demonstrations to fully illustrate the methodology under discussion. (F,W)

25. Law and Society

This course will examine aspects of the legal process, including how and when the process is invoked, judicial decision-making, the role of the lawyer. Illustrative cases will be drawn from diverse areas, for example, commitment of the mentally ill, conscientious objection to the draft, economic equalization under the Constitution. (S)

30. Workshop in Student Media (2)

A half course open to members of the staffs of the student papers. Laboratory work covering the reporting, editing, layout and production of a regularly scheduled newspaper. Students will produce a weekly paper and be given other writing assignments. (Students should see the Office of the Provost concerning the number of times the course may be taken for credit.)

44. Society and Human Values

Course will consider historical and contemporary approaches to human values; criteria for determining values appropriate to human persons in community; contemporary and impending critical issues, social and individual, requiring value choice. (S)

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)

105A-105B-105C. Practicum in Student Counseling (2-2-2)

A program to acquaint students with fields of study and areas of professional experience in counseling, leadership and residence-hall staffing. *Prerequisite: appointment as a Resident Assistant for UCSD residence hall.* (F,W,S)

195. Discussion Leading

Discussion and tutorial activities associated with interdisciplinary courses. In addition to his assignment to an individual class or section, a student participating in this program will be required to meet for one three-hour seminar per week with the course instructor. *Prerequisites: senior standing, permission of instructor.* (F,W,S)

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)

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 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.

Interdisciplinary 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)

Interdisciplinary 187. Practicum in Learning/English (4)
(F,W,S)

Interdisciplinary 188. Practicum in Learning/Social Sciences (4)
(F,W,S)

Interdisciplinary 189. Practicum in Learning/Languages and Fine Arts (4)
(F,W,S)

LANGUAGE

OFFICE: Language Center, 2125 Psychology and Linguistics Building

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Language proficiency requirements are established for undergraduate students by the Colleges and for graduate students by the department. John Muir College students: see college and major department requirements.

Revelle College students demonstrate their proficiency in a foreign language by satisfactory performance in a language proficiency examination (which tests both conversational and reading abilities). There is no formal language course requirement, but students who are not proficient upon entrance will normally gain the requisite proficiency after taking from one to four courses in the Language Sequence (Language 1-2-3-4-5-6). A student who is not yet proficient after completing those courses can satisfy the requisite proficiency by taking one of the Literature 10 courses.

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 language or literature courses will be as follows:

COURSE	PREREQUISITES	
	PLACEMENT SCORE	PREVIOUS SCORE
Lang 1	0-400	none
Lang 2	410-500	Lang 1
Lang 3		Lang 2
Lang 4	500-550	Lang 3
Lang 5		Lang 4
Lang 6		Lang 5
Lit 10	550-650	proficiency
Lit 11	650 plus	Lit 10

Note: Students who have completed Russian 3 or have achieved 500 on the CEEBS examination should take Literature/Russian 9.

Students who have completed Hebrew E4 may continue with Hebrew literature 10.

Courses numbered Language 11 or 12 are intended for students whose primary concern is to learn to read a language, and graduate students preparing to fulfill their graduate reading examination requirements. Courses numbered 12A, 12B, 12C need not be taken in sequence.

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. (Revelle students must already be proficient in a language before studying a second language in Language 19.) Prior to registration, students must consult the instructor 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.

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

LOWER DIVISION

Lang/Fr 1-2-3-4-5-6. French (4-4-4-4-4-4)

See general description above.

Lang/Ge 1-2-3-4-5-6 German (4-4-4-4-4-4)

See general description above.

Lang/Hebrew E1-E2-E3. Hebrew (4-4-4)

An experimental course in elementary Hebrew. Credit and grade determined by performance on laboratory material. Supplementary meetings with a native speaker of Hebrew available for three hours a week.

Lang/Hebrew E4. Intermediate Hebrew (4)

An experimental course intended for students who have already acquired a basic knowledge of Hebrew or who have completed Hebrew E3. Practice in speaking, reading and grammar review.

Lang/Ru 1-2-3-4-5-6. Russian (4-4-4-4-4-4)

See general description above.

Lang/Sp 1-2-3-4-5-6. Spanish (4-4-4-4-4-4)

See general description above.

Lang/En 2A-2B-2C. Intermediate English as a Foreign Language (4-4-4)

Need not be taken in sequence. Open to undergraduate and graduate students whose native language is not English. (F,W,S)

Literature 9. Russian (4)

See *Departments of Instruction: Literature*.

Literature 10. French (4)

See *Departments of Instruction: Literature*.

Literature 10. German (4)

See *Departments of Instruction: Literature*.

Literature 10. Hebrew (4)

See *Departments of Instruction: Literature*.

Literature 10. Italian (4)

See *Departments of Instruction: Literature*.

Literature 10. Russian (4)

See *Departments of Instruction: Literature*.

Literature 10. Spanish (4)

See *Departments of Instruction: Literature*.

Lang/Fr 11. Elementary French Reading* (4)

A course designed to prepare students for graduate reading examination. (F,W,S)

Lang/Ge 11. Elementary German Reading* (4)

A course designed to prepare students for graduate reading examinations. (F,W,S)

Lang/Ru 11. Elementary Russian Reading* (4)

A course designed to prepare students for graduate reading examination. (F,W,S)

Lang/Fr 12A-12B-12C. Intermediate French Reading* (4-4-4)

Need not be taken in sequence. A course designed to prepare students for graduate reading examination. (F,W,S)

Lang/Ge 12A-12B-12C. Intermediate German Reading* (4-4-4)

Need not be taken in sequence. A course designed to prepare students for graduate reading examination. (F,W,S)

Lang/Ja 12A-12B-12C. Intermediate Japanese Reading (4-4-4)

Intended to give an opportunity to those who already have basic knowledge of spoken Japanese to acquire reading knowledge of the language. *Prerequisites: basic knowledge of spoken Japanese; consent of instructor.*

Lang/Ru 12A-12B-12C. Intermediate Russian Readings* (4-4-4)

Need not be taken in sequence. A course designed to prepare students for graduate reading examination. (F,W,S)

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.)

Language 19. Directed Study-Language* (2-4)

Self-instructional materials are available at present in Afrikaans, American Sign Language, Arabic (Iraqi), Basque, Burmese, Chinese (Mandarin), Czech, Danish, Dutch, Finnish, French, German, Modern Greek, Haitian Creole, Modern Hebrew, Hindustani, Hungarian, Icelandic, Igbo, Italian, Japanese, Korean, Luganda, Malay, Norwegian, Persian, Polish, Portuguese, Russian, Serbo-Croatian, Spanish, Swahili, Swedish, Tai, Twi, Turkish, Vietnamese, Yiddish, and Yoruba. *Prerequisite: must have passed college language proficiency requirement in another language.*

*Credit earned in language courses which duplicates credit gained in previous courses will not be counted towards graduation.

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 61. Elementary Mandarin (4)

Basic grammar and usage with initial emphasis on the spoken language. The written language will be progressively incorporated.

Lang/Ch 62. Elementary Mandarin (4)

Continuation of Lang/Ch 61. *Prerequisite: Lang/Ch 61 or equivalent.*

Lang/Ch 63. Elementary Mandarin (4)

Continuation of Lang/Ch 62. *Prerequisite: Lang/Ch 62 or equivalent.*

Lang/Ch 71. Intermediate Cantonese (4)

Usage and grammar with equal emphasis on the written language and spoken language. *Prerequisite: Lang/Ch 53 or equivalent.*

UPPER DIVISION

Lang/Sp 101A-101B-101C. Conversational Spanish for Medical Students (4-4-4)

A course designed to teach basic Spanish conversation and reading to meet the special needs of students in clinical settings. *Prerequisite: medical student status or permission of instructor.*

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 engineering 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 foreign languages. 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-1C (with the consent of the instructor, Linguistics 100 may substitute for the sequence).

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 the 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 from individual faculty members 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 relevant 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 all 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-1C (or with the consent of the instructor, Linguistics 100) in addition to one upper-division course other than 100. 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.
- (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, 181; 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 110; 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 140, 143, 179, 183.

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 110; 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 anthropological 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 areal 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 Undergraduate Major Adviser in the Linguistics Department. *Prerequisite: consent of instructor.* (See description under *Major Program* above.) (May be repeated for credit.)

199. Independent Study of Linguistics (2 or 4)

The student will undertake a program of research or advanced reading in linguistics under the supervision of a faculty member of the Linguistics Department. *Prerequisite: consent of instructor.* (See description under *Major Program* above.) (May be repeated for credit.)

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)

The 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 on 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, Agrege (*French Literature*)
 °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 Guillen, Ph.D. (*Spanish and Comparative Literature*)
 Fredric Jameson, Ph.D. (*French and Comparative Literature*)
 °°Reinhard Lettau, Ph.D. (*German Literature*)
 Louis Marin, L.E.E.S. (*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, Chairman*)
 Bernhard Blume, Ph.D. (*German 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:

- †Leonard Barkan, Ph.D. (*English and Comparative Literature*)
 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*)
 Jerome Katsell, Ph.D. (*Russian Literature*)

- Ismith Khan, Ph.D. (*Caribbean Literature*)
 Susan Kirkpatrick, Ph.D. (*Spanish and Comparative Literature*)
 °Keith D. Lowe, Ph.D. (*English Literature*)
 °Fred V. Randel, Ph.D. (*English Literature*)
 °George H. Szanto, Ph.D. (*Dramatic and Comparative 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*)
 James K. Lyon, Ph.D. (*Visiting Associate Professor, German Literature*)

Acting Assistant Professors:

- Antonio Carreira-Verez, M.A. (*Spanish Literature*)
 Page A. duBois, M.A. (*Classics*)
 Raymond Fleming, M.A. (*Italian and Comparative Literature*)
 ††Sigrít Kicza, M.A. (*German Literature*)
 Rosaura Sanchez, M.A. (*Spanish and Third World Studies*)
 Saul Steier, M.A. (*English Literature*)
 Cynthia Walk, M.A. (*German Literature*)

Lecturers:

- Lawrence Waddy, M.A. (*Classics*)
 Eleanor Widmer, Ph.D. (*English and American Literature*)
 Sam Hinton, A.B. (*Folklore*) (*Winter Only*)
 Helene Laperrousaz, C.A.P.E.S. (*French*)

°On leave 1973-74

°°On leave Winter and Spring 1974

†On leave Fall 1973

††On leave Fall and Winter 1973-74

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All literature courses at UCSD are offered by a single Department of Literature. The Department brings together teacher-scholars and students who would elsewhere be separated by the languages in which the national literatures are written. Here they are united by the nature of the studies they pursue. This lends a general and comparatist aspect to both undergraduate and graduate programs, which lead to the bachelor of arts, the candidate in philosophy, and the 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 in the Winter Quarter of their senior year Literature 191, 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 inter-departmental 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, in French Literature, in German Literature, in Spanish Literature, and in Comparative Literature. The Department 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 program of study makes explicit provision for a significant amount of independent work. Tutorial work and interdisciplinary study are encouraged; in addition, all graduate students work in close association with an adviser who directs their independent study preparatory to the Qualifying Examination. No specific courses are required — on 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 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/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. Two hours lecture and one hour discussion. (Open only to Muir College students.)

1A *Man and His Imagination* Mr. Steier (F)

1B *Man and His Nature* Mr. Barkan (W)

1C *Man and Society* Mrs. Widmer (S)

Lit/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.

Literature of Decolonization: the French Domain

Poetry, novels, and plays and films from Africa and the West Indies, mostly Senegal and Martinique: Fanon, Césaire, Senghor, Sembane, etc. Negritude and "métissage culturel". All works in translation. Mr. Benamou (F)

England in Art and Literature

Artists for and against the social order in the 18th and 19th century England. Mr. Dijkstra (W)

Spanish Peninsular Culture: Fine Arts and Literature

Music, painting and films will be used to illuminate the cultural and historical context of a selection of masterpieces of Spanish literature, moving from the popular ballads of the 15th century to the surrealist movement of the 20th century. All works in translation. Miss Kirkpatrick (S)

UPPER DIVISION

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/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 intellectual activity and the social and political environment in which it took place. (Cross-listed as Philosophy 109A-109B-109C and History 109A-109B-109C.) Miss duBois (F,W,S)

Lit/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* Mrs. Widmer (W)

112 *Expository Writing* (Not to be offered 1973-74)

114 *Verse* Mr. Fussell (F)

Lit/115. Writing 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. (Same as Third World Studies III.) Mr. Kahn (F)

Lit/116. 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.* Mr. Kahn (W)

Lit/120. The Classical Tradition (4)

Greek and Roman Literature in Translation. Women in classical antiquity, their place in literature, society and myth. Miss duBois (S)

Lit/122. The Literature of Renaissance Humanism (4)

(Not to be offered 1973-74.)

Lit/123. Studies in 18th Century European Literature (4)

In translation. Topics to be considered include the age of sensibility, enlightenment, neo-classicism. Attention given to historical and cultural contexts.

Diderot, Voltaire, et al Mr. Barnouw (W)

Lit/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 in Translation:

Emphasis on historical and cultural contexts, the concept of nature, reaction to science, and the role of the imagination. Mr. Barnouw (S)

125A-125B. The French Revolution and the Cultural Impact on England and Germany (4)

(Not to be offered 1973-74.)

Lit/Gen 126. Epic Poetry (4)

A study of major epics, in translation if their original language is not English.

Love and War:

The romantic epic: Homer's "Odyssey", Ovid's "Metamorphoses", Chaucer's "Troilus and Criseyde", and parts of Ariosto's "Orlando Furioso", and Spenser's "Faerie Queene". Mr. Barkan (S)

Lit/127. The Novel (4)

Aspects of the novel, not confined to a single national literature. Texts may be read in English. Two hours lecture and one hour discussion. *Prerequisite: upper-division standing or consent of instructor.*

"Anti-book" or "Anatomy"

Includes works by Rabelais, Cervantes, Swift, Sterne, Dickens, and Nabakov. Mr. Steier (S)

Lit/128. The Drama (4)

(Not to be offered 1973-74.)

Lit/129. Lyric Poetry (4)

Studies in lyric and/or epic poetry. Not confined to a single national literature.

Native and Primitive Poetry and Theory:

The course will begin with the "unwritten songs", rituals, dreams and festivals of the peoples of the first harmony. Examples range from Asian songs to Native American chants. Poetry and theories as attempts toward a second harmony will also be read. All texts are in English. The students are required to give an extra half-hour in the morning to sit silently with the instructor at some suitable spot in the wooded area before proceeding to the class proper. Mr. Yip (S)

Lit/Gen 130. Introduction to Criticism (4)

Theories of criticism and the role and function of critics and artists in society. Ms. Williams (F)

Lit/It/Tr 148. Italian Literature in Translation (4)

(Not to be offered 1973-74.)

Lit/Gen 149. German Literature in Translation (4)

Texts may be read in English. Topic varies from quarter to quarter.

The German Short Story from Goethe to Grass

Discussion of the "Novelle" as a distinct genre through an examination of themes and narrative techniques. Miss Walk (F)

Lit/Gen 150. Masterpieces of Chinese Literature in Translation (4)

Course will focus on a few representative masterpieces of Chinese literature in its classical age, with emphasis on the formal conventions and the social or intellectual presuppositions that are indispensable to their understanding. *Poetry and Criticism in Modern China:*

The New literature of modern China since the May 4th Movement is a literature of crisis after crisis. This course attempts to study the poetry and criticism as they evolve from these crises. Mr. Yip (W)

Lit/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. Two hours lecture and one hour discussion.

Borges Mr. Alazraki (F)

Utopias Mr. Elliott (W)

Science Fiction

The major texts of science fiction from H. G. Wells to the present. The course will aim at a definition of science fiction as a form, and at an evaluation of its expression of contemporary society. Some emphasis will also be placed on the historical changes in style and function from the beginning of the twentieth century. Mr. Jameson (F)

Lit/154. The New Literatures (4)

A consideration of one or more literatures of emerging nations. Texts may be read in English. Examples: Caribbean literature or African literature. Topic varies. May be repeated for credit with instructor's approval.

Spanish Literature in Translation Mr. Blanco (W)

Lit/Gen 155. Novels of the Third World (4)

The novels of African, Caribbean, and Indian writers will be studied and also Latin American novelists. Mr. Khan (F)

Lit/161. The Forms of Folklore (4)

Mr. Hinton (W)

Lit/Gen 171. Pushkin (4)

A study of the major works of Pushkin, verse and prose. All readings will be in English. Mr. Saville (F)

Lit/Gen 172. Short Masterpieces of Russian Fiction (4)

Short stories and novellas from the Eighteenth Century to the Soviet Period. All readings will be in English. Mr. Saville (W)

Lit/Gen 173. Chekhov (4)

A study of major dramas and short stories by Chekhov. All readings will be in English. Mr. Katsell (W)

Lit/Gen 174. Solzhenitsyn (4)

Major novels and other fiction by Solzhenitsyn, in the context of Soviet history. All readings will be in English. Mr. Katsell (S)

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. Mrs. Brown (S)

Lit/Gen 176. Russian Drama (4)

A survey of major Russian drama, from the Eighteenth Century to the Soviet Period. All readings will be in English. (Not to be offered 1973-74.)

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. (Not to be offered 1973-74.)

Lit/Gen 178. Russian Poetry (4)

Lyric and narrative verse by the chief Russian poets, mainly of the Nineteenth and Twentieth Centuries. All readings will be in English. (Not to be offered 1973-74.)

Lit/Gen 179. Tolstoy (4)

A study of some of Tolstoy's major novels, novellas, and short stories. All readings will be in English. (Not to be offered 1973-74.)

Lit/Gen 180. Dostoevsky (4)

A study of some of Dostoevsky's major novels and novellas. All readings will be in English. (Not to be offered 1973-74.)

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. (Not to be offered 1973-74.)

Lit/Gen 182. Russian Autobiography (4)

Major Russian autobiographies, mainly from the Nineteenth and Twentieth Centuries. Emphasis will be on the techniques of autobiography, the reflections of history in this literary genre, the development of personal identity, and the poetic vocation. All readings will be in English. (Not to be offered 1973-74.)

Lit/Gen 183. Russian Literature from the Beginnings through the Eighteenth Century (4)

A study of major works of Russian literature in the earlier periods, seen in the context of Russian history. All readings will be in English. (Not to be offered 1973-74.)

Lit/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. Texts may be read in English. Three hours. (Not to be offered 1973-74.)

Lit/191. The Study of Literature (4)

Critical approaches to literature, with theoretical readings and practical applications. Primarily for students who plan to go on to graduate study or otherwise make literature their profession. Should be followed by a 199 in which student will write a senior essay. *Prerequisites: upper division standing or consent of instructor.* Mr. Pearce (W)

Lit/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. Staff (F,W,S)

GRADUATE**Lit/Gen 500. Apprentice Teaching in Literature (1-4)**

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 undergraduate Humanities sequence. *Prerequisite: student must be a Teaching Assistant.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Gen 505. Apprentice Teaching in Third College (1-4)

Consideration of pedagogical methods appropriate to the teaching of Third College programs. Supervised teaching in Third College. *Prerequisite: student must be a Teaching Assistant.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

**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 1973-74.)

Lit/Ch 198. Directed Group Study (4)

Directed group study in areas of Chinese literature not normally covered in courses. *Prerequisites: upper-division standing and permission of Department.* Staff (F,W,S)

Lit/Ch 199. Special Studies (4)

Tutorial individual guided reading in an area not normally covered in courses. *Prerequisite: upper-division standing and permission of Department.* Staff (F,W,S)

**COMPARATIVE LITERATURE
GRADUATE****Lit/CL 206. Romance Philology (4)**

(Not to be offered 1973-74.)

Lit/CL 207. Germanic Philology (4)

(Not to be offered 1973-74.)

Lit/CL 208. Textural Criticism (4)

(Not to be offered 1973-74.)

Lit/CL 210. Classical Studies (4)

(Not to be offered 1973-74.)

Lit/CL 215. Medieval Studies (4)

(Not to be offered 1973-74.)

Lit/CL 221. Renaissance Studies (4)

One or more major writers, texts or trends of European Renaissance Literature.

Study of Renaissance epic, including Boiardo, Ariosto, Tasso, Ronsard, Spenser and Milton. Mr. Dunseath (S)

Lit/CL 224. Seventeenth Century Studies (4)

(Not to be offered 1973-74.)

Lit/CL 231. Eighteenth Century Studies (4)

(Not to be offered 1973-74.)

Lit/CL 241. Romanticism (4)

A study of the Romantic movement in various national literatures. Mr. Barnouw (W)

Lit/CL 242. Nineteenth Century Studies (4)

French-Russian literary influences. A study of the mutual influences among Nineteenth-Century novelists — Balzac, Hugo, Dostoevsky, Turgenev. Mrs. Brown (F)

Lit/CL 243. Symbolism (4)

(Not to be offered 1973-74.)

Lit/CL 252. Modernism (4)

(Not to be offered 1973-74.)

Lit/CL 253. The New Literature (4)

(Not to be offered 1973-74.)

Lit/CL 261. Comparative Literature: History and Theory (4)

(Not to be offered 1973-74.)

Lit/CL 262. Comparative Prosody (4)

(Not to be offered 1973-74.)

Lit/CL 263. Theory and Practice of Translation (4)

(Not to be offered 1973-74.)

Lit/CL 271. Critical Theory (4)

Problems of literary analysis; competing schools and major figures in literary criticism.

The Frankfurt School Mr. Jameson (W)

Lit/CL 272. Literature and Social History (4)

(Not to be offered 1973-74.)

Lit/CL 273. Art and Literature (4)

An investigation into themes and styles common to literature and the visual arts.

A year-long sequence of seminars exploring the development and classification of methods for the analysis of elements of interaction between art and literature. Topics will include: the semiology of art and literature; how to "read" a painting and how to "see" a text; links between perception and ideology. Students are expected to enroll for the full sequence. Upon permission from the instructors, a limited number of students may be admitted. Messrs. Dijkstra and Marin (F,W,S)

Lit/CL 274. Genre Studies (4)

A consideration of a representative selection of works relating to a theme, form, or literary genre.

Study of Landscape Poetry, East and West

Why "Landscape Poetry" and not "Nature Poetry" when in fact we read mainly Wordsworth, Snyder, Hsieh Ling-yun, The Orchid Pavilion Poets and Wang Wei? To do so is to channel many vague impressions of sameness into more intelligent understanding of the divergence and the convergence both on the metaphysical and the physical levels, at which point we can perhaps legitimately ask the question of the adequacy of the landscape. Landscape painting and certain related theories form an integral part of this seminar. Mr. Yip (F)

Study of the Short Story in Representative Examples

From French, Russian and English literature. Emphasis will be on the aesthetics of the genre and on its development. Mr. Katsell (W)

Lit/CL 276. The Modern Theatre (4)

(Not to be offered 1973-74.)

Lit/CL 279. Literary Studies and Linguistics (4)

(Not to be offered 1973-74.)

Lit/CL 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/CL 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/CL 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. Reading and Writing (2)

Intensive course in reading and rhetoric limited to students recommended by the Provost. May be repeated for credit. Staff (F,W,S)

Lit/En 21-22-23. The English Literary Imagination (4-4-4)

A critical reading of major English and American authors, considered in relation to their own periods and to ours. One or more quarters may be taken separately. Two hours lecture and one hour discussion.

21 *The Middle Ages and the Renaissance* Mr. Dunseath (F)

22 *Neoclassicism and Romanticism* Mr. Wright (W)

23 *The Rise of Modernism* Mr. Behar (S)

UPPER DIVISION

Prerequisite: upper-division standing or consent of the instructor. Additional prerequisites may be specified below.

Lit/En 101. English Literary Prose (4)

(Not to be offered 1973-74.)

Lit/En 102. English Dramatic Literature (4)

The development of the drama in English. Two hours lecture and one hour discussion.

Restoration and Eighteenth Century Comedy

Etherege, Wycherley, Congreve, Farquhar, Gay, Fielding, Sheridan. Mr. Steier (S)

Lit/En 103. English Poetry (4)

(Not to be offered 1973-74.)

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. Two hours lecture and one hour discussion.

Chaucer Mr. Crowne (F)

Lit/En 122. The Renaissance (4)

Major literary works of the Renaissance as seen against the historical and intellectual background of the period. Two hours lecture and one hour discussion.

Metaphysical Poetry:

Donne, Herbert, Vaughan, Crashaw, Traherne. Mr. Dunseath (W)

Lit/En 123. The 18th Century (4)

Major literary works of the 18th century. Two hours lecture and one hour discussion.

Major Authors:

Swift, Pope, Fielding, Johnson, Blake. Mr. Elliott (F)

Lit/En 124. The 19th Century (4)

Readings in the Romantics and Victorians: the intellectual background of the age. Two hours lecture and one hour discussion.

English Romanticism Mr. Barnouw (F)

The Novel:

Austen, Bronte, Dickens, Thackeray, Trollope. Mr. Wright (S)

Lit/En 125. American Literature of the 19th Century (4)

A critical study of major American writers of the 19th century. Two hours lecture and one hour discussion.

The American Renaissance Mr. Fussell (W)

Lit/En 126. The Modern Period (4)

A critical study of major American and English writers of our period. Two hours lecture and one hour discussion.

Modern British and American Poetry:

Pound, Williams, Eliot, Yeats, Stevens. Mr. Behar (F)

Modern British and American Fiction Mr. Stewart (W)

Lit/En 130. Themes in English Intellectual and Literary History (4)

One or more themes in English literature, not confined to a single period or genre: for instance, love, death, politics, imagination. Topic varies. May be repeated for credit with instructor's approval.

Rise of Individualism in Renaissance Literature Mr. Steier (F)

Lit/En 140. Introduction to Black 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. Mr. Williams (W)

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. Two hours lecture and one hour discussion. *Prerequisite: upper-division standing.* Mr. Dunseath (F)

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. Two hours lecture and one hour discussion.

Close attention to a small number of plays from the second half of Shakespeare's career, including such topics as structure, imagery, history of ideas, and theatre. Mr. Barkan (W)

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. Three hours. The student may enroll in more than one section in a single quarter.

John Milton Mr. Steier (W)

"Hamlet", "The Confidence Man" and "The Waste Land" Mr. Fussell (W)

Platonism and Renaissance Literature Mr. Barkan (S)

An inquiry into the relation between philosophy and literature. The reading, all done in English, will include philosophical works of Plato, Plotinus, Ficino, Pico della Mirandola, and literary works to Castiglione, Shakespeare, Sidney and Spenser.

Poe Mr. Dijkstra (S)

Mark Twain and Henry James Mr. Fussell (S)

T. S. Eliot Mr. Behar (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. *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. *Prerequisite: special permission of the department and upper-division standing.* Staff (F,W,S)

GRADUATE**Lit/En 202. Bibliography and Methods of Research (4)**

(Not to be offered 1973-74.)

Lit/En 211A-211B. Old English Literature (4-4)

Lit/En 211A is a study of Old English language, forms and syntax, and reading of some prose and verse. Lit/En 211B is a study of Old English poetry. *Prerequisite: Lit/En 211A for 211B.* Mr. Crowne (W,S)

Lit/En 214. Middle English Literature (4)

(Not to be offered 1973-74.)

Lit/En 221. 16th Century English Literature (4)

(Not to be offered 1973-74.)

Lit/En 224. 17th Century English Literature (4)

Consideration of one or more major figures, texts, or trends in 17th century English literature, including the metaphysical poets and Jacobean Drama. Topic varies from year to year.

Donne Mr. Dunseath (W)

Lit/En 226. Shakespeare (4)

(Not to be offered 1973-74.)

Lit/En 231. Restoration and 18th Century English Literature (4)

Consideration of one or more figures, texts, or trends in Restoration and 18th century English literature, including Dryden, Pope, Swift, the early novel, satire. Topic varies from year to year.

Swift Mr. Elliott (F)

Lit/En 236. Later 18th Century English Literature (4)

(Not to be offered 1973-74.)

Lit/En 241. English Literature of the Romantic Period (4)

(Not to be offered 1973-74.)

Lit/En 244. Colonial American Studies (4)

(Not to be offered 1973-74.)

Lit/En 245. 19th Century American Studies (4)

Consideration of some of the principal writers and movements in 19th century American literature. Topic varies from year to year.

Whitman Mr. Fussell (S)

Lit/En 246. Victorian Literature (4)

Consideration of one or more major figures, texts, or trends in the Victorian period.

Trollope Mr. Wright (F)

Lit/En 251. 20th Century English Literature (4)

Consideration of one or more major figures, texts, or trends in 20th century English literature.

Studies in Literature and Culture:

Eliot, Yeats, Conrad, Forster, Lawrence. Mr. Behar (F)

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.

Ezra Pound Mr. Yip (W)

History and Myth in American Writing, 1919-1939

Three of four writers to be selected from the following: Anderson, Crane, Hemingway, Fitzgerald, Faulkner, Nathaniel West, Mike Gold, Mr. Behar (W)

William Faulkner Mr. Stewart (S)

Lit/En 271. Genres in English (4)

(Not to be offered 1973-74.)

Lit/En 275. Plays and Roleplays (4)

Analysis of dramatic texts (two plays) by contrasting these with transcriptions of *ad hoc* speech. Transcriptions are of students improvising drama from given germinal situations. The germinal situations of the plays and transcriptions being contrasted will be similar. Mr. Waterhouse (S)

Lit/En 297. Directed Studies (1-12)

Guided, supervised reading in a broad area of English and American literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/En 298. Special Projects (4)

Treatment of a special topic in English and American literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

Lit/En 299. Thesis (1-12)

Research for the dissertation. Offered for repeated registration. *Prerequisite: advancement to candidacy for the Ph.D. degree.* (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

**FRENCH LITERATURE
LOWER DIVISION****Lit/Fr 10. Readings and Interpretations (4)**

The course is entirely taught in the language of the literature concerned 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

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. Cohen (F); Mr. Jameson (S); Staff (W)

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.* Miss Laperrousaz (F,W,S)

UPPER DIVISION

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Fr 121. The Middle Ages and the Renaissance (4)

(Not to be offered 1973-74.)

Lit/Fr 122. The Seventeenth and Eighteenth Centuries (4)

(Not to be offered 1973-74.)

Lit/Fr 124. The Nineteenth and Twentieth Centuries (4)

(Not to be offered 1973-74.)

Lit/Fr 130A-130B-130C. Themes in French Intellectual and Literary History (4-4-4)

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.* Courses may be taken out of normal order only by permission of the instructor.

L'image du Bonheur dans la Littérature Française

What image of happiness underlies the works of Rabelais, Molière, Diderot, Rousseau, Fourier, Stendhal, Baudelaire, Gide, Camus, and Breton. Team-work. Mr. Benamou (F)

What is Literature

A corroboration and critique of Sartre's perspective through different historical examples. Mr. Cohen (W)

*Socialization of and Attitudes Towards Children and Adolescents Mrs. Brown (S)***Lit/Fr 140. Composition and Stylistics (4)**

Analysis of classical and modern French literary texts to increase the student's sensitivity to style and improve his ability to write and speak French. Strongly recommended for students who take French as their primary literature. Mr. Benamou (W)

Lit/Fr 151. Major French Authors (4)

A study in depth of the works of a major French writer. Recommended for students whose primary literature is French. May be repeated for credit.

*Le XVIII^e Siècle Français Mr. Marin (F)***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. Three hours. *Prerequisite: upper-division standing or permission of department.* Staff

*Literature and society as reflected in the works of Romantic, Realist and Naturalist Schools. Mrs. Brown (W)**La Fontaine et la "Fable" Mr. Marin (S)***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. *Prerequisite: 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. *Prerequisite: upper-division standing and permission of department.* Staff (F,W,S)

GRADUATE**Lit/Fr 203. History of the French Language (4)**

(Not to be offered 1973-74.)

Lit/Fr 211. Introduction to Old French Language and Literature (4)

(Not to be offered 1973-74.)

Lit/Fr 221. Sixteenth Century French Literature (4)

(Not to be offered 1973-74.)

Lit/Fr 224. Seventeenth Century French Literature (4)

(Not to be offered 1973-74.)

Lit/Fr 231. Eighteenth Century French Literature (4)

(Not to be offered 1973-74.)

Lit/Fr 241. Nineteenth Century French Literature (4)

Consideration of one or more major figures, texts, or trends in 19th century French literature.

*The Novel Mr. Jameson (F)***Lit/Fr 251. 20th Century French Literature (4)**

Selected topics in modern French literature and thought. Mr. Cohen (F)

Surrealism

The movement in its several aspects: poetry, film, politics, morals. An introductory course, with works in French, discussions in English and French. Mr. Benamou (W)

The Poetics of Speech and Writing

MacLuhan vs. Derrida, with attention to poets, text, ideology. Some works by Mallarmé, Apollinaire, Césaire, St. John Perse, Deguy, etc. Mr. Benamou (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.) Staff (F,W,S)

Lit/Fr 298. Special Projects (4)

Treatment of a special topic in French literature. Offered for repeated registration. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

Lit/Fr 299. Thesis (1-12)

Research for the dissertation. *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 entirely taught in the language of the literature concerned 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 in which an ability to read extensive texts in German is called for. *Prerequisite: proficiency in a foreign language.*

*Middle Ages and Renaissance Mr. Wierschin (F)**Classicism and Romanticism Miss Walk (W)**The Twentieth Century Mr. Kieza (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.* Miss Walk (F), Mr. Kieza (S)

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. Two hours lecture and one hour discussion.

Romanticism

Bonaventure, Novalis, Tieck. An attempted survey of Early Romantic prose with extreme samples. Mr. Lettau (F)

Lit/Ge 102. German Dramatic Literature (4)

(Not to be offered 1973-74.)

Lit/Ge 103. German Poetry (4)

(Not to be offered 1973-74.)

Lit/Ge 123. 18th Century German Literature (4)

(Not to be offered 1973-74.)

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. Strongly recommended for students who take German as their primary literature.

Stylistic variations and potentialities will be explored, various classical and modern texts will be analysed to set up basic stylistic criteria and guiding principles. At least one composition per week on various subjects. Mr. Wierschin (S)

Lit/Ge 149. German Literature (4)

One or more aspects of German literature such as the contemporary novel, nineteenth-century poetry. Topics vary from quarter to quarter. May be repeated for credit.

Short Story from Goethe to Grass

Discussion of the "Novelle" as a distinct genre through an examination of themes and narrative techniques. Miss Walk (F)

Lit/Ge 151. Goethe (4)

(Not to be offered 1973-74.)

Lit/Ge 152. Major German Authors (4)

(Not to be offered 1973-74.)

Lit/Ge 190. Seminars (4)

These seminars are devoted to a variety of special topics, including the works of single authors, genre studies, problems in literary criticism, literature and society, and the like. The student may enroll in more than one section in a single quarter.

*Interpretation of Dramatic Literature Staff (F)**Interpretation of Lyric Poetry Staff (W)**The German Enlightenment*

A survey of German Enlightenment philosophy, literary theory and practice against the social and political background of the period, with special emphasis on the criticism and drama of Lessing. Miss Walk (W)

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. *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. *Prerequisite: upper-division standing and permission of department.* Staff (F,W,S)

GRADUATE

Lit/Ge 203. Cultural History of the German Language (4)

(Not to be offered 1973-74.)

Lit/Ge 210A. Middle High German (4)

Introduction to the Middle High German language. Reading of texts with exercises in semantics, grammar, etymology, and syntax. Mr. Wierschin (F)

Lit/Ge 210B. Middle High German (4)

Middle High German II. Analysis of texts representing a variety of genres. Mr. Wierschin (W)

Lit/Ge 221. Middle High German Classicism (4)

(Not to be offered 1973-74.)

Lit/Ge 231. Eighteenth Century German Literature (4)

The German Drama of "Storm and Stress" Staff (F)

Schiller's "Wallenstein" Staff (W)

Lit/Ge 238. Goethe (4)

(Not to be offered 1973-74.)

Lit/Ge 241. German Romantic Prose (4)

(Not to be offered 1973-74.)

Lit/Ge 242. Nineteenth Century German Literature (4)

(Not to be offered 1973-74.)

Lit/Ge 251. The Twentieth Century (4)

(Not to be offered 1973-74.)

Lit/Ge 252. Major German Authors (4)

A study in depth of the work of one major German author.

Brecht

Critical study of Brecht's work; with emphasis on Brecht's experiences during his California/American years and his intellectual relationship to Kipling. Mr. Lyon (S)

Lit/Ge 271. Theory of Genres (4)

(Not to be offered 1973-74.)

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.

The German Comedy

Critical study of the genre from the rise of classical comedy in the eighteenth century to the tragicomedy of the twentieth century. The course will focus on various forms of German comedy and their relation to concurrent developments in European drama generally. Miss Walk (S)

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. *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. Miss duBois (F)

Lit/Gr 2. Intermediate Greek (4)

Continuing instruction in Greek grammar, with reading of single texts. *Prerequisite: Lit/Gr 1 or equivalent.* Miss duBois (W)

UPPER DIVISION

Prerequisite: upper-division standing or consent of instructor. Additional prerequisites may be specified below.

Lit/Gr 100. Introduction to Greek Literature (4)

Reading and discussion of selections from representative authors. Review of grammar as needed. *Prerequisite: Lit/Gr 2 or equivalent.* Miss duBois (S)

Lit/Gr 101. Readings in Greek Literature (4)

Mr. Waddy (F)

Lit/Gr 102. Readings in Greek Literature (4)

Mr. Waddy (W)

Lit/Gr 103. Readings in Greek Literature (4)

Mr. Waddy (S)

Lit/Gr 199. Special Studies (4)

Tutorial; individual guided reading in areas of Greek literature not normally covered in courses. Prerequisite: upper-division standing and permission of Department, upon demonstration of proficiency equivalent to successful completion of Lit/Gr 100. Staff (F,W,S)

GRADUATE

Lit/Gr 297. Directed Study (1-12)

Guided and supervised reading in a broad area of Greek Literature. (Satisfactory/Unsatisfactory grades only.) Staff (F,W,S)

Lit/Gr 298. Special Projects (4)

Treatment of a special topic in Greek literature. (Satisfactory/Unsatisfactory grades permitted.) Staff (F,W,S)

HEBREW LITERATURE LOWER DIVISION

Lit/He 10. Readings and Interpretations (4)

The course is entirely taught in the language of the literature concerned 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

Prerequisite: upper-division standing and permission of the Department.

Lit/He 199. Special Studies (4)

Tutorial; individual guided reading in areas of Hebrew literature not normally covered in courses. *Prerequisite: upper-division standing or permission of department.* Staff (F,W,S)

LATIN LITERATURE LOWER DIVISION

Lit/La 1. Beginning Latin (4)

Fundamentals of Latin grammar, exercises in vocabulary and accidence and in reading. Two hours lecture and one hour discussion. Mr. Waddy (F)

Lit/La 2. Intermediate Latin (4)

Continuing instruction in Latin grammar, with reading of simple texts. Two hours lecture and one hour discussion. *Prerequisite: Lit/La 1 or equivalent.* Mr. Waddy (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.* Mr. Waddy (S)

Lit/La 101. Readings in Latin Literature (4)

Mr. Waddy (F)

Lit/La 102. Readings in Latin Literature (4)

Mr. Waddy (W)

Lit/La 103. Readings in Latin Literature (4)

Mr. Waddy (S)

Lit/La 199. Special Studies (4)

Tutorial; individual guided reading in areas of Latin literature not normally covered in courses. *Prerequisite: 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. This course is designed to follow Lang/Ru 1-2-3, which are prerequisite to it. Students will also be admitted who have obtained 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 non-literary 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, in the case of students who have not taken Lit/Ru 10, 2. 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 1973-74.)

Lit/Ru 124. Advanced Language and Literature (4)

Short works of classical and modern Russian literature, in prose and verse. Grammar review, and practice in conversation and composition. Mr. Saville (F)

Lit/Ru 126. Advanced Language and Literature (4)

Continuation of the work in Lit/Ru 124. Mrs. Brown (W)

Lit/Ru 128. Advanced Language and Literature (4)

Continuation of the work in Lit/Ru 126. Mr. Katsell (S)

Lit/Ru 171. Pushkin (4)

Consists of the lectures of Lit/Gen 171, with readings and papers in the original, and additional meetings to be arranged with the instructor. Mr. Saville (F)

Lit/Ru 172. Short Masterpieces of Russian Fiction (4)

Consists of the lectures of Lit/Gen 172, with readings and papers in the original, and additional meetings to be arranged with the instructor. Mr. Saville (W)

Lit/Ru 173. Chekhov (4)

Consists of the lectures of Lit/Gen 173, with readings and papers in the original, and additional meetings to be arranged with the instructor. Mr. Katsell (W)

Lit/Ru 174. Solzhenitsyn (4)

Consists of the lectures of Lit/Gen 174, with readings and papers in the original and additional meetings to be arranged with the instructor. Mr. Katsell (S)

Lit/Ru 175. Nineteenth Century Prose (4)

Consists of the lectures of Lit/Gen 175, with readings and papers in the original, and additional meetings to be arranged with the instructor. Mrs. Brown (S)

Lit/Ru 198. Directed Group Study (4)

Directed group study in areas of Russian literature not normally covered in courses. *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. *Prerequisite: upper-division standing or 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, compositions and readings from Chicano and Latin American authors. Equivalent to Lit/Sp 10. *Prerequisite: consent of instructor.* Miss Sanchez (F)

Lit/Sp 10. Readings and Interpretations (4)

The course is entirely taught in the language of the literature concerned 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 in which an ability to read extensive texts in Spanish is called for. *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 1973-74.)

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)

(Not to be offered 1973-74.)

Lit/Sp 102. Spanish Dramatic Literature (4)

The development of the drama in Spanish.

Development of the Spanish Theater from the Romantics to the Twentieth Century

Close reading of individual works by Zorrilla, Rivas, Echegaray, Unamuno, Benavente, Valle-Inclan, and Garcia Lorca with discussion of general changes in the conception of theater and its role in society. Miss Kirkpatrick (F)

Lit/Sp 103. Spanish Poetry (4)

(Not to be offered 1973-74.)

Lit/Sp 104. History of Spanish Language (4)

Historical description of Spanish phonology, morphology and syntax based on readings of the different periods. Miss Sanchez (W)

Lit/Sp 121. The Medieval Period (4)

(Not to be offered 1973-74.)

Lit/Sp 122. Renaissance and Baroque (4)

Studies in selected topics in 16th and 17th century Spanish Literature.

Conceptismo:

A study of the prose of Quevedo and Gracian. Mr. Carreira (S)

Lit/Sp 124. The 19th Century (4)

(Not to be offered 1973-74.)

Lit/Sp 125. Spanish-American Literature (4)

(Not to be offered 1973-74.)

Lit/Sp 126. The Modern Period (4)

Selected topics in Modern Spanish Literature.

Contemporary Spanish Novel

A study of the major novelists of 1927 generation: Sender, Max Aub, Ayala, Chacel and Barea. Mr. Carreira (F)

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.

The Twentieth Century Novel

A study of the major trends and authors in contemporary Spanish-American Novel. Mr. Alazraki (W)

Lit/Sp 131. Spanish American Poetry (4)
(Not to be offered 1973-74.)

Lit/Sp 132. Spanish American Essay (4)
(Not to be offered 1973-74.)

Lit/Sp 140. Composition and Stylistics (4)
(Not to be offered 1973-74.)

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. Miss Sanchez (F)

Lit/Sp 151. Cervantes (4)
A critical reading of the "Quijote". Required of literature majors whose primary literature is Spanish. Mr. Carreira (W)

Lit/Sp 153. Introduction to Chicano Literature (4)
(Not to be offered 1973-74.)

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. Three hours.

The Poetry of Pablo Neruda

An intensive reading of his major works with emphasis on aesthetic development of his poetry from early works to the present. Mr. Alazraki (W)

Mariano Jose de Larra

The main emphasis will be on Larra's essays as vehicles of cultural and political criticism and of personal self-expression. The questions of his relationship to the Enlightenment and to Romanticism will be studied in conjunction with the development of his vision of society and self. Miss Kirkpatrick (S)

Lit/Sp 198. Directed Group Study in Spanish Literature (4)

Research seminars and research, under the direction of a member of the staff. May be repeated for credit. *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. *Prerequisite: upper-division standing and special permission of the Department.* Staff (F,W,S)

GRADUATE

Lit/Sp 201. Reading Medieval Texts (4)

Introduction to the reading of Medieval Spanish. It will provide the student with the linguistic and cultural background necessary to go on to more work in depth in the medieval field.

Theoretical and practical introduction to the reading of primary source material to study the problems of transmission and re-creation of medieval texts. (To be held 1973-74 at Catedra-Seminario Menendez Pidal, in Madrid.) Mr. Catalan (F)

Lit/Sp 202. Spanish Language In America (4)

Selected topics on the history, structure and peculiarities of the Spanish Language in America.

Spanish American Dialects Miss Sanchez (S)

Lit/Sp 203. History of the Spanish Language (4)
(Not to be offered 1973-74.)

Lit/Sp 208. Textural Criticism in Spanish (4)

Tools and methods of scholarly research in literature for establishing texts from both manuscript and printed sources.

Fifteenth-Twentieth-century ballad manuscripts, chapbooks, cancioneros, and modern folkloric materials in Spanish, Judeo-Spanish, Catalan, and Portuguese. (To be held 1973-74 at Catedra-Seminario Menendez Pidal, in Madrid.) Mr. Catalan (F,W,S)

Lit/Sp 214. Studies in Medieval Literature (4)

(Not to be offered 1973-74.)

Lit/Sp 216. 15th Century Spanish Literature and Culture (4)

(Not to be offered 1973-74.)

Lit/Sp 224. Golden Age Studies

Consideration of one or more major figures, texts, trends or problems in Spanish Golden Age studies.

Golden Age Drama Mr. Blanco (F,W)

Baroque Poetry

A study of the poetry of Gongora, Lope, and Quevedo. Mr. Carreira (W)

Lit/Sp 226. Cervantes (4)

A critical reading of the "Quijote".

The Exemplary Novels Mr. Carreira (S)

Lit/Sp 231. Eighteenth-Century Spanish Literature (4)

(Not to be offered 1973-74.)

Lit/Sp 241. Romanticism in Spain (4)

(Not to be offered 1973-74.)

Lit/Sp 248. Nineteenth-Century Theater (4)

(Not to be offered 1973-74.)

Lit/Sp 252. Studies in Modern Hispanic Literature and Culture (4)

Major trends and figures considered in the context of late 19th and 20th century Hispanic culture.

Galdos, novelist

A study of Galdos' development as a novelist with respect to the possibilities of the novel form in the late nineteenth century. The interplay of symbolism and realism in his work and the relation of the novel to history will be considered as well as problems of freedom and autonomy in novelistic form. Prerequisites: previous reading of one of the Episodios nacionales, Dona Perfecta, Fortunata y Jacinta, and El Amigo Manso. Miss Kirkpatrick (F)

Literature and Politics of Spanish Romanticism

A study of the interrelationship of aesthetic and political ideology in the following phases of Spanish Romanticism: 1) Pre-romanticism of the Ilustrados: Cadalso 2) The nationalist Romantic reaction of Bohl de Faber and Fernan Caballero 3) The liberal romantic tradition of Martinez de la Rosa, Espronceda and Larra. Miss Kirkpatrick (W)

Lit/Sp 253. Chicano Literature (4)

(Not to be offered 1973-74.)

Lit/Sp 254. Modern Spanish Poetry (4)

(Not to be offered 1973-74.)

Lit/Sp 255. The Modern Spanish Novel (4)

(Not to be offered 1973-74.)

Lit/Sp 258. Spanish-American Prose (4)

Consideration of one or more major figures, texts, trends or problems in Spanish-American prose.

Julio Cortazar

A critical examination of Cortazar's fiction with emphasis on his short stories. Mr. Alazraki (F)

Lit/Sp 259. Spanish-American Poetry (4)

(Not to be offered 1973-74.)

Lit/Sp 271. Literary Theory (4)

Problems and approaches in literary theory in the context of Spanish and Spanish-American literature.

The Spanish-American Short Story

Study of the short story as a form and a literary genre. Some aspects of its development in Latin America will be studied but emphasis will be placed on formalistic elements. Mr. Alazraki (S)

Lit/Sp 272. Literature and Society Studies (4)

Special topics in practical criticism involving social and economic historical perspectives.

The Social Foundation of Narrative Forms in Golden Age (To be held 1973-74 at Catedra-seminario Menendez Pidal, in Madrid.) Mr. Guillen (W,S)

Lit/Sp 280. Field Work

Techniques of on-the-spot linguistic and folkloric surveys, including the practice of ballad collection in the Spanish Peninsula. Mr. Catalan (W)

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.)

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.
- 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. Warschawski, Ph.D.

Associate Professors:

- †John W. Evans, M.D., Ph.D.
- Jay P. Fillmore, 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.
- Philip Erdelsky, Ph.D.
- David Golber, Ph.D.
- Patrick J. Ledden, Ph.D. (*Assistant Provost, Muir College*)
- Richard R. Patterson, Ph.D.
- Audrey A. Terras, Ph.D.
- John J. Wavrik, Ph.D.
- James E. White, Ph.D.
- Einar Hille, Ph.D., *Research Mathematician*
- Arthur Sard, Ph.D., *Research Associate in Mathematics*
- Frank B. Thiess, Ph.D., *Lecturer in Mathematics*
- °On leave Spring 1974
- °°On leave 1973-74
- †On leave Fall, Winter 1973-74

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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 behavioral 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 161A-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 languages may be substituted.) The foreign-language examinations, which consist of the translation of selected passages in mathematics, are administered by the Department.

Doctor's Degree Program

During the first two years the student will acquire a general background in mathematics by preparing for and taking the departmental qualifying examinations. Written examinations must be taken in four of the following areas: algebra, applied analysis, complex analysis, differential geometry, mathematical logic, numerical mathematics, ordinary or partial differential equations, probability or mathematical statistics, real analysis, topology, an approved minor outside the Department.

One of the four examinations must be in either real analysis or complex analysis and another must be in either algebra or topology. The examinations are given at the beginning and end of each academic year. Because the department expects the student to have completed four examinations by the beginning of his third year, he is required to attempt examinations in four areas by that time. (Exception to this requirement for students entering with inadequate background can only be made with the approval of the department before the end of the student's first quarter.) Examinations may be repeated, but no more than eight attempts are allowed in order to pass the examinations in four areas.

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.

After satisfactory completion of the departmental examinations, a doctoral committee appointed by the Graduate Division will conduct the student's oral qualifying examination. Before taking the oral qualifying examination the student must demonstrate a satisfactory reading knowledge of two foreign languages (chosen from French, German, or Russian; in exceptional cases other languages may be substituted). The foreign-language examinations, which consist of the translation of selected passages in mathematics, are administered by the Department.

Successful passing of the oral qualifying examination advances the student to candidacy for the doctor's degree. The student will subsequently devote himself to study and research for his doctoral dissertation. After completion of the dissertation he will take the final examination, which is conducted by his doctoral committee. The examination is oral and deals primarily with the dissertation and its relationship to the general field in which the subject lies.

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 and trigonometric 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 logarithmic and exponential functions. Methods of integration. Taylor

series, complex numbers. Three lectures, two recitations. *Prerequisite:* Mathematics 1A. (W,S)

1C. Elements of Mathematical Analysis. (4)

Vector geometry, velocity and acceleration vectors. Partial derivatives, multiple integrals. Ordinary differential equations. Three lectures, two recitations. *Prerequisite:* Mathematics 1B. (F,S)

2A. Calculus and Analytic Geometry. (4)

Differential and integral calculus of functions of one variable; limits, continuity; differentiation of algebraic and trigonometric functions; applications. Definite integral, primitive functions, fundamental theorem of the calculus. Elements of analytic geometry as needed in the development of the calculus. Three lectures, two recitations. *Prerequisites:* three or more units of high school mathematics; one-half unit of trigonometry is desirable. (F,W)

2B. Calculus and Analytic Geometry. (4)

Applications of the definite integral, calculus of logarithmic, exponential and hyperbolic functions. Methods of integration. Plane analytic geometry, polar coordinates. Vector geometry, vector functions and their derivatives. Three lectures, two recitations. *Prerequisite:* Mathematics 2A. (*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 Structures 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 3 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 structures of higher algebra: sets and mappings, the integers, rational, real and complex numbers, groups, rings (especially polynomial rings) and ideals, fields, real and complex vector spaces, linear transformations, inner product spaces, matrices, triangular form, diagonalization. Three lectures, one recitation. *Prerequisite: Mathematics 2E.* (F,W,S)

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. Applied Modern 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 science, engineering science, economics. Instructors from various departments will mathematize specific problems in their fields by extracting the pertinent data and structures from the available information. Three lectures. *Prerequisites: Mathematics 2C, 2D, 2E, or consent of instructor.* (F,W)

112. Vector Analysis. (4)

Vector algebra and calculus. Applications to geometry and mechanics. 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, 2D.* (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 equations, 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, Riemann-Stieltjes integration, partial differentiation, multiple integration, Jacobians. Additional topics at the discretion of the instructor: power series, Fourier series, successive approximations or other infinite processes. Three lectures, one recitation. *Prerequisites: Mathematics 2C, 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. *Prerequisite: 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: Mathematics 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; Polya's theory of counting; Hall's theorem; assignment problem; backtrack technique; error-correcting codes; combinatorial optimization problems. Three lectures, one recitation. *Prerequisite: Programming experience and Mathematics 2E.* (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)

199. Independent Study for Undergraduates. (2 or 4)

Independent reading in advanced mathematics by individual students. Three periods. *Prerequisite: permission of department.* (F,W,S)

GRADUATE

200A-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, Wedderburn theory, representation of finite groups, places and valuations, polynomial and power series rings. *Prerequisites: Mathematics 100A-100B-100C or consent of instructor.*

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)*

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 171A-171B or 210A-210B-210C, or 240A-240B-240C, or Economics 212, or AMES 255A-255B, 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-220B-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, 220A-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. Poincaré-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, Carathéodory'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 bounded 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.*

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. Mathematical Logic. (3-3-3)

Propositional calculus and quantification theory. Completeness theorem; theory of equality; compactness theorem. Skolem-Löwenheim 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.*

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 recursion 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. (3-3-3)

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.*

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.*

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.) *Prerequisite: consent of adviser.* (Satisfactory/Unsatisfactory grades only.)

MUIR

OFFICE: Provost, Muir College

* * *

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 adviser for project and by Provost.*

MUSIC

OFFICE: Building 407, Matthews Campus

Professors:

°Robert Erickson, M.A.
Peter Farrell, M.M.
Kenneth Gaburo, D.M.A.
Thomas Nee, M.A.
Wilbur Ogdon, Ph.D.
John Silber, Ph.D. (*Chairman*)

Associate Professors:

Keith Humble, Dip.Mus.
Roger Reynolds, M.M. (*Director, Project for Music Experiment*)

Assistant Professors:

James L. Campbell, M.S.
°Pauline Oliveros, B.A.
Bertram J. Turetzky, M.A.

Eugene Gratoovich, D.M.A., *Visiting Associate Professor*

F. Robert Shallenberg, D.M.A., *Lecturer*

°On leave 1973-74

* * *

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 departmental curriculum includes the following categories of study:

I.

Experimental Studies — Seminars of an exploratory nature. Students who enroll in these courses do so as experimentalists themselves, joining individual faculty members in the common pursuit of research problems. Experimental Studies Seminars treat areas of present faculty research interests, such as:

Timbre Research: study of harmonic and inharmonic partials, volume/brightness, attack transient, formant, loudness, modulation and beats, phase, noise bands and spatial orientation for their effects upon musical timbre. Readings, experiments, projects.

Compositional Linguistics: the application of linguistic data to music composition and analysis; consideration of the vocal phenomenon and implications such as Music as Language.

Time Perception in Aesthetic Situations: intensive discussion and projects based on relevant research publications in psychology, physiology, biology, communications, etc.

Upper-Division Courses:

Music 106A-106B-106C. Experimental Studies Seminars (F,W,S)

Music 108A-108B. Studies in New Instrumental Resources (F,W)

Music 199. Independent Study (F,W,S)

Graduate Courses:

Music 206A-206B-206C. Experimental Studies Seminars

Music 208A-208B. Seminar in New Instrumental Resources

Music 240. Experimental Instruction

Music 299. Advanced Research Projects and Independent Study

II.

Composition — Studies in composition are primarily of an experimental nature, pursued through seminars and individual instruction. Students are expected to expand their theoretical and technical knowledge and to incorporate it into their compositions. Provision is made for composing as an instructional mode of learning for those whose principal interest lies in another area.

Upper-Division Courses:

Music 103. Seminar in Composition (F,W,S)

Music 199. Independent Study (F,W,S)

Graduate Courses:

Music 203A-203B-203C. Advanced Problems and Projects in Composition

Music 299. Advanced Research Projects and Independent Study

III.

Performance — Performers are obligated to learn new as well as old skills, and to exercise them in all media, and to conduct, manage, and take part in complex productions, whether in a musical or theatrical capacity.

Upper-Division Courses:

Music 128. Principles and Practice of Conducting (F)

Music 130A-130B-130C. Seminar in Chamber Music Performance (F,W,S)

Music 131. Projects in Chamber Music Performance (F,W,S)

Music 132. Pro-seminar in Music Performance (F,W,S)

Music 135. Concert Orchestra (F,W,S)

Music 136. Reading Orchestra (F,W,S)

Music 140. Concert Chorus (F,W,S)

Music 141. Chamber Chorus (F,W,S)

Music 199. Independent Study (F,W,S)

Graduate Courses:

Music 201A-201B-201C. Advanced Problems and Projects in Conducting and Performance

Music 230. Advanced Seminar in Performance of Music for Small Ensembles

Music 232. Pro-seminar in Music Performance

Music 299. Advanced Research Projects and Independent Study

IV.

Technology — In addition to developing his or her instrumental capability, a performer is expected to develop a practical ability to use electro-acoustic devices in performance, composition, and research.

Upper-Division Courses:

Music 104B. Projects in Electroacoustic Transmission of Music Information (W,S)

Music 105A-105B. Electronics in Music (F,W)

°Music 120A-120B. Audio Circuitry for Musicians (F,W)

Graduate Courses:

Music 202. Problems and Projects in the Specialized Use of Electronics in Performance

Music 204. Projects Seminar in Electroacoustic Transmission of Music Information

Music 299. Advanced Research Projects and Independent Study

V.

Theoretical Studies — Seminars and studies in analytic theory and systematic musicology, concerned with fields of knowledge representing formed systems of established practice. Theoretical Studies Seminars treat areas of present faculty research interests, such as:

Structural Analysis: the theories of Heinrich Schenker are applied to selected pre-twentieth century compositions in order to formulate notions about their essential structure.

Notation: testing notation as a means of private storage and public dissemination of information; economy, generality, appropriateness, definition.

Other areas of research may include Twentieth Century Music Systems, Contemporary Structural Analysis, Tuning and Temperament, Instrumentation.

Upper-Division Courses:

Music 100A-100B-100C. Music Theory and Practice I (F,W,S)

Music 101A-101B-101C. Music Theory and Practice II (F,W,S)

Music 102A-102B-102C. Music Theory and Practice III (F,W,S)

Music 104A. Principles of Electroacoustic Transmission of Music Information (F)

Graduate Courses:

Music 299. Advanced Research Projects and Independent Study

VI.

Literature and Special Studies — Analytical, critical and interpretative studies of the music of selected historical periods, cultures and media.

Upper-Division Courses:

Music 110. Laboratory Survey of Music Literature (F,W,S)

Music 111. Seminar in Non-Western Music

°Music 112. Studies in Vocal and Choral Literature (F)

Music 113. Studies in Opera (F)

Music 114. Music of the 20th Century (F)

Music 116. Seminar in Medieval and Early Renaissance Music (S)

Music 117. Seminar in Late Renaissance Music (W)

Music 123. The Orchestra and its Literature (S)

Music 124. Studies in Chamber Music (S)

Music 199. Independent Study (F,W,S)

Graduate Courses:

Music 212. Seminar in Vocal and Choral Literature

Music 213. Opera Studies

Music 214. Seminar in 20th Century Music

Music 215. Seminar in Bach and Related Studies

Music 216. Seminar Studies in Late-Medieval and Early-Renaissance Music

Music 217. Seminar Studies in Late-Renaissance and Early-Baroque Music

Music 223. Seminar Studies in Orchestral Literature

Music 224. Seminar Studies in Chamber Literature

Music 297. Candidates Tutorial

Music 299. Advanced Research Projects and Independent Study

VII.

Complementary Disciplines: These are approved studies exterior to the Department of Music pertinent to the student's needs and/or desires. (Psychology, linguistics, physics, electronics, visual arts, etc.)

The Undergraduate Program

Undergraduate courses offered by the Department of Music serve various purposes:

1. Enable students to undertake a major consisting of eighteen courses or less, according to the students' previous preparation or 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 requirement of Revelle College.
5. Allow a choice of elective courses to all students, with or without prior music training.

Prerequisite to acceptance into a curriculum program leading to a B.A. with a major in music is a competence in the reading and hearing of pitch and rhythmic relations as well as a satisfactory level of performance. These levels may be satisfied through examinations administered by the department the week prior to the beginning of classes. Music 2A-2B-2C and Music 30A-30B-30C are courses designed to prepare those abilities.

Major requirements for entering the curriculum program:

1. Music 1A-1B-1C
2. Demonstration of pitch, rhythmic and

performance ability through examinations

a. preparation for pitch/rhythm ability in Music 2A = 2B-2C.

b. preparation for performance ability in Music 30A-30B-30C.

Courses required for the B.A. in Music:

1. The nine-quarter sequence: Music Theory and Practice; Music 100A-100B-100C; Music 101A-101B-101C; Music 102A-102B-102C.
2. Three-quarter sequence: Laboratory Survey of Music Literature; Music 110A-110B-110C.
3. The six-quarter sequence: Seminar in Chamber Music Performance; Music 130A-130B-130C-130D-130E-130F.
4. The six-quarter sequence: Music Performance through Directed Ensemble; Music 135, or Music 136, or Music 140, or Music 141.
5. The three-quarter sequence: Contemporary Issues in Music; Music 143.

Special Interest Programs for Music Majors:

Each student should select one Special Interest six-course sequence offered by the Department to develop in depth understanding and skills. Current special interest programs are: Pro-seminar in Music Performance, Composition, Music Communication, Music Electronics, Theoretical Studies, Literature Studies.

Since some music courses require musical abilities, non-music students wishing to take those courses as electives are asked to obtain the consent of the instructor prior to enrollment.

Students within the music major are advised to plan for private lesson expenses on their major instrument.

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 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.

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 will elect a minimum of three categories of study, each category consisting of a minimum of three courses. Approved groups of courses could be formed from the seven categories of study: Experimental Studies, Composition, Performance, Technology, Theoretical Studies, Literature and Special Studies. The remaining requirement, beyond any non-credit remedial course work determined by the department or the Graduate Division, and the thesis, would be a three-unit candidate's tutorial, taken as a three quarter sequence during the first year of graduate study. This tutorial is intended to serve two functions: (1) the supervision of independent remedial studies and (2) the guided preparation for thesis research.

The department will require a reading ability in one or more foreign languages if the student's research area calls for such proficiency.

Doctor's Degree Program

The student entering graduate studies leading to the Ph.D. degree in music at UCSD will be expected to have reached a superior level of musical competence and to have accomplished a program of masters study acceptable to the Department of Music of UCSD.

The requirements for the Ph.D. will include the following: (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. would be 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 such examinations. The student will choose other electives in music and electives in other disciplines (such as history, literature, art history, philosophy, physics) when useful to this purpose. He will also undertake independent studies, supervised by an appropriate member of the faculty, and prepare himself in the library and laboratory for those qualifying examinations.

COURSES

LOWER DIVISION

1A-1B-1C. The Nature of Music (4-4-4)

Development of music perception and discrimination through participation projects 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; music manuscript 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 and 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.*

10. Projects and Studies in Music (1)

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 requirement. (F)

11A-11B-11C. Listening Laboratory in Music Literature (4-4-4)

A three quarter survey of the world's art music in recorded and live performance. Two to four hours of assigned music listening weekly and one, two-hour discussion section. Occasional papers or reports.

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 for 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 and additive principles of musical time measurement. *Prerequisites: Music 2A-2B-2C or proficiency by examination.*

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 and 101A or proficiency by examination.*

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.*

103A-103B-103C. Seminar in Composition (4-4-4)

(Composition) Individual projects in composition critically reviewed in seminar with fellow student and faculty composers. *Prerequisites: Music 102A-102B-102C, or permission of instructor.*

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. Three meetings. *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 multivarying conditions caused by complex sound events. *Prerequisites: 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.

106A-106B-106C. Experimental Studies Seminars (4-4-4)

(Experimental Studies) Individual and Group problems in experimental studies. Seminar topics determined according to present research interest of faculty member directing the course. An elective for qualified undergraduate. *Prerequisite: consent of instructor. (F,W,S)*

107. Theoretical Studies Seminar (4)

Seminars offered by faculty within areas of present research interests, such as: structural analysis, notation, 20th century music systems, contemporary structural analysis, tuning and temperament, instrumentation. May be repeated for credit.

108A-108B. Studies in New Instrumental Resources (4-4)

(Experimental Studies) Extensions of conventional instrumental technique and tone production, and their application to music composition, notation and performance. Must be taken in sequence or may be taken separately with instructor's consent. An elective for qualified undergraduates. (F,W)

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 when advisable. Occasional readings, papers and reports. Required of all music majors. *Prerequisites: Music 1A-1B-1C and 2A-2B-2C or consent of department.*

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)

(Literature and Special Studies) 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. (F)

113. Studies in Opera (4)

(Literature and Special Studies) A critical study of representative operas. At least one opera discussed will be selected because of the opportunity to see it in staged performance. (F)

114. Studies in Music of the 20th Century (4)

(Literature and Special Studies) 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.

115. Seminar in Bach Studies (4)

(Literature and Special Studies) A study of the art of J.S. Bach, with particular attention to problems of style and structure. Music majors are required to take an additional projects seminar session for course credit. *Prerequisite: ability to read music or consent of instructor. (W)*

116. Seminar in Medieval and Early Renaissance Music (4)

(Literature and Special Studies) The development of an operational and intellectual account of medieval and early Renaissance music. (S)

117. Seminar in Late Renaissance and Early Baroque Music (4)

(Literature and Special Studies) Functional performance problems and realizations of music of the sixteenth and seventeenth centuries. (W)

120A-120B. Audio Circuitry for Musicians (2-2)

(Performance and Technology) AC and DC circuit analysis; soldering and assembly techniques; projects. (F,W)

123. The Orchestra and Its Literature (4)

(Literature and Special Studies) A study of the instruments of the orchestra: their resources, tonal effects; their use by major composers; methods of writing for modern instruments; analysis of representative scores. Music majors are required to take an additional projects seminar session. Three meetings. *Prerequisite: ability to read music. (S)*

124. Studies in Chamber Music (4)

(Literature and Special Studies) 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. (S)

128. Principles and Practice of Conducting (4)

(Performance and Technology) The theory and practice of conducting as related to the study of instrumental and choral literature. *Prerequisite: consent of instructor. (F)*

130A-130B-130C. Seminar in Chamber Music Performance (2-2-2)

(Performance and Technology) Performance of representative chamber music literature. May be repeated for credit. (F,W,S)

131. Projects Course in Chamber Music Performance (2-2-2)

(Performance and Technology) Individual projects in the preparation of chamber music for performance. (F,W,S)

132. Pro-Seminar in Music Performance (2)

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 but no more than six units may be credited toward graduation. *Prerequisite: consent of instructor through audition.*

133A-133B-133C. Perspectives of Jazz (4-2-2)

A study of the music from a theoretical, historical and applied manner (i.e., theory, harmony, ear-training, listening, styles, aesthetics, history (readings/discussion), performance training). *Prerequisite: consent of instructor.* (F,W,S)

135. Concert Orchestra (2)

(Performance and Technology Activity). Study and performance of orchestral literature. May be repeated for credit. *Prerequisite: Consent of instructor by audition.* (F,W,S)

136. Reading Orchestra (2)

(Performance and Technology Activity). Study of standard orchestral literature in coached rehearsal sessions. Course may be repeated for credit. *Prerequisite: consent of instructor by audition.* (F,W,S)

140. Concert Chorus (2)

(Performance and Technology Activity). Study and performance of choral literature. Course may be repeated for credit. *Prerequisite: consent of instructor by audition.* (F,W,S)

141. Chamber Chorus (2)

(Performance and Technology Activity). Study and performance of literature for small choral ensemble. Course may be repeated for credit. *Prerequisite: consent of instructor by audition.* (F,W,S)

142. Women's Chorus (2)

Study and performance of music literature for choral ensembles composed of women's voices. May be repeated for credit. (F,W,S)

143. Contemporary Issues in Music (2)

Bi-weekly seminars on contemporary issues in music. Required of all music majors.

199. Independent Study (2 or 4)

(All Categories) Independent reading, research, or creative work under the direction of a faculty member. *Prerequisites: consent of instructor and departmental approval.* (F,W,S)

GRADUATE

201A-201B-201C. Advanced Problems and Projects in Conducting and Performance (1 or 3, 1 or 3, 1 or 3)

The general nature of this course conforms to the category *Performance and Technology* in the graduate curriculum. Specific content is determined from year to year. (Satisfactory/Unsatisfactory grades permitted.)

202. Problems and Projects in the Specialized Use of Electronics in Performance (3)

(Performance and Technology). May be repeated for credit.

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)

(Performance and Technology) *Prerequisites: Music 104A and consent of instructor.*

205. Advanced use of Electronics in Music (3)

(Theoretical Studies) 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 Seminars (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. Must be taken in sequence or may be taken separately with instructor's consent.

209A-209B. Advanced Music Theory and Practice (0-3)

Advanced integrated studies in music theory; composition and styles study through analysis and performance. Two quarters of 209 may be taken as a substitute for one quarter of 207, with permission from the professor. Must be taken in sequence; credit is received only at the end of the second quarter.

211. 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.*

212. Seminar in Vocal and Choral Literature (3)

(Literature and Special Studies) A critical and historical study of selected works and repertory.

213. Opera Studies (3)

(Literature and Special Studies) A detailed analytical study of selected operas in production in San Diego, Los Angeles, or San Francisco. *Prerequisite: consent of instructor.*

214. Seminar in 20th Century Music (3)

(Literature and 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)

(Literature and 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)

(Literature and Special Studies) Problems of style and performance in selected music of the 13th, 14th, and 15th centuries.

217. Seminar Studies in Late-Renaissance and Early-Baroque Music (3)

(Literature and 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)

(Literature and 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)

(Literature and Special Studies) A critical and historical study of selected works and repertory.

230. Advanced Seminar in Performance of Music for Small Ensemble (3)

(Performance and Technology) Performance of representative chamber music literature through coached rehearsal and seminar studies. (Course may be repeated for credit since literature studied varies from quarter to quarter.)

232. Pro-Seminar in Music Performance (2)

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. Seminars may be repeated but no more than six units may be credited toward the degree.

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 (1-1-1)

(Literature and Special Studies) A course requirement for all prospective M.A. and Ph.D. candidates, the tutorial is taken with the student's graduate advisor 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, 1-12, 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

* * *

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.

If warranted by enrollment and the numbers of students with advanced mathematics placement, an honors option may be offered within the Natural Science 2 sequence.

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. *Prerequisite: one quarter or one semester of any college level introductory chemistry course, but preferably Natural Science 1A.* (W)

1BL. Natural Science: Chemistry (4)

A laboratory course designed to demonstrate various concepts discussed in Natural Science 1A, 1B, as well as to acquaint students with simple laboratory techniques. Lecture portion to be taught concurrently with Natural Science 1B. *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. 3 hours lecture; 2 hours recitation; and 4 laboratory exercises during the quarter. *Prerequisites: elementary trigonometry, vectors, calculus and Natural Science 1D or the equivalent.* (S)

2A. Natural Science: Physics (4)

Introductory lectures on the range of natural phenomena which can be understood in terms of the physical sciences are followed by the study of particle motion. Applications are made to astronomy and to the structure of matter. Three hours, two hours recitation, three hours problem session. (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, two hours problem session. (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 covalent and ionic binding in molecules and solids. Three hours lecture, two hours recitation, 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 and 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 and two 3-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. This course is designed for students not intending to major in physical or biological sciences. One 3-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. One hour recitation and two 3-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.
 Robert Galambos, M.D., Ph.D.
 David M. Green, Ph.D. (*Psychology*)
 Robert B. Livingston, M.D.
 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*)

Associate Professors:

John W. Evans, M.D., Ph.D. (*Mathematics*)
 Youssef Hatefi, Ph.D. (*Adjunct, Neurochemistry*)

James R. Nelson, M.D. (*Adjunct*)

Roger N. Rosenberg, M.D.

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*)

G. David Lange, Ph.D.

Allen I. Selverston, Ph.D. (*Biology*)

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 pre-clinical 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 student, 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 mechanisms 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 innovations 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 (4)**
Directed group studies in areas not presently offered by the Department. *Prerequisite: consent of department.*
- 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.) (F)
- 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, neurosciences or consent of instructor.* (Satisfactory/Unsatisfactory grades permitted.) (F)
- 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, post-doctoral 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.) (F,W,S)
- 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. *Prerequisites: 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)

235. Ultrastructure of the Nervous System (1)

A laboratory course with exposure to techniques in electron microscopy of the nervous system; imbedding, fixation, sectioning, and use of the electron microscope. Limited to six students per quarter. *Prerequisite: undergraduate biology.* (Satisfactory/Unsatisfactory grades only.) (Not to be offered 1973-74.)

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)

240. 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)

241. EEG Clinical Seminars (1)

Presentation of interesting case histories of EEG patients and EEGs recorded in the previous week. Study of movies of seizure patients, integration of EEG findings with behavior. Review of research projects in clinical neurology, depth recording, computer techniques in automation of EEG. (Satisfactory/Unsatisfactory grades only.) (F,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)

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.
Stanley W. Moore, Ph.D.
Frederick A. Olafson, Ph.D. (*Chairman*)
Avrum Stroll, Ph.D.

Honorary Professor:

Herbert Marcuse, Ph.D.

Associate Professor:

Edward N. Lee, Ph.D.

Assistant Professors:

Georgios H. Anagnostopoulos, Ph.D.
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*

Richard S. Rudner, *Visiting Professor (Winter and Spring)*

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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 110	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.)	Additional Phil. Course (Sect. 4)
or	or	or
Additional Phil. Course (Sect. 4)	Sequence Course (Sect. 3)	Sequence Course (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 philosophical 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 expected to take in each year of residence at least twelve units in graduate philosophy courses (specifically, those numbered 201-295). The balance of the student's course work, which will normally total 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.

Prior to the conclusion of the seventh quarter in residence all students must pass a written comprehensive examination administered by the Department. This 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 examinations 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.

All the examinations 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 for each examination will be issued to students to help them in preparation.

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.

Students are allowed four hours to complete each part (I, II, and III). All three parts of the written comprehensive examination must be attempted during one (three-day) examination period. This 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. Each student who attempts the examination will receive from the Graduate Adviser official and written evaluations of his performance.

Students failing any part(s) of the examination shall be required to retake only the part(s) failed. No part of the examination may be attempted

more than twice. 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 1973-74.)

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.) (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.) (W)

15. Introduction to Philosophy (4)

A study of the scope and nature of human knowledge in both its everyday and scientific forms. (S)

20-21-22. Theories of Society (4-4-4)

A course dealing with the historical and systematic development of social and political thought and institutions. Analysis and critical examination of representative texts drawn from classical and contemporary sources. (Philosophy 20-21-22 may be used in fulfilling the Revelle College social science requirement.) (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. (F)

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. (W)

UPPER DIVISION

101. 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; from 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. (S)

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.)

110A. Symbolic Logic (4)
Introduction to mathematical logic; consistency and completeness results for propositional and predicate calculi and identity theory. (W)

110B. Symbolic Logic (4)
First order theories, recursive functions, arithmetic models, Godel results. (S)

112A. Philosophy of Science (4)
An introductory examination of the nature, import and procedures of science in the light of its historical development. (F)

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.* (W)

120A. Political Philosophy (4)
An examination of problems and theories concerning the nature of the state, society and government. Two or three lecture-discussions. (S)

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.*

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.*

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.

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. (W)

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.* (S)

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. (W)

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.* (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. (F)

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. (W)

172. Epistemology (4)

A course dealing with topics in the theory of knowledge, such as the nature of knowledge and belief, the justification of knowledge claims, knowledge of the external world, knowledge of other minds, the nature of perception, memory.

180. Senior Colloquium (4)

A seminar dealing with the examination of specific philosophical problems and topics and designed for seniors of high standing who major in Philosophy. *Prerequisites: senior status and permission of department.* May be repeated for credit.

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. (F)

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. (Not to be offered 1973-74.)

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. (Not to be offered 1973-74.)

204. Topics in the History of Philosophy: Early Modern Philosophy. (4)

Philosophical and intellectual currents of the Renaissance, with

reference to the origins and development of classical humanism and medieval scholasticism and the emergence of a Renaissance philosophy of man. (S)

205. Topics in the History of Philosophy: 17th and 18th 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.) (W,S)

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. (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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.* (Not to be offered 1973-74.)

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. (S)

220. Topics in Moral and Political Philosophy (4)

A course of studies designed to prepare students for advanced work in seminars. (Not to be offered 1973-74.)

223. Seminar in Ethics. (4)

An examination of the nature of moral problems, judgements and principles, with emphasis on recent developments in moral philosophy and classic formulations of ethical theories.

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. (F,W)

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. (F)

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. (W)

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. (S)

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. (Not to be offered 1973-74.)

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. (F,W)

272. Seminar in Theory of Knowledge (4)

An examination and critique of representative theories of mind, reality, knowledge and perception. (Not to be offered 1973-74.)

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.) (F)

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)

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 R. 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, M.A.

J. Charles Millenbah, B.S.

Robert Moss, B.A.

Andrew Skief, Jr., B.S.

* * *

Activity and participation vividly describe the many programs of the Department of Physical Education. Beautiful facilities provide an activity center for enjoyable 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 beautiful 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, inertube basketball, six-man volleyball, three-man basketball, squash, handball, badminton, soccer, kickball, softball, fencing, table tennis, inertube 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. Consult the recreation newsletter, *Trying Times*, for current information.

Casual Recreation — Many hours are available to use gymnasium and pool facilities for your own enjoyment. 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 sheer joy 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 — Intermediate Level (improvement of skill techniques and/or game strategy);
- D — Advanced Level (for skilled participants 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 life-saving 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 (1/2)

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 (1/2)

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 diver 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 swimmers certificate.*

11A-B-C-D. Sailing (0)

Course is designed to make sailing an easily understood sport and to provide students an opportunity for a lifetime of stimulating and relaxing activity. Special emphasis is placed on nautical terms, water and safety rules, demonstrations and practical exercises on rigging and boat handling.

13. Introduction to Lifetime Sports (0)

Designed to introduce students to the following lifetime sports: badminton, cycling, golf, physical fitness, salt- and fresh-water fishing, skin- and SCUBA diving, surfing, swimming, tennis and volleyball.

14A-14B-14C-14D. Tennis (0)

Instruction in the fundamentals of the serve, strokes, volley, rules, scoring, tactics and court strategy.

15A-15B-15C-15D. 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 enjoy participation.

16A-16B-16C-16D. 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.

19. Squash (0)

Introduction to the sport, including instruction in fundamental skills and techniques, individual and group practice, and opportunities for competition.

20. Handball (0)

Instruction in fundamentals of the serve, rally and court strategy. Opportunity for singles and doubles competition.

21A-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.

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. Women's Conditioning (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 (1/2)

Theory and practice of regular exercise and nutritional needs for development, maintenance and continuing good health.

36. Aerobics (0)

A physical-conditioning course emphasizing the discussion, planning, and actual conduct of a variety of aerobic-type activity programs, including: walking, jogging, stationary running, rope jumping, swimming, cycling, and aerobic sport activities, adapted to student skills, interests, and available equipment and facilities.

38. Basketball, Men (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 gymnastic 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.

47A-47C-47D. Fencing, Foil (1/2)

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 (1/2)

Designed for the intermediate and advanced student of fencing to continue his training in classical Hungarian sabre style.

49. Fencing, Theatrical (1/2)

Fencing techniques useful to students involved in performing arts. Emphasis will be upon choreography and dramatic presentation.

50A-50C-50D. 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****86. Techniques of Officiating (0)**

Designed to give a thorough knowledge and mastery of rules, field layout, and scorekeeping under actual game conditions. A prerequisite for student employment for officiating intramural athletic contests.

87. Basketball 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 Physics-Chemistry Building

Professors:

William Ian Axford, Ph.D.

Keith A Brueckner, Ph.D.

E. Margaret Burbridge, Ph.D. (*Astronomy*)

Geoffrey R. Burbridge, 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:

Barry Block, Ph.D.

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. Shore, Ph.D.
 Wayne Vernon, Ph.D.
 Dieter K. Wohlleben, Ph.D. (*In Residence*)

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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 subatomic 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 non-contiguous 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-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 140	Physics 130B	
	Physics 141	

*Restricted electives may be chosen from upper-division or graduate courses in physics, chemistry, biology, 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 deficient backgrounds in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics:

(a) Lower-division preparation required:

Natural Science 2A-2B-2C-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 deficient backgrounds in mathematics or chemistry will be required to remedy the deficiency in their junior year. The consequent rearrangement of the upper-division program will be devised by consultation between the student and the departmental adviser for biophysics.

The following courses are required for the physics major with specialization in biophysics-premedical:

(a) Lower-division preparation required:

Natural Science 2A-2B-2C-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 Elect	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, 140, 141

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.

The entering graduate student is 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. Upper-division courses are available for students with minor deficiencies in undergraduate training.

Master's Degree Program

Requirements for the Master of Science degree can be met according to Plan II (comprehensive examination). (See *Graduate Division: The Master's Degree*.) The comprehensive examination is identical to the first-year written examination for Ph.D. students. A list of acceptable courses is available in the 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 the student opportunity for emphasizing his special interests.

An entering student is assigned a faculty adviser to guide him in his 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 every entering graduate student during registration week for the purpose of enabling the faculty to give him better guidance in his graduate work. Performance on this test has no bearing on the student's status in graduate school.

First-Year Written Examination

A student is 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 6 advanced courses selected from the following groups, provided that they obtain at least a 3.0 average in 5 out of the 6. The selection must include all of Group I and at least one course from each of Groups II and III.

Second-Year Graduate Courses**Group I. (3)**

Physics 212C (Quantum Mechanics) Fall

Physics 210A (Statistical Mechanics) Fall

Physics 210B (Statistical Mechanics) Winter

Group II. (1-2)

Physics 213 (Theoretical Nuclear Physics) Winter

Physics 215 (High Energy Nuclear Physics) Spring

Group III. (1-2)

Physics 211 (Solid State Physics) Spring

Physics 216 (Atomic and Molecular Theory) Fall

Group IV. (0-2)

Physics 219 (Introductory Astrophysics) Winter

Physics 218 (Introductory Plasma Physics) Spring

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 a student has passed the departmental examinations, he should obtain a faculty research supervisor. When he is ready to demonstrate his ability to engage in thesis research, he may take the Qualifying Examination.

Thesis Defense

When a student has completed his thesis, he is asked to present and defend it before his doctoral committee.

Advanced Courses and Seminars

In addition to the above-listed basic courses, the Department offers a weekly general departmental colloquium, advanced courses for students doing specialized research, and seminars in the main departmental areas of interest. Students are strongly urged to enroll for credit in appropriate advanced courses and seminars.

Course Credit by Examination

Students have an option of obtaining credit for a physics graduate course by taking the final examination without participating in any class exercises. They must, however, officially register for the course and notify the instructor and the Department office of their intention no later than the first week of the course.

COURSES**LOWER DIVISION**

The Department of Physics cooperates in the teaching and administration of the Natural Science sequences for Revelle College students. (See course listings: *Natural Sciences*.)

5A. Physics (4)

Topics in physics particularly relevant to the study of medicine. Material will be selected from subject areas such as mechanics, diffusion, hydrostatics and hydrodynamics, and elasticity. This course is primarily for students in the Third College Health Sciences Program. *Prerequisite: Science/Technology 1C or equivalent basic course in physics.*

5B. Physics (4)

A continuation of Physics 5A. It is intended for students in the Third College Health Sciences Program. *Prerequisite: Physics 5A.*

5C. Physics (4)

Study of wave motion, sound, geometrical and physical optics with biological applications. *Prerequisites: 5A-5B.*

UPPER DIVISION**(SEE ALSO 2COURSE LISTINGS: EARTH SCIENCES, 1)****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 where required of mathematics. Primary emphasis will be placed on learning the way a physicist deals with the natural world by studying the development of physics, its interaction with other intellectual disciplines, and the analysis of simple situations. The limitation and value of the physicist's analysis will be discussed together with the impact of physical thought and its successes on other fields. (F,W,S)

120A-120B-120C. Physical Measurements (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; Schrodinger equation for hydrogen-like atoms; Pauli principle, Heisenberg principle; particle in a periodic potential. Four hours lecture. *Prerequisite: Physics 130A.* (W)

130C. Quantum Physics (4)

Elementary nuclear physics; quantum mechanics of radiation: elementary particles and scattering. Three hours lecture. *Prerequisites: Physics 100C, 130B.* (S)

131. Modern Physics Laboratory (2)

Experiments in radioactivity, x-rays, atomic physics, resonance physics, solid-state physics, etc. 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)

140. Thermodynamics (4)

Classical thermodynamics including the first, second and third laws; thermodynamic potentials; phase transitions; applications to low-temperature physics, radiation, and chemical reactions. Four hours lecture. *Prerequisite or co-registration: Mathematics 2D.* (F)

141. Statistical Physics (4)

Elementary statistical mechanics, probabilistic interpretation of entropy, fluctuation phenomena, transport phenomena. Four hours lecture. *Prerequisites: Physics 110A, 140.* (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, 141.* (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. *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 hour 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, 141, 161.* (S)

Prerequisites: Physics 130B, 141, 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)

195. Physics Instruction (2)

Each student will be responsible for and teach a class section of a lower-division physics course. He will also attend a weekly meeting on teaching methods and materials conducted by the professor who supervises his teaching. *Prerequisite: consent of instructor.* (F,W,S)

198. Directed Group Study (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 applications to linear and non-linear motion in inertial and non-inertial frames. (F)

200B. Theoretical Mechanics (3)

Variational principles, Hamilton's equations, and Hamilton-Jacobi theory. Special relativity. Rigid body and continuum mechanics. *Prerequisite: Physics 200A.* (W)

203A. Advanced Classical Electrodynamics (3)

The boundary value problems of electrostatics and the electrostatics of macroscopic media, magnetostatics and the properties of magnetic materials, currents in extended media, macroscopic properties of superconductors, electromagnetic induction and quasi-static phenomena, Maxwell theory and wave propagation. *Prerequisite: Physics 100C or equivalent.* (F)

203B. Advanced Classical Electrodynamics (4)

Application of Maxwell's equations to radiating systems and boundary value problems, such as wave guides and diffraction phenomena; relativistic electrodynamics; radiation by moving charges; classical electron theory; nonlinear phenomena. *Prerequisites: Physics 100C or equivalent; Physics 203A.* (S)

206. Topics in Bio-Physics and Physical Bio-Chemistry (3)

Application of physical methods to bio-chemistry, e.g., X-ray diffraction, optical rotatory 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 140, 141, 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 Schrodinger equation

- and the quantum mechanics of one-particle system, matrices and the transformation theory of quantum mechanics, approximation methods for discrete stationary states, translational and rotational invariance, angular momentum and spin, theory of scattering, approximation methods in the continuum and for time-dependent problems and the quantum theory of atomic structure. *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)**
Nuclear forces, two-nucleon system, interaction of nucleons with the electromagnetic field, beta transformation of nucleons; nuclear systematics, models of nuclear structure, nuclear transformations and reactions. *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 212B.* (F)
- 218. Introductory Plasma Physics (3)**
Elementary properties of plasma; occurrence of plasma; positive column; magnetized plasma; magnetohydrodynamics; high frequency behavior of plasma; collisionless kinetic theory; application of plasma physics. (S)
- 219. Introductory Astrophysics (3)**
Fundamentals of radiative transfer; theory of gray and non-gray stellar atmospheres; Eddington's approximation, principles of invariance. Formation of absorption lines, curve of growth, resonance radiation. Convection theory. Stellar structure: polytropes, nuclear reactions, stellar models. Stellar evolution. *Prerequisites: Physics 130C, 141, or equivalent.* (W)
- 220. Group Theoretical Methods in Physics (3)**
Study of the representations and applications of groups to problems in physics, 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)**
Nuclear structure; the collective model; radiation theory; beta decay; introduction to the many-body problem. *Prerequisite: Physics 213.* (Satisfactory/Unsatisfactory grades permitted.) (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 radiation; 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.) (S)
- 230A. Advanced Solid-State Physics (3)**
A sequel to Physics 211 for students intending to specialize in solid-state physics and related subjects. Examples of topics to be covered are electron-electron and electron-phonon interactions, superconductivity, Landau theory of Fermi liquids, surfaces, disordered systems. *Prerequisite: Physics 211.* (Satisfactory/Unsatisfactory grades permitted.) (F)
- 230B. Advanced Solid-State Physics (3)**
Selection of topics of current interest. Examples: magnetic and electric resonances, surface physics, superconductivity, ferroelectrics, disordered systems, phase transitions, liquid helium, ferromagnetism. Topics given in this course may vary from year to year. *Prerequisite: Physics 211.* (Satisfactory/Unsatisfactory grades permitted.) (W)
- 231. Collision Theory (3)**
Collision theory and its application to atomic and molecular processes. Description of collision processes, scatterings and resonances in composite systems. Rearrangement collisions and the methods of approximation. *Prerequisites: Physics 212A, 212B.* (Satisfactory/Unsatisfactory grades permitted.) (S)
- 232A-232B. Advanced Plasma Physics (3-3)**
Vlasov equations and elementary excitations of an infinite medium; kinetic theory with applications to diffusion, scattering, etc.; quasi-linear theory and turbulence. Invariants of single-particle motions; stability theory; magnetohydrodynamics and generalizations to include resistivity and finite Larmor radius; microinstabilities; applications to fusion, MHD power generation and propulsion. *Prerequisites: Physics 203B, 210B, 218.* (Satisfactory/Unsatisfactory grades permitted.) (F,W)
- 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)**

Discussions of current research in atomic and molecular structures and collisions. (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/Unsatisfactory grades only.) (F,W,S)

299. Research in Physics (1-12)

(Satisfactory/Unsatisfactory grades permitted.) (F,W,S)

PHYSIOLOGY AND PHARMACOLOGY

OFFICE: 2042 Basic Science Building

Professors:

Samuel H. Barondes, M.D. (*Psychiatry*)

Eugene F. Bernstein, M.D., Ph.D. (*Surgery*)

Theodore H. Bullock, Ph.D. (*Neurosciences*)

Darrell D. Fanestil, M.D. (*Medicine*)

Morris E. Friedkin, Ph.D. (*Biology*)

Arnost Fronck, M.D., Ph.D. (*Bioengineering*)

Harold T. Hammel, Ph.D. (*Physiology*)

Nathan O. Kaplan, Ph.D. (*Chemistry*)

Allen Lein, Ph.D. (*Medicine, Associate Dean, School of 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*)

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

The first year of graduate study includes major courses of the School of Medicine core curriculum: biochemistry, organ physiology, pharmacology, and basic neurology. Via a laboratory rotation program, students are familiarized with faculty research activities. Additional course work depends on the student's interest and the direction of his thesis project. Projects must be chosen and qualifying examinations taken by the end of the second year.

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. Besides taking formal advanced courses in these areas, students participate in seminars, journal clubs, and the activities of postdoctoral fellows.

The graduate program in physiology and pharmacology is also designed 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 exercises 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 cytogenetic 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 interactions 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)

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. Special Topics in Pharmacology (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)

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: Principles of Physiology, Organ Physiology and Pharmacology, consent of instructor.* (F,S)

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. *Prerequisite: P/P 204 or equivalent.* (F)

248. 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 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.* (F)

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.* (W,S)

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, etc. (W)

125A. Chicano Politics (4)

A survey of contemporary Chicano politics. The Chicano community in the American political system; government policies as they affect Chicanos; barrio and movement politics and strategies; social and economic trends as they affect politics. *Prerequisite: sophomore standing.* (W)

125B. Field Work in Chicano Politics (4)

Each student will be required to do field work relating to the Chicano community, in either individual or group projects. The topic should be on some aspect of Chicano politics, broadly defined, and have theoretical significance. Class will meet once a week for two hours and there will be some common reading. *Prerequisites: sophomore standing, Political Science 125A, and consent of instructor.* (S)

131. Selected Topics in Latin American Politics (4)

A comparative analysis of contemporary political issues in Latin America. Material to be drawn from two or three countries. Among the topics: development; nationalism; 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.* (W)

150B. Political Change in the United States (4)

A review of strategies that have been proposed for producing political change in the United States. These strategies will be evaluated in light of the analytical material presented in the previous quarter. (S)

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)

199. Independent Study for Undergraduates (4)

Independent reading in advanced political science by individual students. *Prerequisite: consent of instructor.* (F,W,S)

PSYCHOLOGY

OFFICE: 5217 Psychology-Linguistics Building

Professors:

Norman H. Anderson, Ph.D.
J. Anthony Deutsch, D.Phil.
Edmund J. Fantino, Ph.D.
David M. Green, Ph.D.
George Mandier, Ph.D.
Donald A. Norman, Ph.D.
George S. Reynolds, Ph.D. (*Chairman*)

Associate Professor:

Harry L. Munsinger, Ph.D.

Assistant Professors:

Ebbe B. Ebbesen, Ph.D.
David E. Rumelhart, Ph.D.
J. Edward Russo, Ph.D.

* * *

Ursula Bellugi-Klima, Ed.D., *Associate Adjunct Professor of Psychology*

Robert Galambos, Ph.D., M.D., *Professor of Neurosciences*

* * *

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 human and animal behavior. Students who major in psychology can expect to develop a knowledge of a broad range of content areas as well as basic skills in experimental and analytic procedures.

The major program is designed to involve the student in current research problems of the field. 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, in the three-quarter sequence of Psychology 194, each student performs a research project of his choice, guided by a member of the staff. In addition, students may choose from a wide variety of courses to complete the major program. A minimum of three upper-division courses in psychology is required in addition to the 105, 110, 115 and 194 course sequences. Psychology 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 a Psychology Major

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.

A student who wishes to enter the major in psychology must know calculus through the level of Mathematics 1C. Probability theory and statistics will be taught as part of the psychology major during the junior year.

The basic science requirement can be met by taking five of the lower-division science courses offered in the colleges. Some knowledge of programming is highly recommended. This may be acquired through APIS 10, which can also count as one of the science courses.

The College Science and Mathematics Requirements
Each college imposes its own science and mathematics requirement upon its students. A student who wishes to major in psychology must also fulfill the special prerequisites listed above. These prerequisites are automatically met by the Revelle College requirements. Muir College and Third College students will have to take either the Mathematics 1A, 1B, 1C or 2A, 2B, 2C sequence, as well as a total of five science courses from the ones offered to them.

MAJOR PROGRAM IN PSYCHOLOGY

(RECOMMENDED SCHEDULE)

FALL	WINTER	SPRING
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
— —	— —	— —
— —	— —	— —

*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 Division: 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 courses from within the Department. The courses must 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 principles 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.

UPPER DIVISION

105. Introduction to Experimental Psychology (4)

Introduction to experimental work in operant psychology. *Prerequisites: Mathematics 1C; co-registration in Psychology 110 and 115.*

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.*

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.*

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).*

132. Sensory Mechanisms (4)

An introduction to sensory mechanisms involving auditory and visual phenomena. *Prerequisite: Psychology 107.*

133. Physiological Psychology (4)

Intensive introduction to current knowledge of physiological factors in learning, motivation, perception, and memory.

134. Social Psychology (4)

Introduction to group behavior, attitude change, social perception. *Prerequisite: permission of instructor.*

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).

137. Developmental Psychology (4)

Intensive survey of current knowledge of cognitive and intellectual 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.*

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 social 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 those 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. *Prerequisite: senior majoring in psychology, philosophy, anthropology, sociology, or political science.*

148. Algebraic Psychology (4)

General theory of judgement based on algebraic models. Emphasis on varied substantive applications, including person perception, social attitudes and opinions, decision-making, and psychophysical 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.

180. Special Topics (4)

Selected seminars by members of the staff. *Prerequisite: major in psychology.*

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)

Theory and current empirical findings in areas of optimal decision making and individual human choice behavior, emphasizing mathematical models of choice and decision making. Will include measurement of utility, identifying and testing rules of combination for decision components, and empirical findings related to the process of decision making. *Prerequisite: graduate standing in psychology.*

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.*

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 aggression, affiliation, and the relationship between self-reports and other behavior will be examined. Advanced seminar. *Prerequisite: permission of instructor.*

233. Topics in Learning and Motivation (3)

Advanced topics in learning and motivation with special emphasis on current research. Advanced seminar. *Prerequisite: Psychology 210.*

234. Cognitive Development (2)

Nature and function of perception and judgment from a developmental point of view. Advanced seminar. *Prerequisite: none.*

235. Topics in Psycholinguistics (3)

Selected topics in experimental psycholinguistics and applications to language acquisition and pathology. *Prerequisite: consent of instructor.*

240. Advanced Quantitative Methods (2)

Selected topics in advanced experimental design and data analysis. *Prerequisite: graduate enrollment in psychology or consent of instructor.*

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. 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 3-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 of motion with applications to orbital and harmonic motion. The concepts of energy and work. The conservation laws are discussed with a view to their application to particle physics as well as to classical mechanics. *Prerequisites: concurrent registration in Mathematics 1A or 2A.* (F)

4AL. The Physics of Equilibrium and Motion (0)

A laboratory course designed to demonstrate various concepts in Science 4A as well as to acquaint students with simple laboratory techniques. *Prerequisite: concurrent registration in Science 4A.*

4B. Waves Energy and Properties of Matter

An introduction to continuum mechanics, dimensional analysis and wave motion. Elementary geometrical optics with applications to optical instruments. Calorimetry and heat transport. *Prerequisite: concurrent registration in Mathematics 1B or 2B.* (W)

4C. Electromagnetic Theory

Electric field and potential, Laplace's and Poisson's equations. Capacitors and capacitance. Stationary electric currents. Ohm's law. Magnetic fields, vector potential. The law of induction. The displacement current. Maxwell's equations. Electromagnetic waves, AC circuits. *Prerequisites: concurrent registration in Mathematics 1C or 2C.* (S)

4D. Modern Physics

Subatomic particles, wave-particle duality, introductory quantum theory, atomic structure and spectra, periodic table, molecular binding and spectra, nuclear physics. *Prerequisites: Science 4A-4B-4C sequence or equivalent and Mathematics 1C or 2C.* (W)

4E. Science: Laboratory

Introduction to experimental physics and electronics. Wave experiments in microwaves, optics, and acoustics. Magnetic field measurements. Properties of materials. (F)

4F. Electric Circuit Laboratory

Experimental introduction to electric circuits and systems. Measurement and observation of electrical properties of various elements, linear and nonlinear circuits, frequency response, wave shaping. (S)

UPPER DIVISION

140A. Organic Chemistry (Muir)

The properties and reactions of alkanes, cycloalkanes, arenes, alkyl halides and alcohols. The mechanism of S_N1 , S_N2 , 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

Professors:

Russell F. Doolittle, Ph.D. (*Chemistry*)
 Richard W. Dutton, Ph.D. (*Biology*)
 William R. Frazer, Ph.D. (*Physics*)
 Laurence E. Peterson, Ph.D. (*Physics*)
 Sheldon Schultz, Ph.D. (*Physics, Coordinator of Science and Technology*)

Associate Professors:

Trevor C. McMorris, Ph.D. (*Chemistry*)
 Percy J. Russell, Ph.D. (*Biology*)
 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*)
 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*)
 James W. White, Ph.D. (*Mathematics*)

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General Requirements

The Science and Technology Program gives students an understanding of the basic laws of nature and their relation to the foundations of a technological society. The basic sequence, which is required of all students in Third College, consists of three quarters covering biology, chemistry, and physics (Science and Technology 1A-1B-1C).

The mathematics requirements for students in Third College consist of two quarters (8 units) of any college-level mathematics. The mathematics requirement may be satisfied by one of the following three methods:

1. **Mathematics 4A-4B:** This sequence is the one most likely to be taken by entering students as a means of fulfilling the mathematics requirement. 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, 2:** Strongly recommended for science or mathematics majors who have sufficient high school background in mathematics.
3. Two quarters of any other college-level mathematics course.

Health Sciences Major Program

The Health Sciences Major Program (one of the biology majors in Third College) which is the first specialized science program in Third College, has been developed out of the College's commitment to educate large numbers of competent minority students for careers in the natural sciences. It is designed to prepare students for medical or dental school, graduate school in biology, or in the allied health professions.

To accomplish these aims the Health Science major includes:

1. an introductory freshman-year sequence (three quarters of science and technology, three quarters of mathematics — including calculus);
2. a more content-oriented sophomore sequence (four quarters of science);
3. a core series of biomedical courses (10 quarters);
4. a supplementary series of courses (four quarters) chosen from public health sciences, environmental biology, clinical chemistry, biotechnology, or other course groupings in accordance with the selected major;
5. a field work project in the community.

The Science Majors

Science and Technology is an interdisciplinary program of the Third College. Therefore, students declaring a science or mathematics major (other than Health Science) 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 the 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

1A. Introduction to Modern Biology (4)

The course will present an introduction to modern biology. A detailed exploration of specific areas will be used to illustrate biological principles. The laboratory will extend and further explore the material covered in the lectures and discussions. (F)

1B. Chemistry (4)

This course is designed to introduce some of the fundamental concepts and theories of chemistry; topics of atomic and molecular structure, electro-chemistry, kinetics, and thermodynamics; elementary problem-solving and basic chemical laboratory techniques. (W)

1C. Physics (4)

A topical treatment of some of the basic principles of physics developed in the context of a study of contemporary urban and environmental problems. A quantitative study of physics will be undertaken proceeding inductively from selected topics such as: Urban Transportation Systems, the Generation and Distribution of Electrical Energy, Nuclear Energy, Physics of the Environment, Pollution, etc. Some of the areas of physics treated will be: Kinematics and Dynamics, Hydrodynamics, Thermodynamics, Basic Electric Circuit Theory, Basic Ideas of Atomic and Nuclear Physics. (S)

2A. Chemistry

This course is the first part of the three-part introductory chemistry sequence. Lecture material includes electrochemistry, kinetics and thermodynamics. *Prerequisite: Sci/Tech 1B or consent of instructor.* (F)

2AL. Chemistry

Laboratory course: introduction to gravimetric, volumetric, and potentiometric methods of analysis. *Prerequisite: Sci/Tech 1B or consent of instructor.* (F)

2B. Chemistry

The second part of the introductory chemistry sequence. The areas of electrochemistry, kinetics and thermodynamics are further developed. *Prerequisite: Sci/Tech 2A or permission of instructor.* (W)

2C. Chemistry

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. (S)

5A. Physics

Topics in physics particularly relevant to the study of medicine. Material will be selected from subject areas such as mechanics, diffusion, hydrostatics and hydrodynamics, and elasticity. This course is primarily for students in the Third College Health Sciences Program. Associated laboratory. *Prerequisite: Sci/Tech 1C or equivalent basic course in physics.* (F)

5B. Physics

A continuation of Physics 5A, intended for students in the Third College Health Sciences Program. Associated laboratory. *Prerequisite: Physics 5A.* (W)

5C. Physics

Study of wave-motion, sound, geometrical and physical optics with biological applications. Associated laboratory. (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)

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. (*Oceanography, Chairman of the Department*)
 Seibert Q. Duntley, Sc.D. (*Physics*)
 Albert E. J. Engel, Ph.D. (*Geology*)
 Edward W. Fager, Ph.D. (*Marine Ecology*)
 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. (*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*)
 Per F. Scholander, M.D., Ph.D. (*Physiology*)
 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*)
 Warren S. Wooster, Ph.D. (*Oceanography*)
 Milton A. Bramlette, Ph.D. (*Geology, Emeritus*)
 Carl H. Eckart, Ph.D. (*Geophysics, Emeritus*)
 Denis L. Fox, Ph.D. (*Marine Biochemistry, Emeritus*)

Carl L. Hubbs, Ph.D. (*Biology, Emeritus*)
 Martin W. Johnson, Ph.D. (*Marine Biology, Emeritus*)
 Norris W. Rakestraw, Ph.D. (*Chemistry, Emeritus*)

Roger Revelle, Ph.D. (*Oceanography, 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. (*Oceanography*)
 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*)
 Nicholas D. Holland, Ph.D. (*Marine Biology*)
 Michael M. Mullin, Ph.D. (*Oceanography*)
 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. (*Oceanography*)
 Joris M. T. M. Gieskes, Ph.D. (*Oceanography*)
 Miriam Kastner, Ph.D. (*Geology*)
 John D. Mudie, Ph.D. (*Geophysics*)
 George N. Somero, Ph.D. (*Biology*)

* * *

Elbert H. Ahlstrom, Ph.D., *Adjunct Professor of Oceanography*
 Reuben Lasker, Ph.D., *Associate 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 Lecturer*

William R. Riedel, M.S., *Research Geologist and 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 Institute 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, systematics, distribution, ecology, 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 arrays, multichannel data-processing methods, nonlinear tidal prediction, long-period resonant and equilibrium fluctuations in the Earth and its oceans, radiative transfer in the sea and the atmosphere, interactions of weakly nonlinear wave fields, studies of oceanic crustal structure, acoustic propagation in the oceans, interpretation of regional geomagnetic data, processes of ocean-floor spreading, and irreversible thermodynamics.

Physical Oceanography is the field of study that deals with mechanisms of energy transfer through the sea and across its boundaries, and with the physical interactions of the sea with its surroundings.

Research activities within this curricular group include: study of the general circulation of the oceans, including the relations of ocean currents to driving forces and constraints of the ocean basins; fluctuations of currents, and the transport of properties; the mechanisms of transport of energy, momentum, and physical substances within the sea and across its boundaries; properties of wind waves, internal waves, tsunami and planetary waves; the thermodynamic description of the sea as a system not in equilibrium; optical and acoustic properties of the sea; and the influence of surf on near-shore currents and the transport of sediments.

Applied Ocean Sciences is concerned with man's purposeful and useful intervention into the sea. The 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 programs are as follows:

Biological oceanography — two years of chemistry, including general and organic chemistry (physical chemistry requiring calculus may be substituted for physics requiring calculus where a more elementary physics course was taken); 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, 275A-275B, 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 during two quarters of each year.

Marine Chemistry

Students in this curriculum will be expected to take courses within the areas of physical and biological oceanography and marine geology or marine biology, as well as courses in the Department of Chemistry, which will be assigned according to personal needs after consultation with a faculty adviser.

Geological Sciences

The Geological Sciences curricular group offers programs leading to the Ph.D. either in Earth Sciences or Oceanography. The only general requirement is responsibility for material offered in the Marine Geology Seminar (SIO 248A-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 a reading knowledge of German or Russian 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 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)

208. Oceanography Field Course (2-4)

Methods of measurement, observation, and sampling used at sea; oceanic cruise dealing with problems of current interest; analysis and interpretation of results with a report. *Prerequisites: SIO 210A, 240, 260, 270A.* Staff (F,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)

211A-211B. Ocean Waves (3-3)

Propagation and dynamics of waves in the ocean including the effects of stratification, rotation, topography, wind and nonlinearity. *Prerequisites: SIO 210A, 214.* 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)

213A-213B. Radiative Transfer In the Sea (2-3)

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,W)

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)

216A-216B. Physics of Sediment Transport (3-3)

Mechanics and energetics of sediment transport by water, wind, waves, and density flows. Application to the near-shore environment and to the formation of sedimentary structures. 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 algebra.* 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, Alfvén waves, and the theory of the origin and secular variation of the earth's magnetic field. *Prerequisite: SIO 220.* 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. Speiss (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, anisotropic 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: SIO 248 or 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 Paleooceanography (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)

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.* 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 permitted.) 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 (3)

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)

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. Gieskes (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. Chemistry of Natural Products (3)

Topics will be chosen from the following headings: classification of organic natural products, applications of spectroscopy to structure determination, biosynthesis and synthesis of natural products, chemical ecology and natural products from the marine environment. *Prerequisites: undergraduate organic chemistry or biochemistry.* 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)

273. Introduction to Animal Behavior (3)

Sensory capacities, instinct, and learning; a comparative examination of the relative importances of concurrent stimuli, inherited neural and motor organization, and the modification of central organization by past experience (including biorhythmicity), in determining animal behavior. Emphasis, where possible, on ecologically oriented studies and on studies involving invertebrate animals. Mr. Enright (F)

275A-275B. Marine Ecology (3-3)

Single-species population dynamics and interspecific relationships in communities; theory, observation, and interpretation. Behavior, environmental factors, and productivity as they relate to the distribution and abundance of organisms. *Prerequisite: SIO 280.* Mr. Fager (W,S)

275C. 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. Fager (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)

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. Fleminger and staff (F)

281. Environmental Physiology and Biochemistry of Marine Organisms (3)

Emphasis on adaptation to environmental factors such as temperature, pressure, and salinity. *Prerequisites: adequate training in biology and physical sciences, and consent of 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. Mr. Scholander (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 microscopy, 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)

287. Marine Microbiology (2)

Ecology, biochemical activities, and methods of studying microorganisms in the sea. Emphasis will be on bacteria. *Prerequisite: consent of instructor.* Mr. Carlucci (W)

288A-288B. Ecology of Shore Microbes (3-3)

Field and laboratory investigations of the ecology, physiology, and metabolic activities of marine littoral microorganisms: algae, bacteria, fungi, and protozoans. Special methods of isolating and culturing selected organisms, individual research projects. *Prerequisites: preparation in biological sciences, including physiology or microbiology. Introductory courses in chemistry and biology of the sea are recommended.* Mr. Lewin (F,W)

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)

A seminar dealing with various topics in the biological sciences. 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:

Bennett M. Berger, Ph.D.

Aaron Cicourel, Ph.D. (*Chairman*)

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.

Bennetta Jules-Rosette, Ph.D.

Hugh B. Mehan, Ph.D.

Gail M. Omvedt, Ph.D.

Reyes Ramos, Ph.D.

Paul Wong, Ph.D.

Will H. Wright, Ph.D.

Acting Assistant Professors:

Bruce C. Johnson, M.A.

Anthony Ngubo, M.A.

* * *

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 also available 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 from 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, 115, 116, 117.
- B. Social organization and institutions: 110, 111, 112, 113, 114, 136, 143, 151.
- C. Social change and control: 105, 120, 121, 122, 123, 130, 131, 132, 135, 137A, 137B, 141, 142.
- D. Social bases of knowledge: 149, 152, 153, 156, 159, 181, 187.

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.

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

The Department of Sociology offers courses leading to degrees of C. Phil. and Ph.D. The program emphasizes the analysis of natural settings in studying social interaction and the comparative and cross-cultural study of social change.

Admission

Qualified and interested students may be admitted from a broad range of undergraduate preparations, including 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 3-4 years after entrance to the graduate program.

At the core of the program is a group of 6 one-quarter courses integrating theoretical materials with empirical studies and providing instruction in practical methods of conducting research. These courses will occupy approximately 2/3 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 advisor. 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; social change; medical sociology; 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 other work, each student will be evaluated by the department in a written statement of evaluation at the end of his or 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 will also 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 dissertation research will vary greatly, depending upon the specific problem chosen. Following approval of the proposed research, the student is to undertake the study in frequent communication and consultation with his or 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 dissertation, and conducted by his 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, concepts, 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 positions of religion, education, the mass media, and the arts; predicting future trends.

UPPER DIVISION

Prerequisite: 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 phenomena available. Demonstrations and projects focus on the productive and perspectival nature of language representation systems. *Prerequisite: Sociology 106.*

108. Sociology of Culture (4)

A study of the concept of culture, its origins, and its applications primarily to modern societies. Included will be discussions of the role in society of various symbolic systems, such as art, science, myths, history, language.

110. The Family (4)

An examination of the family as an institution in modern and premodern societies. We 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; 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 for coping as a minority in American society.

116. The Social Organization of Education (4)

The history and philosophy of education in America and other societies; the role of the educational institution in the socialization of the child.

117. Classroom Interaction (4)

This course is designed to develop the student's understanding of and competence in classroom conduct and organization by the application of sociolinguistic theory and the ethnography of communication in the classroom.

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, marijuana use and suicide will be considered.

122. Sociology of Law (4)

Functions of law in society; social source of legal change; social conditions affecting the administration of justice; role of social science in jurisprudence.

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 structures 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 sub-communities 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 19th and 20th 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.

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 also treat 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 19th 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 primarily concerned 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. 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.

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.

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.

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.*

187. Cinema of Dissent (4)

A study of the cinema as a method of dissent and as a medium for the analysis of race and class relationships. Included will be films which reveal and challenge accepted attitudes toward minority groups and social classes and describe lives and social relationships in Third World communities. Films will be shown, with discussion, and readings will be required.

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.

199. Independent Study (4)

Tutorial, individual guided reading and study in an area not covered by the present limited course offerings. *Prerequisite: upper-division standing or permission of department.*

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.)

209. Special Topics (4)

Devoted to specific topics, interest in which has jointly developed among a small group of students and an interested faculty member. Graduate students will be assigned an additional paper and/or examination of more complex design and material. (Satisfactory/Unsatisfactory grades permitted.)

212. Social Stratification (4)

The causes and effects of social rankings in various societies. Theories of stratification; the dynamics of informal social groupings; determinants of institutional power, and the nature of struggles for power; the distribution of wealth and its causes; the dynamics of social mobility; the effects of stratification on life styles, culture, and deviance. Graduate students will be assigned an additional research paper and/or examination of more complex material and design. (Satisfactory/Unsatisfactory grades permitted.)

215. Seminar in Political Sociology (4)

Research and readings in sociological analysis of political institutions. Readings on politics and stratification power structure. Political elites; conflict groups, participation. Student research in selected areas. (Satisfactory/Unsatisfactory grades permitted.)

223. Social Problems and Social Solutions (4)

This is a seminar concerned with the facts and theories about social problems and the possible solutions to those problems. (Satisfactory/Unsatisfactory grades permitted.)

224. Sociology of Deviant Behavior (4)

Introduction to the sociological study of conformity and deviance, with emphasis on processes of social control.

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, ethnomethodological 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. Recent Trends in Sociological Research (4)

Required of all graduate students during first term of residence; procedures for reading and evaluating journal articles and monographs in process of theory and hypothesis development in selected areas of current sociological research.

253. Recent Trends in Sociological Research (4)

A continuation of Soc. 252, with emphasis on data collection methods and current issues in sociological method through analysis of research studies and practice in research activity. (Satisfactory/Unsatisfactory grades permitted.)

254. Recent Trends in Sociological Research (4)

Continuation of 252 and 253. Required of all graduate students during first term of residence; procedures for reading and evaluating journal articles and monographs in process of theory and hypothesis development in selected areas of current sociological research. (Satisfactory/Unsatisfactory grades permitted.)

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. Practicum in Empirical Research I (3-6)

This course would accompany 252-253 and provide practical, supervised experiences in varieties of research methods, including participant-observation, field reports, survey research, questionnaire design, interviewing. (Satisfactory/Unsatisfactory grades permitted.)

257. Issues in Theory and Method (4)

An examination of major perspectives and methodological approaches in contemporary sociology: functionalism, symbolic interaction, ethnomethodology, casual inference and other perspectives examined as strategies for research. (Satisfactory/Unsatisfactory grades permitted.)

258. Practicum in Empirical Research II (4)

Continuation of Sociology 256 and 257, with emphasis on the development of an individual and complete piece of research by students. (Satisfactory/Unsatisfactory grades permitted.)

290. Graduate 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. (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.)

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

Suzanne Jacobs, Ed.M., *Supervisor of Subject A*

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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) or Communications 10 (for Third 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 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

* * *

The Program

The Teacher Education Program (TEP) 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 "complete" 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 3 years. The TEP plans to offer courses which satisfy the requirements for a "complete" credential in its Language and Education Summer Workshops.

The main theme of the TEP is multicultural 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 the skills necessary to move between different cultural systems if (s)he chooses to do so. The most current research in comparative cultures, comparative child development, and social interaction will provide the prospective teacher with insight into the cultural heritage and language systems of Afro-American, Asian American, Mexican American, and Native American peoples, and with information about the influence of different cultural systems on classroom interaction. The TEP is a campus-wide program physically located at Third College because of its commitment to minority education.

Curriculum

The State requires that the teacher in the elementary school be prepared to teach all the 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 Major. The Diversified Major 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 *Interdisciplinary 186 through 189*.) The candidate can take a total of three tutoring courses as long as (s)he tutors in a different subject area each time; these courses will be credited toward the Diversified Major. 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 16 quarter hours of courses which

deal with the sociology of education, mathematics/science methods, English methods, and reading methods. 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 will be engaged in a Field Methods Seminar (described below).

Student Selection

Students interested in applying to the TEP will be advised in the Spring of their sophomore year as to what courses they should take in their junior year, at which time the actual coursework for the TEP begins. Student performance in these courses will be a factor in program selection. Other criteria for admission to the program include:

- 1) academic excellence,
- 2) strong desire to teach children and to teach children to teach themselves,
- 3) strong desire to improve the quality of American education,
- 4) strong interest in multicultural approaches to education, and
- 5) community involvement

Prospective candidates for the TEP will be carefully reviewed by a diversified committee composed of faculty, staff, and students. Formal acceptance into the TEP will take place during the student's junior year, prior to student teaching.

COURSES

All of the following courses are required toward the "partial" elementary education credential. Students are advised to consult with TEP staff to determine how they can best fulfill the Diversified Major 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)

Sociology 117. Classroom Interaction (4)
The application of sociolinguistic theory — the ethnography of

communication to the classroom. *Prerequisite: Consent of instructor.* (W)

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.* (S)

TEP 190. Field Methods (4)

Training in social-science field techniques, sociolinguistic research techniques, and interactional analysis methods. *Prerequisite: affirmed teacher candidate.* (F)

TEP 310. Innovative Math and Science Teaching Methods (4)

An exploration of techniques for the effective teaching of mathematics and science in elementary grades. Emphasis will be placed on activity oriented, student-centered, problem-solving techniques for teaching logical relations, geometric functions, probability, number operations which are consistent with the cognitive development of the child. Inexpensive and practical methods and equipment will be demonstrated; "activity-inquiry" methods will be stressed. *Prerequisite: affirmed teacher candidate.*

TEP 315. Practicum in Student Teaching (12)

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)

THIRD WORLD STUDIES

OFFICE: Building 410, Matthews Campus

Professor:

Carlos Blanco-Aguinaga, Ph.D. (*Spanish Literature*,

Coordinator of Third World Studies)

Assistant Professors:

Joyce Justus, Ph.D. (*Anthropology*)

Ismith M. Khan, Ph.D. (*Caribbean and Comparative Literature*)

Arturo Madrid, Ph.D. (*Spanish Literature*)

Edward Reynolds, Ph.D. (*History*)

Benjamin K. Tsou, Ph.D. (*Linguistics*)

Paul Wong, Ph.D. (*Sociology*)

* * *

Roger F. Barriteau, M.A., *Lecturer in Philosophy*

Anthony Ngubo, M.A., *Lecturer in Sociology*

Rosaura Sanchez, M.A., *Acting Assistant Professor in Literature, Coordinator of Bilingual Sequence*

* * *

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 20th 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: *Departments 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*).

Also, Chicano Literature and Black U. S. Literature is offered (see *Literature*).

COURSES

LOWER DIVISION

1A. 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. (F)

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)

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)

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 both at 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. *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. *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 supra-national 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. *Prerequisite: upper-division standing.* (S)

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 discusses 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)

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 characteristics of the Chicano community by exerting a critical analysis of the societal context in which "La Raza" has sought to maintain and develop its culture. *Prerequisite: consent of instructor.*

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 borne of colonialism will be studied through the works of McKay, Selvon, Lamming, Naipaul, Harris, Salby, 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)

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 INTERDISCIPLINARY 186 THROUGH 189.)

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, M.A. (*Acting, History*)

Lecturers:

Earl B. Gilliam, Ll.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*

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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 urban and rural 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 of urban and rural affairs 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.

The department will offer courses in the following areas: Social Policy and Planning; Community Dynamics, Organization, and Development; Third World Perspectives in Urban and Rural Issues; Technology and Future Settlements; Social, Political, and Economic History of Urbanization; and Methodology.

Social Policy and Social Planning: This area deals with the study of social needs and alternative means for meeting them. It is concerned with the definition of social well-being, the development of options for the prevention and compensation of social inequities arising from the process of economic development, the allocation of resources to meet human needs and the evaluation of performance toward meeting those ends. It investigates means for achieving the optimum allocation of resources among social services to achieve complex social needs, evaluating the results of such allocations, the relationship between user and provider goals in the provision of services, and strategies of change toward achieving a more adequate fit between social service performance and user needs. Emphasis will be placed on the impact of alternative policy and programs on meeting the specific needs of Third World people.

Community Dynamics, Organization, and Development: A study of the effects of conflict of institutions, social mobility, individuation, anomie and ethnocentrism on community dynamics. The positive interaction between delivery systems and ethnocentrism is examined. Linkages or frames of reference for community organization and development are based upon those theoretical constructs which have been found applicable to the social sciences.

Third World Perspectives in Urban and Rural Studies: An examination of the political, social, and economic status of Third

World peoples in urban and rural areas, particularly within the United States. Areas such as social policy and its impact on Third World peoples, goals and alternative futures, and strategies for change will be studied from a Third World perspective.

Technology and Future Settlements: This area will examine the role of technology as a tool for societal change and adaptation; review of technological innovations and their effects on the structure of human settlements; understanding of technological change in relation to how it has impacted on people living in urban and rural areas, especially tracing its social impact on the forces that control technology. Included in the area would be an understanding of cybernetics, and social implications of the ways in which technological advances are implemented, and the use of technology as a planning tool.

Social, Political, and Economic History of Urbanization: This area focuses on the distribution of social costs and benefits of the urbanization-industrialization process, identifying, through comparative analysis, forces generating various forms of urbanization. It will examine the origins and results of alternative means for compensating those suffering consequences of social costs of development as well as means for preventing such costs. The contributions of historic, literary, economic, and social science analyses will form the primary intellectual base of this interdisciplinary area. Special emphasis will be placed upon the impact of urbanization on Third World people.

Methodology in Urban and Rural Studies: This area will cover the application of scientific and other methods to the analysis of social phenomena, and contribute to a general understanding of the ways in which methodological strategies themselves can be evaluated. Students will study the uses of observation, personal and official documents, measurement, laboratory techniques, surveys, organizational analysis, cross-cultural comparisons, and so forth. Statistical and computer applications, as well as problems of data collection and analysis, simulation, and model building, will be studied and evaluated as to their effectiveness in the resolution of human urban and rural problems.

Additional courses focusing more specifically on issues will be offered. For example, law (American criminal justice, and legal appraisal of American institutions), welfare, housing, transportation, education, health and mental health, employment, affluence (poverty, human resources, and social ecology).

Degree Requirements

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.*

Each student majoring in Urban and Rural Studies will be required to take URS 6A-6B-6C or 106 (for majors with upper-division standing) plus eleven additional upper-division courses in Urban and Rural Studies. This includes one required fieldwork course and one required Senior Fieldwork Seminar.**

All three courses in the 6A-6B-6C or 106 sequence are prerequisites for most upper-division courses in Urban and Rural Studies, therefore, the above sequence should be taken as soon

as possible. Credit will not be given for both 6C and 106.

Additional fieldwork courses may be taken upon petition to the department faculty, but no more than four fieldwork courses (URS 196) can be applied towards the eleven upper-division course requirements in Urban and Rural Studies.

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.

Majors are required to develop a minor in fields outside of Urban and Rural Studies consisting of at least four courses relevant to the main focus of the student's major program. These courses are to be selected by the student with the approval of his faculty adviser.

One course, for present purposes, means four units of credit.

- ° 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

6A-6B-6C. Introduction to Urban and Rural Studies (4-4-4)

An analysis of urbanization in an industrial society. Urbanization will be approached as a complex system of human interactions. Housing, health, social welfare, and alternative strategies for change will be major areas of concern in the course. Methodology for urban and rural studies will be presented. This course must be taken in sequence. (F,W,S)

UPPER DIVISION

101. 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.* (F)

102. Community Conflict and Change (4)

Investigates socio-economic and political phenomena bearing on man's continued coexistence with his environment and institutions. Topics examined include community dynamics, translating information into policy, translating policy into legislation, translating policy and information into programs, techniques for program analysis and evaluation. *Prerequisite: consent of instructor.* ()

103. 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. *Prerequisites: URS Senior majors or permission of instructor.*

106A-106B-106C. Analysis of Urban and Rural Studies (4-4-4)

Urbanization will be analyzed as a complex system of human interactions. Housing, health, social welfare and alternative strategies for change will be major areas of concern in the course. Methodology for urban and rural studies will be considered. Students taking URS 106 will not be given credit for URS 6C. *Prerequisites: 6A, 6B, and a major in Urban and Rural Studies.*

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.* (F,W,S)

119. Legal Research, Method and Communications (4)

A study of the historical, mechanistic, philosophical, "realism" and "social" engineering schools of American jurisprudence; the acquisition of a basic working knowledge of the key-note and Digest system, Shepardizing, legal encyclopedias and case services, the acquisition of legal communication skills. (S)

120. 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. (S)

121. 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.* (W)

122. 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. (F)

123. 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.* (F,W)

124. 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.

125. Systems Approach to Community Mental Health (4)

Systems theory is combined with concepts in preventive mental health as a tool for analyzing man-environment interfaces involving various culture groups, and environments affecting their lives. Comprehensive health, education, police-community relations are specimen areas of concern. *Prerequisites: URS 6A-6B-6C and consent of instructor.* (F)

131. 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.* (F)

132. 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. *Prerequisites: upper-division standing or permission of instructor.*

135. Introduction to Research Methods (4)

Introduction to methods of studying human phenomena in urban and rural settings. Lectures will give critical expositions of the uses of observation, personal/official documents, problem identification, hypothesis generation, sampling procedures, and research design. Familiarity with statistical techniques unnecessary. *Prerequisite: consent of instructor.* (W)

139. 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. *Prerequisites: upper-division standing or permission of instructor.*

140. 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. *Prerequisites: upper-division standing or permission of instructor.*

141. Social Policy and Social Planning (4)

Focus on defining social well-being, developing alternative means or strategies for the prevention and compensation of social inequities arising from the process of economic development, allocating resources to meet human needs and evaluating performances toward meeting those ends. *Prerequisites: URS 6 or 106 and consent of instructor.* (S)

142. Ethnic Perspective in Urban and Rural Studies (4)

Ethnicity is examined as it is conceived and used by Third World Peoples from the basis of individual or group identity which leads to social competence. Social roles are analyzed and illustrated with intra-ethnic materials. *Prerequisites: URS 6 or 106 and one other course in the social sciences.* (S)

143. Community Development and Organization (4)

Analyze effects of conflicts of institutions, social mobility, individuation, anomie, and ethnocentrism on community dynamics.

Examine positive interactions between delivery systems and ethnocentrism. Linkages or frames of reference built upon aspects of systems theory applicable to the social sciences. *Prerequisites: URS 6 or 106 and consent of instructor.* (W)

144. Social Impact of Urbanization (4)

Focus on distribution of social costs and benefits of the urbanization-industrialization process. Through comparative analysis, will identify forces generating various forms of urbanization, and evaluate human consequences of that process. *Prerequisites: URS 6 or 106 and consent of instructor.* (S)

145. The Planning Profession in the USA (4)

Analyzes the origins and development of urban and regional planning in the U.S.A., its changing societal function, its contemporary performance in the San Diego region, and strategies for its reform. *Prerequisite: upper-division standing or permission of instructor.* (S)

146. Technology and Future Settlements (4)

Examine the role of technology as a planning tool for societal change and adaptation, the effects of technological innovations on the structure of human settlements, and cybernation, or the implementation of technological advances in society. *Prerequisites: URS 6 or 106 and consent of instructor.* (S)

150. Political Change in the United States (4)

An analysis of the political structure of the present-day United States, and a review of proposed strategies for producing change in that structure. Particular attention will be given to the topic as it relates to Third World peoples within the United States. *Prerequisite: sophomore standing or higher.* (W)

160. 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.*

190. Senior Field Seminar (4)

Analysis of applied field experience supported by academic materials related to the subject area of the field work. This course requires preparation of a senior essay on a specified subject area and presentation of the report to the seminar group. *Prerequisites: senior standing and consent of instructor.* (S)

192. Senior Seminar in Community Affairs (4)

An attempt to understand institutional behaviors focusing on uncovering their roles in the complex ecological network that characterizes the community. Visits made to homegrounds of groups whose place in San Diego is significant in terms of community structure or function. *Prerequisites: URS 6A-6B-6C, senior standing, and consent of instructor.* (W)

196. 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 areas such 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. (F,W,S)

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. (F,W,S)

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.* (F,W,S)

VISUAL ARTS

OFFICE: Building 402, Matthews Campus

Professors:

David Antin, M.A.

Harold Cohen, Diploma of Fine Arts

Manny Farber

Associate Professor:

Newton Harrison, M.F.A. (*Chairman*)

Assistant Professors:

Jeffrey Raskin, M.S.

David T. Sanford, M.A.

Jehanne Teilhet, M.A.

Michel Todd, M.A.

Ellen Van Fleet, M.A.

Lecturers:

Doris Fienga, Ph.D.

Fred Lonidier, M.F.A.

Philip A. Steinmetz

* * *

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 available 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 esthetic productions, their information structure and significance. Consequently, a flexible introductory program of historically based courses, Visual Arts 13A-13B-13C, 14A-14B-14C-14D, 15A-15B-15C-15D, 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, are 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 the computer science for the arts, theatrical events, linguistic structures, etc. are provided. In this context, theoretical courses with a media orientation as in Film or Photography will also be offered.

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.

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 (including pre-sculpture and pre-painting)

Beginning Painting

Beginning Sculpture

Intermediate Painting or Intermediate Sculpture

Beginning Computer Programming or Photography

Six quarters of upper-division Art History

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 M.F.A. is a terminal degree in the Visual Arts. It consists of a two-year program aimed primarily at students who are already on their way to becoming artists and at certain students from other disciplines with specially relevant backgrounds who wish to participate productively in the reevaluation of art through criticism or art making. The program emphasizes the continual reevaluation of the meaning and nature of art making, stressing the strategies and roles of the artist in the art situation. It allows for the exploration of various genres and media, including painting, sculpture, photography,

event making, computer media and conceptual work; but no genre, however hallowed, is considered either inevitable or intrinsically necessary, and, consequently, techniques are stressed only to the degree that they are requisite to the accomplishment of a valued aim of a particular artist.

The Graduate Program

A two-year Master of Fine Arts program in studio work is offered in visual arts. Please contact the department directly for further information.

COURSES

LOWER DIVISION

6. Pre-Painting (4)

An elementary course in painting designed to prepare students for upper-division studio classes.

7. Pre-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.*

13C. The Art Course "Primitive Art History": Polynesian Art (4)

A critical analysis of what the arts of Polynesia can tell us about the Polynesian culture at the time of contact with Western culture. This course will cover Tonga, Samoa, Society Island, Marquesas, New Zealand, Hawaii and Easter Island. *Prerequisite: 13A.*

13D. The Art Course "Primitive Art History": Melanesian Art (4)

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: 13A.*

13E. The Art Course "Primitive Art History": Sociology of Primitive Art (4)

Analyzes theories on what the arts can tell us about a culture, e.g., why do people in pre-literate cultures, who live in rectangular houses, tend to emphasize rounded forms in their art? *Prerequisites: 13A and the consent of the instructor.*

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.

14C. The Art Course "Oriental Art History" (4)

An introduction to Japanese Art. This course covers the pre-historic period, and the Kamakura through Tokugana Periods.

14D. The Art Course "Oriental Art History": An Introduction to the art of India (4)

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.

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 15th Century Italy, covering architecture, sculpture and painting.

15C. The Art Course "European Art History": Baroque Art (4)

The architecture, sculpture, and painting of the 17th century, principally in Rome and its transalpine expansion.

21. 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.

50. Future of Architecture (4)

An examination of the factors influencing modern urban design and architecture leading to a speculative investigation of the future of the cities and of architecture generally.

54. Art/Customs of W. Africa (4)

A study of the traditional arts of West Africa. Oral tradition, music and dance will be emphasized as they relate to the art forms.

55. Art of Cloisonne (4)

Instruction will include the making of two cloisonne jewels and their settings, covering the sixth to the thirteenth century. Each will be an important example of the cloisonne jeweler's art and craft, selected also to teach certain aspects of cloisonne enameling in increasingly difficult wirework, coloring and goldsmithing.

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 a great deal, develop film and produce mainly slides to examine the individual image or image sequences. There will be a brief introduction to printing.

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.
- 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.
- 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.
- 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. *Prerequisite: 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 pre-literate 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 art styles which survived the transplant in the slave areas of the Americas. Emphasis will be placed in 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 us about the Polynesian culture at the time of contact with Western culture. This course will cover Tonga, Samoa, Society Island, 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 us about a culture, e.g., why do people in pre-literate cultures, who live in rectangular houses, tend to emphasize rounded forms in their art. *Prerequisite: 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 15th 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. *Prerequisite: 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, 15D 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.*

119. Meaning/Medieval Art (4)

An introductory course exploring the meaning of its art-making by interrelation of genres normally treated as distinct disciplines; architecture and manuscript illumination treated as forms of "concrete poetry"; architecture and sculpture treated in relation to medieval theatre; the whole against the background of philosophical and political propaganda.

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. *Prerequisite: Visual Arts 113A, 113B and consent of the instructor.*

130. Advanced Problems of Art Criticism (4)

A seminar for advanced students in art criticism and art history in relation to the problems set by the real phenomena of art production. *Prerequisite: Consent of the instructor.*

131. Semiotics (4)

A structural analysis of art as seen in the context of cultural communication.

132. 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.

133. Feeding and Feedback (4)

An examination in depth of the learning process, particularly in relation to the development of art attitudes in the individual.

134. Words and Pictures (4)

Ranging from the hieroglyphs in Egyptian bas-reliefs to the contemporary use of language in conceptual art, this course investigates the interaction of words and images. Book and manuscript illustration, scientific illustration, titles, labels and concrete poetry will also be discussed. *Prerequisite: two quarters of The Art Course.*

135. Drawing to Anti-Drawing (4)

An inquiry into the problem of alternative modes. Is "painting without drawing" a tenable concept, and, if not, what kind of activity may drawing become. A wide range of possibilities is examined, including various automatic and "accidental" modes. Satisfies Advanced Painting requirement. May be repeated for credit.

136. 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 movie 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 once for credit. *Prerequisite: Upper division standing and consent of the instructor.*

137. 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. May be repeated for credit three times.

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. *Prerequisites: 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.

148. Experimental Architecture (4)

A survey of contemporary structural materials and techniques, with particular stress upon the application of new materials to new forms. May be repeated for credit once.

155. Advanced Cloisonne (4)

Jewels and settings of 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 may begin to design and carry out their own motifs. May be repeated for credit once. *Prerequisite: consent of instructor.*

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 involved in refined control over different films, developers, papers, and other photographic materials. *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. *Prerequisite: Visual Arts 166A and Visual Arts 167A.*

170. Computer Media I (4)

Requiring no mathematical or scientific training, this is an introduction to programming in a higher-level language. Exercises dealing with specific problems of arts are emphasized.

171. Computer Media II (4)

Application techniques in the fine arts and humanities. *Prerequisite: Computer Media I (Visual Arts 170) or programming knowledge.*

172. Heuristics and Synergistics (4)

Using computers in an environment, emphasizing interactive programming and use of heuristics. A humanistic approach. *Prerequisite: Visual Arts/Comm 170 or APIS 10/11 or knowledge of programming.*

174. Drawing with Computers (4)

An intermediate course in graphic programming of a non-technical nature, intended primarily for work in the arts. *Prerequisite: Visual Arts 170 and 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.

188. Hard Look at the Movies (4)

Using a choice of films that show an admitted bias towards the spare films of movie history, the course involves a rigorous attention to what actually comes off the screen. May be repeated once for credit.

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.

190. 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 twice for credit. *Prerequisite: consent of the instructor.*

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 Contemporary Art (4)

A seminar dealing with the problems in the twentieth century art — including painting, sculpture and art criticism. May be repeated once for credit.

193. Seminar in Art Historical Methods and Research (4)

A seminar dealing in the methods of art historical research in relation to special art-history problems, requiring a paper as the final examination showing how well the student can develop independent art historical themes. May be repeated once for credit. *Prerequisite: consent of the instructor.*

194. Advanced Film Seminar (4)

This seminar is designed to deal with a wide variety of practical aspects of the film, including direction, script writing, criticism and photography.

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 idiosyncrasy 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.

209. Materials (4)

The exploration of a wide range of materials, both traditional and new. Purpose of the course is to give a broad understanding of problems relating to the application of materials to specific aesthetic issues, and to provide students with a technique for dealing with an ever-growing mass of new materials and possibilities. May be repeated for credit.

213A. Primitive Art History: "Primitive Arts" (4)

A rigorous 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.

213B. 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 in the transplant in the slave areas of the Americas. Emphasis will be placed in those West African tribes who were captured into Slavery. *Prerequisite: 213A.*

213C. Primitive Art History: "Polynesian Art" (4)

This course serves as a critical analysis of what the arts of Polynesia can tell us about the Polynesian culture at the time of contact with Western culture. This course will cover Tonga, Samoa, Society Island, Marquesas, New Zealand, Hawaii and Easter Island. *Prerequisite: 213A.*

213D. Primitive Art History: "Melanesian Art" (4)

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: 213A.*

213E. Primitive Art History: "Sociology of Primitive Art" (4)

An advanced course which will analyze theories on what the arts can tell us about a culture, e.g., why do people in pre-literate cultures, who live in rectangular houses, tend to emphasize rounded forms in their art. *Prerequisites: 213A and the consent of the instructor.*

214A. History of Oriental Art (4)

Far Eastern and Southeast Asian Art, especially Buddhist.

214B. History of Oriental Art (4)

Chinese.

214C. History of Oriental Art (4)

Japanese.

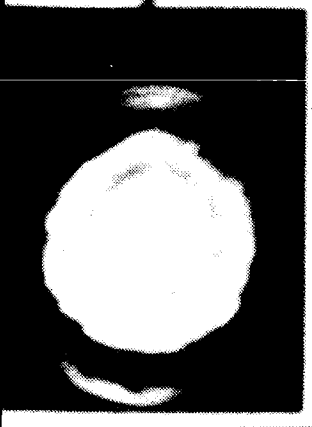
214D. History of Oriental Art (4)

Indian.

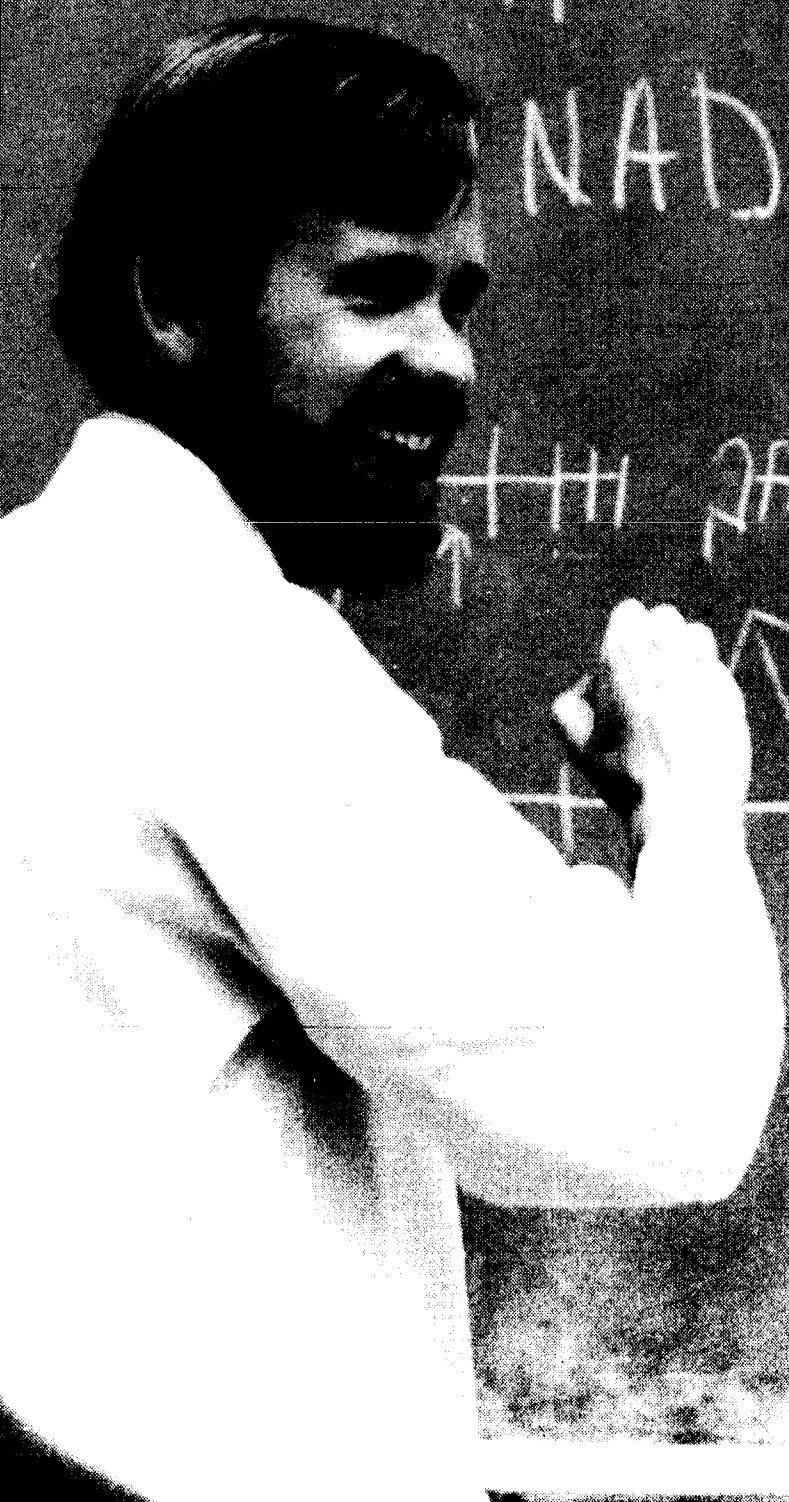
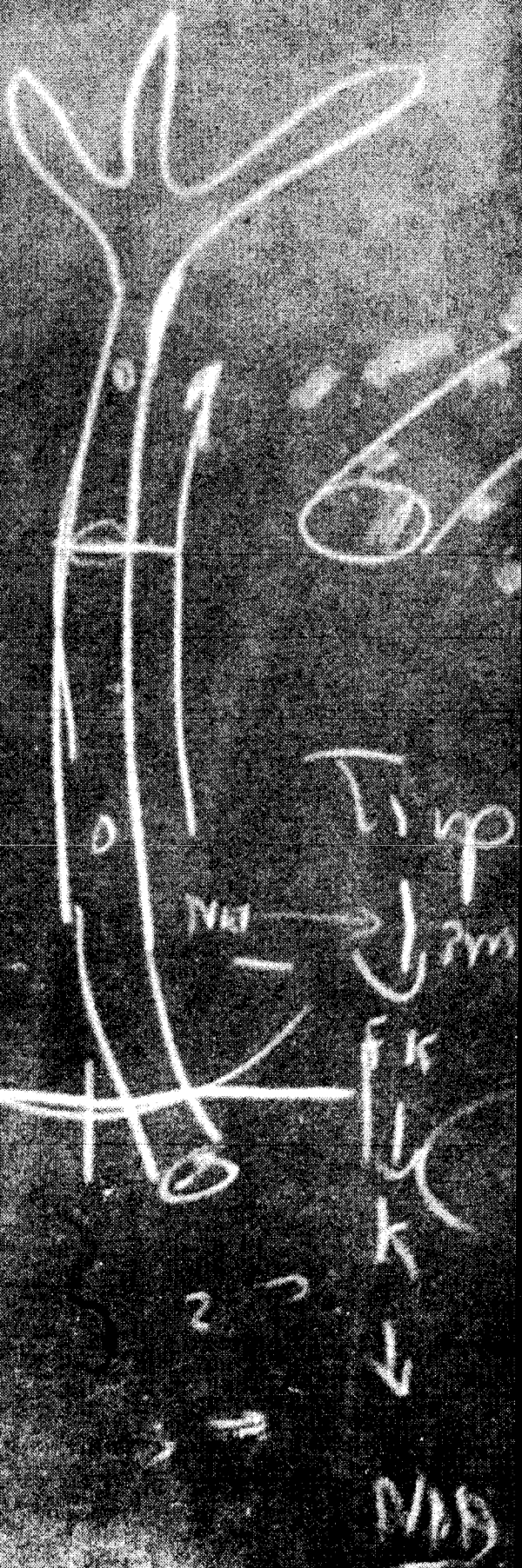
215A. European Art History: "Ancient" (4)

The architecture, sculpture, and painting of ancient Greece,

- Etruria, and Rome from the Geometric Period in Greece to the rule of Constantine in Rome.
- 215B. European Art History: "Renaissance in Fifteenth-Century Italy" (4)**
Fifteenth-century architecture, sculpture, and painting in Italy.
- 215C. European Art History: "Baroque Art" (4)**
The architecture, sculpture and painting of the seventeenth century principally in Rome and its transalpine expansion.
- 215D. 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.
- 215E. European Art History: "Seventeenth-Century Flemish and Dutch Art" (4)**
A study of the works of Rubens and Rembrandt and the historical and cultural context within which they were produced.
- 217. Eighteenth-Century Art History (4)**
A seminar dealing with the painting, sculpture and architecture of the Eighteenth-Century in Europe and America.
- 219. Meaning/Medieval Art (4)**
A course exploring the meaning of its art-making by interrelation of genres normally treated as distinct disciplines: architecture and sculpture treated in relation to medieval theater; the whole against the background of philosophical and political propaganda.
- 220. Contemporary Art History (4)**
A seminar dealing with the problems in the twentieth century, including painting, sculpture and art criticism. Special attention will be given to graduate students who will do specifically advanced, individual projects.
- 225. Advanced Indian Art (4)**
An advanced graduate level course in the study of Hindu art (mainly sculpture and architecture) and iconography — an examination of Hindu concepts (religious and philosophical) and mythological reflections in the visual arts. *Prerequisite: 214D.*
- 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.
- 231. Semiotics (4)**
A structural analysis of art as seen in the context of cultural communication.
- 232. Tactics and Strategies (4)**
A workshop-laboratory class involving a game-theory approach to the making of art in which attempts will be made to define a domain of interaction between a variety of possible players, the simplest of which is a two-person game involving art-audience.
- 234. Words and Pictures (4)**
A course ranging from the hieroglyphs in Egyptian bas-reliefs 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 problem 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. This course 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.
- 245A. 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.
- 245B. Representational Painting (4)**
A continuation of 245A.
- 248. Experimental Architecture (4)**
A survey of contemporary structural materials and techniques, with particular stress upon the application of new materials to new forms.
- 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.
- 272. Computer Animation (4)**
Animation has been a tedious process until recently. A computer, interposed between the film-maker and the camera — instead of a living chain of animators — can both speed the process and bring immediacy to the production. Each student will produce at least two animated films during the course. *Prerequisites: computer programming ability and elementary photographic knowledge.*
- 288. Advanced Problems in Film (4)**
A film course dealing with all aspects of film criticism and film writing, stressing individual problems.
- 290. Graduate Seminar (3)**
A course in art theory and practice in which graduate students relate their own work to one of the several traditions in present art or develop their rationales for rejecting these traditions and developing differently.
- 294. Graduate Film Seminar (4)**
Designed to deal with a wide variety of practical aspects of the film, including direction, script writing, criticism and photography.
- 295. Individual Studies for Graduate Students (1-12)**
Individual research for graduate students in preparation for their comprehensive exhibition for the 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 the present time 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.
- 500. Apprentice Teaching (1-3)**
Apprentice teaching in undergraduate courses given or participated in by the Visual Arts Department.



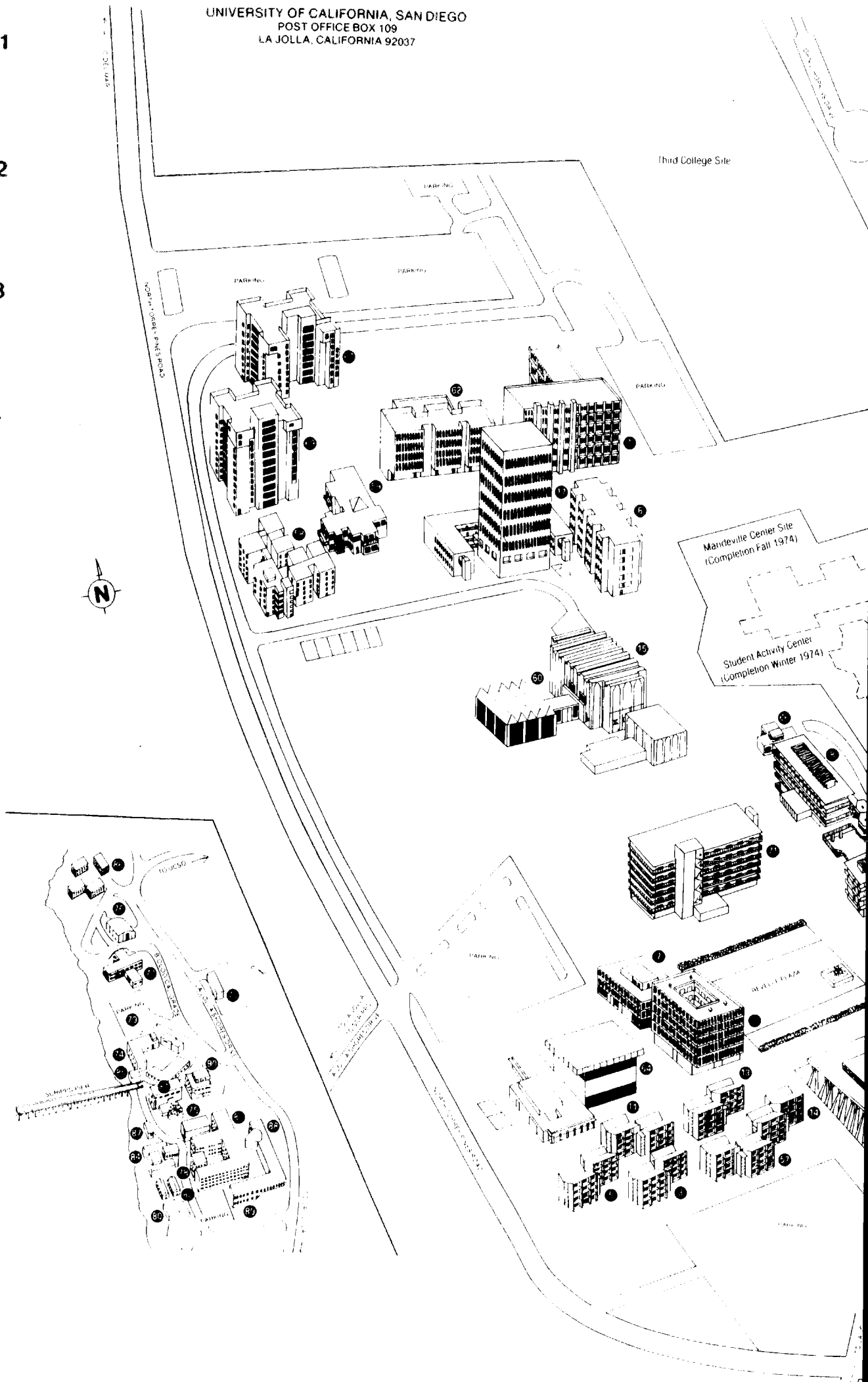
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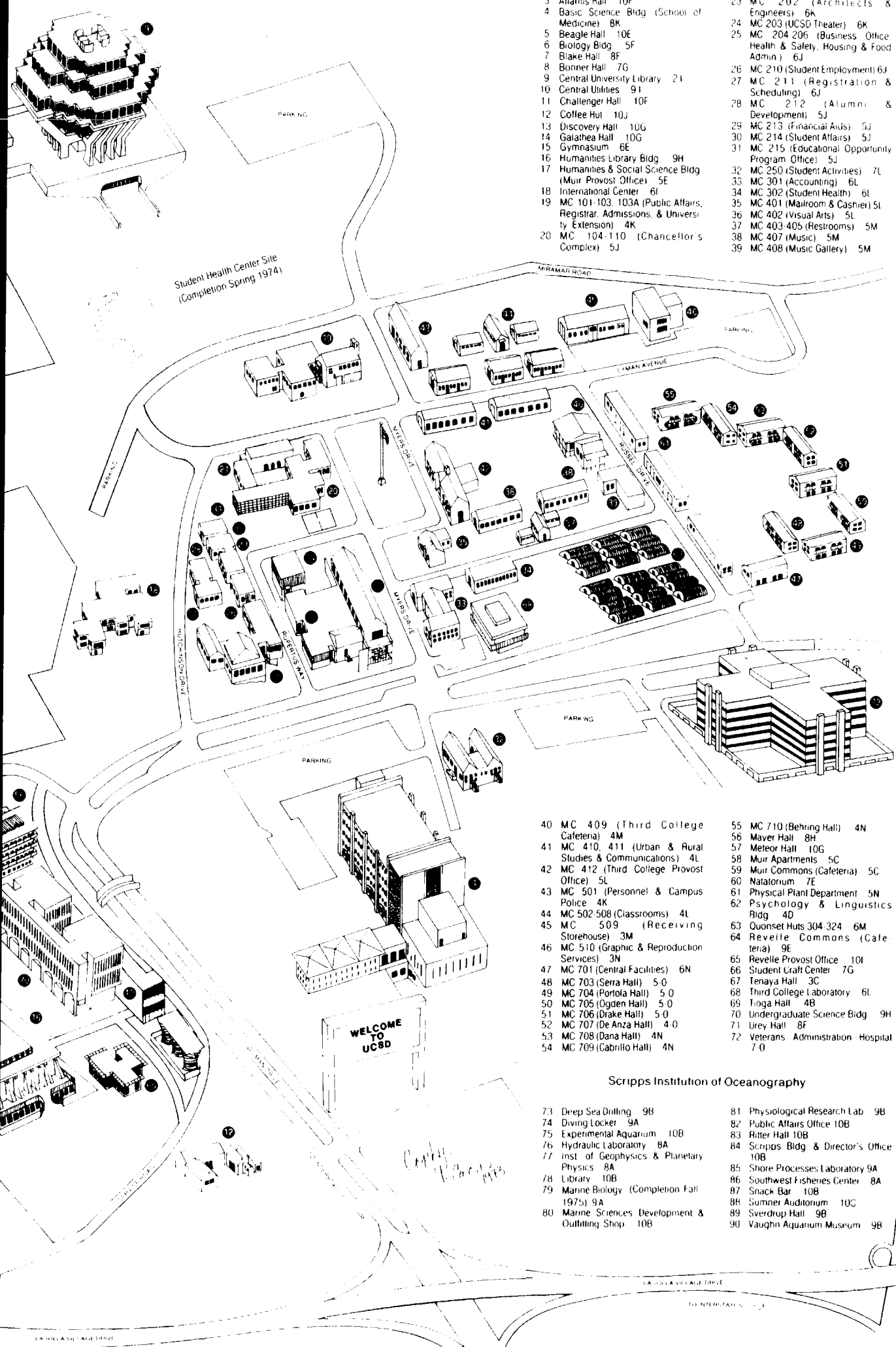


A B C D E F G

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POST OFFICE BOX 109
LA JOLLA, CALIFORNIA 92037

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- 1 Applied Physics & Mathematics Bldg 4C
- 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 2I
- 10 Central Utilities 9I
- 11 Challenger Hall 10F
- 12 Coffee Hut 10J
- 13 Discovery Hall 10G
- 14 Galathea Hall 10G
- 15 Gymnasium 6E
- 16 Humanities Library Bldg 9H
- 17 Humanities & Social Science Bldg (Muir Provost Office) 5E
- 18 International Center 6I
- 19 MC 101-103, 103A (Public Affairs, Registrar, Admissions, & University Extension) 4K
- 20 MC 104-110 (Chancellor's Complex) 5J
- 21 MC 111-112 (Conference Room A & Planning Office) 5J
- 22 MC 201 (Bookstore) 6K
- 23 MC 202 (Architects & Engineers) 6K
- 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) 5I
- 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 Reveille Commons (Cafeteria) 9E
- 65 Reveille Provost Office 10I
- 66 Student Craft Center 7G
- 67 Tenaya Hall 3C
- 68 Third College Laboratory 6L
- 69 Trioga Hall 4B
- 70 Undergraduate Science Bldg 9H
- 71 Urey Hall 8F
- 72 Veterans Administration Hospital 7-0

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 Vaughn Aquarium Museum 9B

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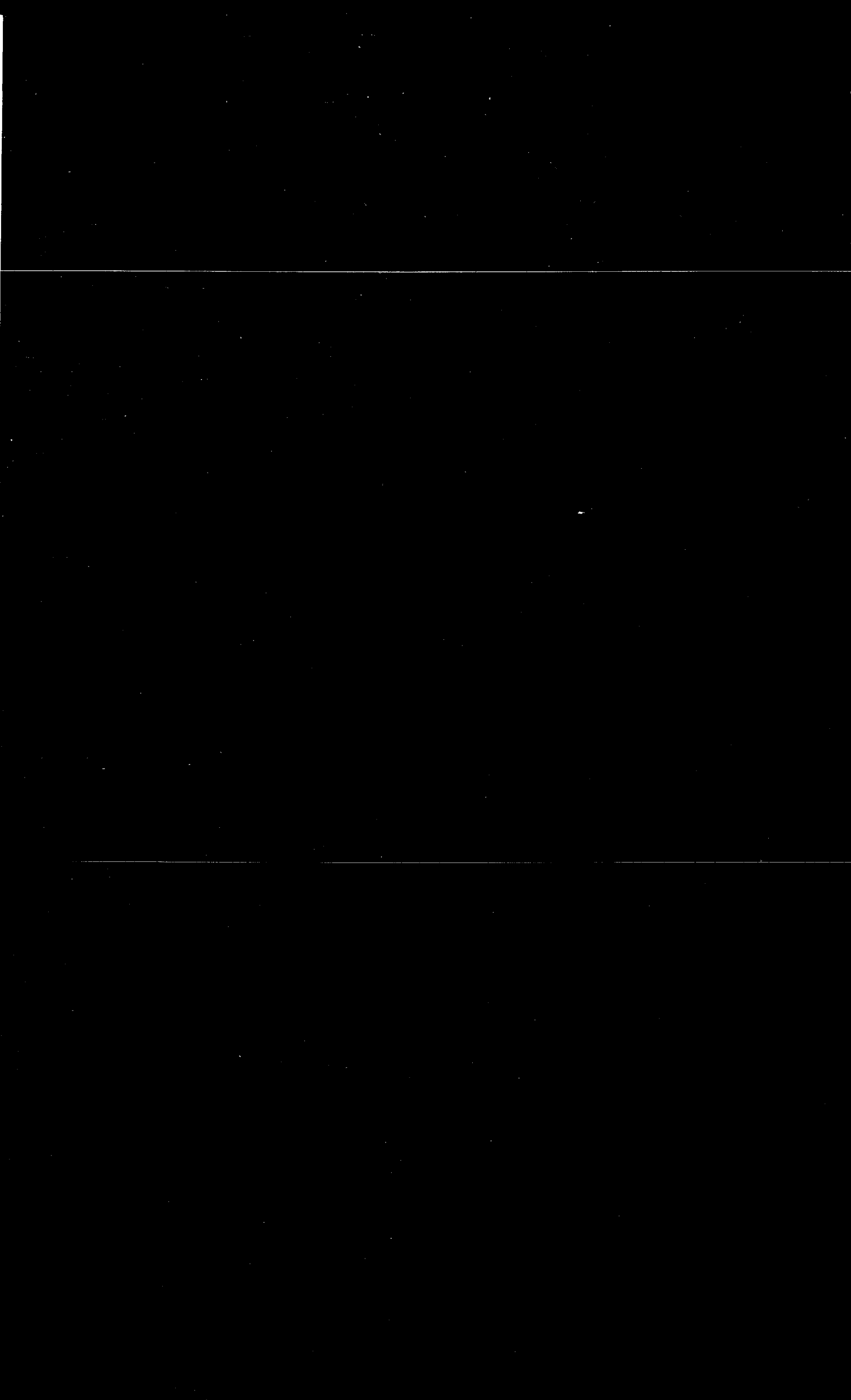
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HISTORY

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 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 first undergraduates, offering a basic lower-division curriculum to prepare students for majors in the humanities, social sciences, biological sciences, physical sciences and mathematics.

Occupying more than 1200 acres, the 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 Pacific 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. Three colleges—Revelle, John Muir and The Third College—presently are in operation, and Fourth College is scheduled to open in the Fall of 1974.

UCSD Facts and Figures (as of May 1, 1973)

On-campus student enrollment (Spring Quarter)	
Undergraduate	4991
Graduate	942
Medical School (excluding 318 hospital residents and interns)	209
	Total
	6142
On-campus faculty members	479
Fellows, National Academy of Sciences	37
Fellows, American Academy of Arts and Sciences	35
Nobel Prize Laureates	3
Total land area—UCSD	
Main campus	1232 acres
Outlying areas	652 acres
	Total
	1884
Books in Library collection (March 31)	961,193
University Extension enrollment (Spring Quarter)	7688

UCSD is accredited by The Western Association of Schools and Colleges.

UCSD

University of California, San Diego
P. O. Box 109
La Jolla, CA 92037

SECOND CLASS

POSTAGE

PAID

LA JOLLA, CA

**University of California,
San Diego**

General Catalogs,

1973/1974